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Abstract

The financial media plays a critical role in financial markets as an information intermediary between information sources and information users. This chapter reviews the literature on the role of the media for financial decision-making, using a broad definition of media based on three key functions: 1) facilitating access to information, 2) filtering information, and 3) creating new information. Though these functions span a diverse set of organizations including search platforms, social media, and traditional print media, a common theme emerges from the literature: the media improves financial-decision making, on average. Markets are more efficient, investors earn higher returns, and firms have lower costs. We also discuss the negative effects of media, including herding and overreaction, as well as suggest future avenues of research.

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The Role of Media in Financial Decision-Making

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ABSTRACT

The financial media plays a critical role in financial markets as an information intermediary between information sources and information users. This chapter reviews the literature on the role of the media for financial decision-making, using a broad definition of media based on three key functions: 1) facilitating access to information, 2) filtering information, and 3) creating new information. Though these functions span a diverse set of organizations including search platforms, social media, and traditional print media, a common theme emerges from the literature: the media improves financial decision-making, on average. Markets are more efficient, investors earn higher returns, and firms have lower costs. We also discuss the negative effects of media, including herding and overreaction, as well as suggest future avenues of research.

Keywords: media, information propagation, information selection, information creation, market efficiency

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1. Introduction

Information is a crucial component of decision-making: one needs to know the available options, their consequences and risks for making decisions. At its simplest level, information has sources and users. Information sources for financial decisions include corporate filings, historical market outcomes, interviews with executives, analyst reports, academic research papers, and direct observation, among many others. Users include anyone who makes financial decisions, including retail investors, small business owners, mutual fund managers, corporate executives, and municipal financial managers.

However, there is a third important agent in the setting. With the exception of first-hand experience or personal communication, nearly all information received by a user is sent through an external process. This process is what we define as media. The media is the intermediary between the information source and the user. One of the key findings in this chapter is that beyond the content of the information, the media itself influences how financial decisions are made.

To organize our discussion of the media's influence on financial decision-making, we identify three activities of media: 1) the propagation of unedited information, 2) the selection of existing information for publication, and 3) the creation of new information. Though these activities are not entirely distinct from each other, and we rarely find evidence that completely isolates the influence of one activity from the others, this framework helps decompose the multiple ways in which media influences decision-making.

This broad definition of the media as an information intermediary includes traditional media outlets, such as newspapers and television, as well as search platforms, such as Bloomberg terminals, which allow users to access original information. It also includes social networking websites that connect numerous information creators with information consumers. Though there are a wide range of media organizations, we show that they all fit into one or more of the three activities of the media that we use to organize the article. By using this conceptual approach, we hope to provide a framework to understand prior research and to point to future research directions.

The study of media in finance is relatively new, but there exist a few other surveys. Tetlock (2014, 2015) focus on causality and theoretical frameworks, Loughran and McDonald (2016) and Marty, Vanstone, and Hahn (2020) on textual analysis, and Bukovina (2016) on social media. What distinguishes our survey is that it is organized, not around methodologies or research design, but around the three major roles played by the media.

Before proceeding, we offer two observations about research on the role of the media in finance. The first is that there is little theoretical work that focuses specifically on the financial media. Most theoretical insights are drawn from broader theories—typically, either rational theories of the demand for and supply of financial information, or behavioral theories.

The second observation is that empirically identifying the causal impact of the media on financial decisions is challenging. Omitted factors may drive both media choices and market outcomes. Alternatively, reverse causation may lead the media to cover news because it caused a strong reaction in the market. Throughout this review, we are careful to use appropriate language for studies that provide correlational evidence compared to studies that provide causal evidence.

Finally, we must acknowledge that this review is necessarily limited in scope and omits important topics and papers. In particular, this review does not cover the role of media for household financial decision-making. Instead, following the majority of the literature, we focus on the role of media in stock markets and for corporate decisions.

Section 2 proposes a conceptual framework for analysing the functions of the financial media. Sections 3, 4 and 5 review the literature covering each function: respectively, propagating, editing, and creating news.

2. Theoretical Framework

We present a simple model to help organise our review. It focuses on the financial media as a purveyor of unbiased information, which we view as its primary function. Thus, the model leaves out any agency problem the media might face, as well as its role as entertainer.

2.1. Setup

The model features three periods ($t = 0, 1, 2$), $N + 1$ projects, and I investors who finance those projects. The financial media supplies information about the projects to the investors.

Projects. Project n ($n = 0, 1, \ldots, N$) yields output $\tilde{y}_n$ in period 2 (net of capital depreciation) where $\tilde{y}_n \equiv \tilde{v}_n k_n$, k_n is the amount of capital invested in the project in period 1, and $\tilde{v}_n$ is its productivity. Project 0 is safe and has known productivity, $\tilde{v}_0 = r$. All other projects are risky: a project succeeds (fails) with a 0.5 probability, in which case, its productivity is $\tilde{v}_n = 1$ ($\tilde{v}_n = 0$). Productivity is i.i.d. across projects.

Investors. There are I identical risk-neutral investors. Each is endowed with K units of capital which she allocates across projects in period 1, with the objective of maximising expected period-2 aggregate output, $Y \equiv E(\sum_{n=0}^{N} \tilde{y}_n)$. While, in our model, there is no explicit stock market, the investor can be interpreted as an equityholder and projects as stocks.

Information. In period 0, an investor can evaluate project n, i.e., acquire a noisy signal, s_n, about its productivity, where $s_n = \{1\}$ or $\{0\}$. The signal is correct with probability q and incorrect with probability $1 - q$, where $q \in [1/2,1]$ is exogenous, i.e., $P[\tilde{v}_n = 1|s_n = 1] = P[\tilde{v}_n = 0|s_n = 0] = q$. The higher q the more informative the signal, with $q = 1/2$ corresponding to an uninformative signal and $q = 1$ to a perfect signal. Conditional on a signal of success (failure), a project's productivity equals 1 (0) with

probability q and 0 (1) with probability $1-q$.[2] Hence, expected productivity equals $E(\tilde{v}_n|s_n=1)=q$ and $E(\tilde{v}_n|s_n=0)=1-q$.

The signal is generated by combining two separate inputs. The first is data, which represents raw facts and figures such as a corporate filling or trading data. To be of any use, data must be analysed. Accordingly, the second input into a signal consists of analysis. We denote d the cost of retrieving data about a project, and a the cost of analysing them. We interpret the data cost as the physical resources needed to gather data, and the analysis cost as capturing people's limited attention/ finite cognitive abilities.

Parameters. To facilitate exposition, we impose two sets of conditions on parameter values. First, projects deemed successful (unsuccessful) are more (less) productive than the safe project, i.e., $q > r > 1-q$ (C1). Second, investors find it in their interest to evaluate all N projects.[3]

We start by determining the capital allocation and expected output given investors' signals. Then, we compare the surplus under different arrangements for supplying those signals, corresponding to functions of the media, namely i) distributing data, ii) selecting projects and iii) creating novel information.

2.2. Capital allocation

In period 1, an investor maximizes expected output conditional on productivity signals, $\sum_{n=0}^{N} E(\tilde{v}_n|s_n)k_n$, subject to her budget constraint $\sum_{n=0}^{N} k_n \leq K$ and to non-negativity constraints $k_n \geq 0$. Under condition (C1), she allocates all her capital to projects deemed successful; if there are no such

[2] For instance, the probability of success conditional on a success signal equals $0.5q/(0.5q + 0.5(1-q) = q$ using Bayes law. Expected productivity conditional on a success signal, $E(\tilde{v}_n|s_n=1)$, equals $q \times 1 + (1-q) \times 0 = q$.

[3] Intuitively, this requires the capital stock K or the signal precision q to be large, or the number of projects N, the safe productivity r or the signal cost $a+d$ to be low. The specific condition is: $K(q-r)\ln(2) \geq (a+d)2^N$.

projects, she invests entirely in the safe project.[4] The expected aggregate output, conditional on signals, equals qK in the former case, and rK in the latter.

The probability that all projects are deemed failures equals $(1/2)^N$. Therefore, the period-0 expected output (or expected output henceforth) equals $Y = \left(1 - \left(\frac{1}{2}\right)^N\right) qK + \left(\frac{1}{2}\right)^N rK = Kq - K\left(\frac{1}{2}\right)^N (q - r)$. The first term—the product of the capital stock with the signal precision—represents expected output if at least one project is deemed successful. Intuitively, a larger K allows to produce on a larger scale, and a larger q to allocate capital more efficiently across the projects. Both complement each other in that the marginal product of capital rises in the quality of its allocation. The second term, which drops rapidly as the number of projects rises, represents the expected shortfall in case all projects are deemed failures.

2.3. Functions of the media

We turn to the source of investors' signals. We consider different arrangements for supplying those signals. In particular, we examine three media companies that produce and distribute signals, each representing a function of the media. We compare the social surplus generated in each case. The social surplus is defined as the sum of expected output minus the cost of producing and analysing signals. The model is agnostic about how that surplus is shared between investors and the media company, but its implications do not depend on the sharing rule.

2.3.1. Benchmark: No media

[4] Under linear technologies and utility, investors are indifferent to how they allocate their capital across projects deemed successful. A small degree of risk aversion or decreasing return to capital would break this indifference and lead them to distribute capital evenly across projects deemed successful.

As a benchmark, we consider the case in in which there is no media outlet, so investors gather their own signals. They each pay $d + a$ per project. The surplus equals

$$S_0 = I(Y - Na - Nd).$$

We consider next three different media outlets.

2.3.2. Propagation of Information: Media as Distributor

The most basic function of the media is to provide raw data. Accordingly, our first arrangement is one in which the media company retrieves data for all projects and makes *all* those data available. The cost of setting up the repository is D. The surplus equals

$$S_1 = I(Y - Na) - Nd - D.$$

The data repository is useful because it avoids duplicating across investors and assets the data retrieval costs. The surplus difference relative to no media is $S_1 - S_0 = (I - 1)Nd - D$. This difference is positive provided the savings on data retrievals ($(I - 1)Nd \approx INd$ for a large population of investors) exceed the repository's set-up cost (D). With a fixed set-up cost, the social gain grows in the number of investors and projects.

2.3.3. Selection of Information: Media as Editor

We turn to an arrangement whereby a media outlet tells investors which projects to pay attention to. Specifically, it reveals the list of projects deemed successful, together with the associated data. This arrangement represents traditional outlets such as *The Wall Street Journal* (*WSJ*) or *CNBC*, which cover selected stories only. To make use of this information, the investor must analyse the data for the selected projects—she expects $N/2$ such projects. The cost of setting up the outlet is E. The surplus equals

$$S_2 = IY - \left(\frac{I}{2} + 1\right)Na - Nd - E.$$

In this expression, the analysis cost is paid for all N projects by the media outlet and for only half by each investor; the data retrieval costs are borne solely by the media outlet. Thus, the media outlet allows investors to restrict their analysis to the selected projects, thereby cutting analysis costs by a half. The surplus difference relative to the data repository is $S_2 - S_1 = (I/2 - 1)Na - (E - D)$. It is positive if the savings on analysis costs, $(I/2 - 1)Na$, exceed the difference in setup costs between the two media functions, $E - D$.

2.3.4. Creation of New Information: Media as Creator

We assumed so far that the media outlet has no technological advantage in producing information. Now we relax this assumption by considering a media outlet that unearths original information, i.e., information that investors cannot uncover alone. This includes the interpretation, contextualisation and discovery of news about projects' fundamentals (e.g., stock recommendations or investigative journalism) as well as information about investors (e.g., their sentiment vis-à-vis a stock). We model this function of the media by assuming that the signals it produces are both more precise than those available to investors and more costly. Specifically, the media outlet's signal is correct with probability $q' > q$, leading to an expected output $Y' = Kq' - K\left(\frac{1}{2}\right)^N (q' - r) > Y$. Its analysis cost rises to $a' > a$, while the data retrieval and setup costs are unchanged at d and E. Therefore, the surplus equals

$$S_3 = IY' - N\left(\frac{Ia}{2} + a'\right) - Nd - E.$$

The surplus difference relative to news editing equals $S_3 - S_2 = I(Y' - Y) - N(a' - a) = I\left(1 - \left(\frac{1}{2}\right)^N\right)K(q' - q)) - N(a' - a)$. Here the gain lies, not in cost savings as with previous functions, but in the improved accuracy of the media, which allows each investor to allocate capital more efficiently.

If the output gain, $I(Y' - Y)$, surpasses the extra analysis cost, $N(a' - a)$, then the surplus with a news creator is larger than with a news editor.

2.3.5. Comparative statics

For all three functions of the media, the surplus it generates scales with the size of the investor population, I. That's because each investor saves on data retrieval and analysis and allocates capital more efficiently. Hence media outlets with a broader audience have larger social value.

In the case of news propagation and selection, the social gain increases (linearly) in the number of projects N as well as in the costs of data retrieval and analysis, d and a. Intuitively, each additional project needs to go through a costly evaluation. This implies that the media is more valuable in economies with more investment opportunities, and for more complex firms, i.e., firms with more data and data that are more difficult to analyse.

In the case of news creation, the surplus generated by the media is increasing in the size of the capital stock, K, because the superior information can be applied on a larger investment scale. Thus, the media adds more value to larger stocks.

3. Propagation of Information: Media as Distributor

The most basic function of the media is to facilitate consumers' access to (existing) information by reducing data retrieval costs (what we called d in the model of Section 2). These media organizations do not create any information and make little or no editorial decisions. Rather, they either actively disseminate information or provide a platform for users to access the stored information themselves, thus serving as an information intermediary. We consider three major types of media of this sort: 1) search platforms for information repositories, 2) internet-based discussion boards and social media websites, and 3) newswires.

3.1. Search Platforms

Information is critical to good financial decision-making. As the amount of data about firms multiplies, search platforms that allow users to quickly filter information stored in a repository grow more valuable. Prior literature has considered two different search platforms used by financial decision-makers: Bloomberg terminals and the SEC's EDGAR system.

3.1.1. For-Profit Search Platforms

Bloomberg terminals provide real-time access to market data for Wall Street firms and are the leading search portal for financial information used by professionals. Ben-Rephael, Da, and Israelsen (2017) show that the most common users of Bloomberg are portfolio managers, analysts and traders. Analyzing search behaviors, they find that institutional investors respond more quickly to news than do retail traders. Moreover, Bloomberg search volume is correlated with permanent price changes following earnings announcements and analysts' recommendations changes. These results indicate that market efficiency is positively correlated with search activity of finance professionals.

Thomson Reuters is another large information intermediary. It publishes both earnings information on its First Call service, as well as analyst forecasts on its Institutional Brokerage Estimate System (I/B/E/S) system. Schaub (2018) shows that abnormal returns and volume are lower on earnings announcement dates if they are entered into the First Call system with a delay, but larger on the entry date for delayed publications, suggesting that First Call increases the market efficiency. Similarly, Akbas et al. (2018) find that forecasts with larger abnormal delays on IBES are related to slower price discovery, especially for small stocks with less analyst coverage.

3.1.2. EDGAR Search Platform.

Another large repository of information relevant for financial decision-makers is the SEC's online repository, which is accessed through the Electronic Data Gathering, Analysis, and Retrieval system

(EDGAR). It offers free access and contains all electronic filings of disclosures mandated by the SEC. Thus, like the Bloomberg search platform, EDGAR serves as an information intermediary with no editorial role.

Researchers exploit EDGAR's server logs to understand whether search activities influence market outcomes. To separate human search activity from automated web scraping performed by robots, they typically design algorithms based on the volume and speed of download requests that originate from a particular IP address.

Using a relatively loose filter for robot searches, Drake, Roulstone, and Thornock (2015) show that the type of information requested is heavily skewed toward annual reports, representing 21% of all requests. Requests are more common when firms have negative abnormal returns and for larger firms with more analysts and media coverage. Using a more restrictive algorithm, Loughran and McDonald (2017) document that the median CRSP firm has only 1.68 per searches per day for its 10-K during the first quarter after the filing. They also show that annual reports requests are spread out over the year following its filing, compared to requests for IPO filings, which are concentrated in time. Using a range of algorithms, Li, Wang, Yan, and Zhao (2019) show that the number of non-robot EDGAR searches is negatively related to earning surprise and post-announcement drift.

Though this line of research shows that stock market outcomes are correlated with EDGAR searches, they cannot establish any causal role because omitted variables may affect both searches and outcomes. To address this problem, researchers exploit the staggered implementation of EDGAR. When the SEC introduced EDGAR, it randomly assigned firms into ten groups with staggered dates for mandated electronic filing over 1993-1996, thereby creating exogenous variation in a firm's exposure to EDGAR. Researchers have shown that thanks to EDGAR 1) trades by individual investors are more informative about future returns, and sell-side analyst forecasts are more accurate (Gao and Huang, 2020); 2) the cost of capital decreases and equity financing increases (Goldstein, Yang, and Zuo, 2022); 3) investments are less sensitive to stock prices (Bird, Karolyi, Ruchti, and Truong, 2021); and 4) the dispersion in analysts' earnings forecasts, short interest, trading volume around earnings announcements,

and stock price crash risk decrease (Chang, Hsiao, Ljungqvist, and Tseng, 2022). Overall, these studies show that greater access to information through EDGAR improves market efficiency.

To identify EDGAR users, researchers match the IP addresses of users on EDGAR server logs to data on the ownership of IP addresses. Gibbons, Iliev, and Kalodimos (2021) finds that analysts rely on EDGAR in 24% of their updates and that EDGAR searches are related to lower forecast errors. Crane, Crotty, and Umar (2022) show that hedge funds that make more requests on EDGAR earn higher returns, especially those that request information quickly or in larger volumes.

In summary, research provides a consistent result: greater information acquisition, enabled by EDGAR and Bloomberg search platforms, leads to better financial decisions. Thus, through its most basic function of providing access to information, media contributes to improving decision making.

Looking forward, firms that release information are beginning to recognize the importance of automated text processing. Since, as discussed above, much of the search volume on EDGAR is performed by robots, firms alter the language they use in their filings to be more easily processed through artificial intelligence algorithms (Cao, Jiang, Yang, and Zhang, 2022). For example, firms avoid words perceived as negative by computational algorithms, but not by humans.

3.2. Social Media

The advent of social media on the internet presents a new form of information intermediation. Compared to traditional media, the sources of information on social media are relatively unfiltered and decentralized. Thus, we think of social media as a platform that connects information creators with information seekers, with little editorial intervention. Sites hosting discussions about stocks include *Yahoo! Finance*, *RagingBull.com* and *TheMotleyFool.com* launched in the early days of the internet, as well as *SeekingAlpha* and *Twitter* later on.

3.2.1. The beneficial effect of social media

Early studies found that message boards posts have little to no relationship with future returns, but they do predict future volume and volatility. For example, Antweiler and Frank (2004) report that the number and tone of posts on discussion boards have no substantial effect on future returns after considering transaction costs, but they do predict volatility and volume, even after controlling for articles in the *WSJ*. Similar results are presented in Tumarkin and Whitelaw (2001) and Dewally (2003) using different time periods and internet sites.

In contrast, studies of more recent times indicate that social media posts may predict returns. Chen, De, Hu, and Hwang (2014) find that the negative tone of posts on *SeekingAlpha* and of users' replies negatively predict stock returns over the next three months (without subsequently reversing), controlling for analysts' reports and the tone in the *Dow Jones (DJ) News Service* articles. Ding, Shi, and Zhou (2022) report further that *SeekingAlpha* posts are correlated with less underreaction to earnings surprises, suggesting that they accelerate the incorporation of earnings news into stock prices. Nekrasov, Teoh, and Wu (2021) show that adding visual components to tweets improves market efficiency.

To alleviate endogeneity concerns, Farrell, et al. (2022) exploit the delayed publication of *SeekingAlpha* articles, in setting similar to those Akbas et al. (2018) and Schaub (2018). Comparing trading behavior after an article has been submitted but before it is published to trading behavior immediately after the article is published, they find that *SeekingAlpha* articles lead to more informed trading, especially when their authors have stronger track records and academic backgrounds.

In contrast to specialized outlets like *SeekingAlpha*, *Twitter*, attracts a more general audience. On one hand, this allows a wider diversity of opinion. On the other, *Twitter* users may be less knowledgeable about finance and more prone to trend-chasing. Research indicates that *Twitter*'s broad base has predictive power for market outcomes. Bartov, Faurel, and Mohanram (2018) find that the tone of *Twitter* posts about Russell 3000 firms predicts future earnings surprises and associated returns. Gu and Kurov (2020) find that *Twitter* sentiment predicts a firm's future stock returns over the next day, controlling for sentiment from traditional media sources. To identify a causal effect, Rakowski, Shirley, and Stark (2019) exploit randomly occurring *Twitter* outages. Comparing periods when *Twitter* is offline

to when it is online, they show that *Twitter* causes increased trading activity and stock returns, regardless of the tone of the Tweets. Thus, *Twitter* posts are not merely a sideshow, but do influence market outcomes.

3.2.2. The detrimental effect of social media

Several papers indicate that herding is common on social media, thereby reducing the aforementioned beneficial role. Da and Huang (2020) finds evidence of herding on *Estimize.com*, an open platform that allows users to make earnings forecasts which are publicized on their website and on Bloomberg terminals. In a field experiment, they show that consensus estimates are more accurate when users are prevented from seeing other forecasts before they make their own. Heimer (2016) shows that exposure to social network messages on *myForexBook* causes the magnitude of traders' disposition effect to double. Thus, trading mistakes are spread through messages conveyed by social networking sites. Chawla, Da, Xu, and Ye (2022) instrument for the speed of retweeting on *Twitter* and find that faster diffusion is correlated with lower spreads and positive price pressure that are reversed the following day. Thus, they argue, *Twitter* tends to spread stale news.

Cookson, Engelberg, and Mullins (2022) study bias in information received by investors on the social network site *StockTwits*. They find that users who are bullish on a particular stock are five times more likely to follow a user who is also bullish on the stock. This leads bullish users to see many more bullish messages. These results suggest that investors willingly sacrifice accuracy of financial information for the utility derived from conforming reports.

Further discussion of the effect of word-of-mouth communication through social media platforms is presented in Hwang (2023) in this handbook. Bernhardt, Ellison, Rennekamp, and White (2023), in this handbook, also discuss the role of social media platforms in the transmission of false information.

3.2.3. Incentives for companies to use social media

In addition to posts by retail investors, the decentralized nature of social media makes it an attractive platform for firms to disseminate disclosures without depending on the editorial choices of traditional media. For example, Blankespoor, Miller, and White (2014) and Guindy (2021) show that social media reduces the cost of capital and adverse selection. On the other hand, firms may be strategic in their disclosures. In a sample of S&P 1500 firms, Jung, Naughton, Tahoun, and Wang (2018) report that firms are less likely to disseminate bad news via *Twitter* than good news.

3.2.4. Social media as watchdog

Finally, as discussed below in Section V, traditional media can serve as a watchdog for corporate fraud. Goetzmann (2022) provides a speculative discussion of the role of social media for corporate governance using the meme-stock phenomena of 2021. He notes that on the one hand, social media provides a louder voice for small investors to influence corporate actions. On the other hand, social media is also rife with inaccurate rumors which could mislead investors.

3.3. Newswires

Newswires are services that distribute to their subscribers press releases written by firms. Their main task is to be fast, and they typically have little editorial input. Some newswires publish nearly any press report for a fee paid by the report's author. Others work on a subscriber-funded basis and provide some editorial selection of their coverage. Historically, news wires have been used by other media companies as source information. With the advent of electronic communication, newswires began distributing to end users through Bloomberg terminals or directly through their own websites.

Researchers generally report a positive association between the use of newswire services and market efficiency. Drake, Guest, and Twedt (2014) find that as the frequency of news flashes about earnings announcements published on newswires increases, the mispricing of cashflows decreases, though the mispricing of accruals is unaffected. Using the predicted coverage of management earnings

guidance on the *DJ Newswire*, Twedt (2016) finds that newswire coverage is associated with larger initial price reactions and faster price discovery.

To provide a causal inference, Soltes (2010) uses the amount of competing news published on the day of a press release to instrument for exogenous changes in newswire readership. He finds that when readership is higher, bid-ask spreads, share turnover, and idiosyncratic volatility are lower. Rogers, Skinner, and Zechman (2016) use the abrupt initiation of coverage of Form 4 insider trading filings via DJ newswires as a natural experiment to show that the dissemination of information by newswires influences stock prices and volume beyond the content of the information generated from a Form 4 filing. Boulland, Degeorge, and Ginglinger (2017) exploit a policy change in Europe that mandated firms to communicate through English-language electronic newswire services. They document that earnings announcements generate a stronger initial reaction to earnings surprises, higher trading volume, and less subsequent stock price drift after a firm adopts a wire service.

4. Selection of Information: Media as Editor

The second key function of the media is the selection of news to publish. We organize our discussion on the selection role of media around two major questions. First, why does the media perform an editorial role at all? The answer to this question is rooted in investors' limited ability to absorb all information. In response to this limitation, the media provides a valuable service by selecting the information that its audience will find most valuable. Second, given that the media can help alleviate attention limitations, how does it choose which information to publish and which to ignore? The answer to this question is based on the incentives of the media, which include both profit maximization and private benefits to the owners of media companies.

4.1. Why Media Companies Select News: Limited Attention

4.1.1. Theory of Limited Attention

There is now a well-developed body of theory analyzing the causes and consequences of limited attention. One stream of theory, rational attention theory, views agents' attention as a scarce resource, which agents allocate optimally by weighing its opportunity cost against the trading profits they expect from higher attention and superior financial information (Sims, 2003; Van Nieuwerburgh and Veldkamp, 2009 and 2010). Traditional models of the demand for information can also be interpreted in this light (e.g., Grossman and Stiglitz, 1980). Another stream assumes that inattentive people simply neglect some public signals (Hirshleifer and Teoh, 2003). In the model of Section 2, we capture investors' limited attention as the analysis cost, a.

Alternatively, behavioral theories assume that attention responds to stimuli and has a direct effect on agents' utility, regardless of its effect on probability distributions and wealth (Loewenstein, 1987). For instance, agents prefer to ignore bad news, even though it improves their decision making, and instead focus on attention to good news. For a more in-depth review of the literature on limited attention, see Nekrasov, Teoh, and Wu (2023) of this handbook.

4.1.2. Evidence on the Attention Role of the Media

We start by reviewing studies that document an effect of media coverage on individual investor behavior and then turn to those that report an effect on market outcomes.

4.1.2.1. Investor Behavior and Media

In an impactful study, Barber and Odean (2008) document that retail investors are net buyers of stocks featured in the DJ News Service, which they label "attention-grabbing stocks," especially for purchases. This finding is consistent with the observation that retail investors rarely sell short and restrict

their sells, unlike purchases, to the stocks they already own. Hence, purchases are chosen from a much larger set of stocks than are sells, and so are more sensitive to media coverage.

Fang, Peress and Zheng (2014) show that professional investors too are sensitive to stocks' media coverage. They document that, mutual fund managers tend to buy stocks in the media more heavily than other stocks. Moreover, this tendency hurts their investment performance, consistent with the notion that it is driven by limited attention. Solomon, Sosyura and Soltes (2012) show that fund managers attract flows from investors by selecting stocks in the media limelight.

Engelberg and Parsons (2011) are the first to rigorously show a causal relationship between media and attention. They document that retail trades respond more strongly to firms' earnings releases when they are covered in the local media. They generate exogenous variations in coverage, holding fixed their information content, by considering, e.g., extreme weather events that disrupt the delivery of daily newspapers.

Peress (2014) also provides causal evidence by exploiting national newspaper strikes in several countries, exogenous to stock market movements. On strike days, trading volume, the dispersion of stock returns, and intraday volatility decrease. Moreover, the market appears to "miss a beat" and then to catch up, as returns on the strike's eve have less predictive power for returns on the strike's day, and more power for the return on the day after the strike.

4.1.2.2. Stock Market Outcomes and Media

The beneficial effect of media

Moving from individual decisions to market outcomes, Stice (1991) studies differences in market responses to SEC filings vs. delayed media coverage. He shows that stock prices respond to *WSJ* earnings announcements, but not to SEC filings when the filings preceded the *WSJ* article. Thus, media coverage helps move prices to their full-information value.

Fang and Peress (2009) report that the presence of media coverage, regardless of the content, is associated with a risk discount, as proxied by negative future stock returns, especially among small stocks and stocks with high individual ownership, low analyst following, and high idiosyncratic volatility. Their interpretation is that the media alleviate informational frictions by reaching a broad population of investors, consistent with Merton's (1987) "investor recognition hypothesis". A similar finding exists for corporate bonds (Gao, Wang, Wang, Wu, and Dong, 2020). The content of articles also matters. Tetlock, Saar-Tsechansky and Macskassy (2008) find that their pessimism predicts firms' earnings and returns.

To provide causal evidence on the pricing effects of the media, Klibanoff, Lamont, and Wizman (1998) use the Net Asset Value (NAV) of closed-end funds to compare fundamental values to prices. In a frictionless market, both NAVs and fund prices would respond equally to new information. Klibanoff et al. find that, while prices typically underreact to changes in NAVs, they don't when relevant news appears on the front page of *The New York Times (NYT)*, indicating that media coverage improved investors' attention to the news.

Peress (2008) employs a related strategy in the context of earnings announcements. He forms pairs of announcements made by the same firm in the same year and generating similar earnings surprise (based on analysts' consensus forecast), with one announcement covered in the *WSJ*. He finds that covered announcements display stronger price and trading volume reactions at the announcement and less subsequent drift. This finding suggests that media coverage speeds up the capitalization of earnings news into prices. Guest (2021) confirms the causal nature of these effects by exploiting restructuring events at the *WSJ* that changed its coverage of earnings news.

Fedyk (2022) provides evidence that the prominence of news coverage affects prices. Using exogeneous variation in the placement of news stories on Bloomberg terminals, she shows that stocks with more prominent media coverage have higher trading volumes. Thus, the selection decision of media editors has a large, causal impact on financial decision-makers.

Another line of research compares stock price behavior following extreme returns for firms with media coverage versus those without. Most studies find evidence that prices tend to reverse less in the

presence of media coverage, suggesting that media coverage increases market efficiency (Pritami and Singal, 2001; Larson and Madura, 2003; Tetlock, 2010; Chan, 2003). Vega (2006) shows that if the media attracts informed investors, there is no overreaction, but if the news media attracts uninformed investors, stock prices overreact to the media coverage.

The detrimental effect of media

Shiller's (2000) writes that "the history of speculative bubbles begins roughly with the advent of newspapers" (p. 85). Indeed, not all evidence implies that media coverage improves market efficiency. In perhaps the earliest study of the role of media in finance, Niederhoffer (1971) shows that the S&P Composite Index overreacts to stories with large headlines reported in the *NYT* from 1950 to 1963. Interestingly, Niederhoffer (1971) finds that the type of news story, such as a natural disaster, presidential election, or medical breakthrough, does not influence the pattern of index returns. Frank and Sanati (2018) find a similar result in a study of S&P 500 firms covered in the *Financial Times* from 1982 to 2013. Dougal, Engelberg, Garcia and Parsons (2012) report a similar pattern involving the pessimism of *WSJ* columnists. Because columnists are pre-scheduled, this finding suggests that journalists influence investor behavior. Hillert, Jacobs and Müller (2014) document that firms with higher newspaper coverage exhibit stronger momentum, which subsequently reverses; moreover, this effect is more pronounced if the article tone matches the firm's return over the portfolio formation period. Further evidence of overreaction to television media coverage is presented in Meschke (2004) and Engelberg, Sasseville, and Williams (2012).

The power of media to influence investors behavior is also apparent when media coverage is misleading, e.g., when the media reports stale information. Tetlock (2011) measures the novelty of news published in the *DJ Newswire* using textual analysis. He finds that stock prices react less to stale news initially but reverse over the following 10 days. This suggests that investors overreact to stale news.

A similar phenomenon is found for inaccurate news. In Ahern and Sosyura (2015)'s study of merger rumors published in the media, investors differentiate inaccurate rumors from accurate ones: for target firms, the publication-date return is 6.9% in accurate rumors, compared to 3.0% for inaccurate

rumors. However, these returns reverse by -1.4% over the following 10 days, indicating an overreaction. Thus, investors appear to overestimate the accuracy of the media. Schmidt (2020) models the publication of rumors and predicts when they are more likely credible.

4.2. How Media Companies Select News: Incentives

Media companies are driven to maximize their profits by increasing revenues and reducing costs. At the same time, managers of media companies may also aim to maximize personal non-pecuniary benefits. Both factors help explain how the media chooses which stories to publish.

4.2.1. Media Bias Appeals to Readers

A media company that aims to maximize profits selects stories that it believes will appeal to its readers. In Mullainathan and Shleifer (2005), readers value accuracy but also derive disutility from reading news inconsistent with their prior beliefs. Gentzkow and Shapiro (2006) argue that when readers are uncertain about the quality of a media outlet, they rationally view news conforming to their beliefs as a sign of quality. Thus, when people hold diverging beliefs, media companies have an incentive to segment the market and slant their coverage towards their priors. In a recent theoretical paper, Goldman, Martel, and Schneemeier (2022) apply these incentives to the financial media. In equilibrium, firms manipulate their reports, but stock prices are not biased on average.

Media bias is often manifested in political orientation (Gentzkow and Shapiro, 2010) and recent evidence shows that newspapers are more likely to slant their reporting of firms based on the political position of executives. Fos, Kempf, and Tsoutsoura (2022) find that from 2008 to 2020, executive teams at S&P 1500 firms have become more likely to be affiliated with the same political party. At the same time, Goldman, Gupta, and Israelsen (2022) show that newspapers are more likely to grant politically aligned firms more favorable coverage in longer articles. For example, *WSJ* articles are more positive for firms that donate more to the Republican party. The disparity between the tone of media coverage of the *WSJ* and the *NYT* for politically extreme firms leads to an increase in disagreement and hence, trading

volume. Similarly, Rees and Twedt (2022) show that media outlets negatively slant their coverage of earnings announcements if the political affiliation of the firm differs from the media outlet's affiliation.

4.2.2. Sensational Stories Appeal to Readers

Beyond slant, media companies also have an incentive to publish stories that are sensational, even if inaccurate, to appeal to readers' interests. Shiller (2000) argues that the media is naturally attracted to financial reporting because it provides constant news flow with high stakes and casino-like outcomes. Jensen (1979) argues that the mass media is a producer of entertainment, not information.

Core, Guay, and Larcker (2008) find evidence that the media sensationalizes CEO compensation, consistent with Jensen's view. They report that CEOs with high total annual pay are more likely to receive coverage by the media, regardless of whether the compensation exceeds expected pay based on economic fundamentals. Similarly, Ahern and Sosyura (2015) show that media outlets, including well-established sources such as the *WSJ* and the *NYT*, are willing to report questionable rumors about mergers if the featured firms have a large appeal.

4.2.3. Advertising Revenue

Many media companies have a local audience and accordingly report local news. Gurun and Butler (2012) document that local media uses fewer negative words to cover local companies compared to nonlocal companies. They find evidence that advertising expenses of local companies help to explain the favorable reporting. Thus, media companies maximizing profit may also selectively cover local firms to attract advertising revenues.

4.2.4. Firm-Originated Media Coverage

A unique aspect of financial media is that it is quite difficult for journalists to uncover new facts. Firms are not, in general, obliged to answer journalists' questions the way government officials are. This makes it costly for the media to acquire information on their own. Thus, much of the information that financial media report is originated from firms themselves. This gives firms the power to influence media coverage.

Cook, Kieschnick, and Van Ness (2006) argue that investment bankers have an incentive to promote IPOs through media stories to attract retail investors. They find that the vast majority of news articles about IPOs are non-negative and descriptive. In addition, they show that investment bankers' compensation is positively correlated with the number of press articles.

Bushee and Miller (2012) find that small firms hire investor relations (IR) firms to garner institutional investors and more media coverage. Compared to a matched set of firms that do not hire an IR firm, firms that do see their disclosures more widely covered. Solomon (2012) extends this work to show that IR firms generate more media coverage of more positive press releases.

Ahern and Sosyura (2014) study how acquiring firms attempt to influence their stock price by issuing news releases before the announcement of a merger. They show that acquirors issue 10% more press releases during merger negotiations compared to baseline averages. The press releases are more likely to use positive language and words that indicate confidence or exaggeration. While these efforts lead to greater coverage in news media, the tone of the media does not follow the exaggerated tone of the firm-originated news releases. Gurun (2020) documents that the presence of a media professional on a firm's board of directors is correlated with receiving more positive media coverage.

An alternative driver of news coverage are activist hedge funds. Dyck, Volchkova, and Zingales (2008) provide evidence that the activist hedge fund, the *Hermitage Fund*, used the media to increase public pressure on portfolio firms with corporate governance violations in Russia. In particular, Anglo-

American newspapers were more likely to cover a firm's governance violation if the *Hermitage Fund* was one of its shareholders.

4.2.5. Managers Seek Non-Pecuniary Benefits

Rather than maximize profits, media companies may promote their owners' particular agenda, especially if the companies' ownership is concentrated. Demsetz and Lehn (1985) argue that of all industries, mass media is most likely to have concentrated ownership so that owners can satisfy their preferences through the product they sell. Empirically, they find that media firms have significantly more ownership concentration than other firms, driven by family and individual owners.

Wagner and Collins (2014) find that after Murdoch purchased the *WSJ* from the Bancroft family in 2007, its editorial pages became more conservative. Kedia and Kim (2021) show further that the *WSJ* increased its coverage and positive tone of firms connected to Murdoch through overlapping board memberships, relative to the coverage in the *NYT*.

5. Creation of New Information: Media as Creator

Though the core role of the media is to distribute information that others have created, in some cases the media expands to news creation—what we modelled in Section 2 as a higher signal precision, q'. Thinking of content creation and distribution as two separate functions on a supply chain, a media organization performing both activities is vertically integrated. We hypothesize that the media vertically integrates when there are synergy gains from doing so. For instance, creating content in-house may provide synergies because the media firm may have better information on what its customers want.

5.1. Fundamental Information Created by the Media

The media can help investors better understand firms' fundamentals. Using textual analysis, Guest (2021) reports that *WSJ* articles whose tone is aligned with that of firms' earnings releases, but which differ in their language, accelerate the incorporation of news into prices. Language differences

include being longer, more readable and specific, including more references to the industry and economy, quoting more sources and repeating less "stale" news from previous *WSJ* articles. These findings suggest that articles with substantive editorial content provide information about firms' earnings by contextualizing or simplifying firms' disclosures.

One type of reporting specific to media companies is investigative journalism. Miller (2006) shows that the media plays a pivotal role in uncovering accounting fraud. In 29% of firms sanctioned by the SEC for accounting violations, the media published articles regarding fraud before a public acknowledgement by the firm or SEC. Miller finds that the market reaction is significantly stronger for original reporting compared to outsourced news, suggesting that the media serves as an important watchdog for corporate fraud. Dyck, Morse, and Zingales (2010) confirm this finding in a study of all reported fraud cases in large US firms from 1996 to 2004. They estimate that the media identified 13% of cases, with a bias towards larger cases. You, Zhang, and Zhang (2016) find that the media's watchdog role relies on its independence. They show that Chinese-state controlled media is less critical than are market-oriented Chinese-media.

Farrell and Whidbee (2002) report that investigative reporting influences firm behavior. In a sample of 79 firms over 1982-1997, firms with forced CEO turnovers were the subjects of 76% more *WSJ* stories about declining earnings than were matched firms without forced turnovers, even after controlling for performance measures. Joe, Louis, and Robinson (2009) study firm responses to being named as one of the 25 worst corporate boards in *Business Week.* They find that, compared to similar firms, named firms experience subsequently a significant increase in the proportion of independent directors and in CEO turnover, and decreases in staggered boards. Relatedly, Kuhnen and Niessen (2012) provide evidence that media coverage influences CEO compensation. They measure public opinion of stock options using the tone of media articles from 1990 to 2010. When the tone is more negative, firms reduce option grants, though the size of overall compensation does not change.

In contrast to the watchdog role of media, Malmendier and Tate (2009) show that positive media coverage of CEOs can have detrimental effects. They document that CEOs who win awards granted by

publications such as *Business Week* and *Forbes* subsequently underperform and spend more time on outside activities, while compensation and earnings management increase.

5.2. Meta-Information Created by the Media

The media is in a unique position to provide insight into its readers. Understanding the interests, emotions, preferences or constraints of a large sample of the population is valuable for detecting deviations of prices from fundamentals (e.g., due to herding). It also helps assess whether deviations may widen further before closing, thereby exposing traders to interim losses (e.g., through a short squeeze), and whether a trade is getting crowded.

One way that traditional media provide this "meta-information" (i.e., information, not about fundamentals, but about investors' beliefs about fundamentals) is through opinion polls. Such polling provides information to readers but may also influence readers' opinions. For instance, Morton, Muller, Page, and Torgler (2015) find that exposure to exit polls decreases voter turnout by a significant margin.

With the advent of online media, new tools are available for media to provide meta-information. For example, it is common for media companies to report the articles that received the most views or downloads. In addition, a feedback loop may be created where media companies tailor news to the preferences of its readers.

Social media is also used to infer meta-information about investors' beliefs and sentiment. Sul, Dennis, and Yuan (2017) and Liew and Budavari (2017) show that sentiment aggregated from *Twitter* about S&P 500 firms helps predict future stock returns. Bartov, Faurel, and Mohanram (2018) show that aggregate opinion from *Twitter* posts predict a firms' quarterly earnings and announcement returns. Social media can also be a self-reinforcing mechanism, such that investors incorrectly extrapolate what they perceive to be a widely held belief from a narrow set of users, as in the meme-stock episodes of 2021 (Pedersen, 2022).

A distinct feature of social media is that it allows investors not only to learn about others' views but to explicitly coordinate their trades. Allen, Haas, Nowak, Pirovano, and Tengulov (2021) show that

the concerted actions of traders through social media platforms lead to price surges and short squeezes in meme stocks in 2021.

6. Conclusion

This chapter reviews the literature on the role of the media for financial decision-making. We define the media as the process of intermediation between information creators and information consumers. This definition of media spans a wide range of media organizations, including search engines for repositories of corporate filings, social media, and traditional print media. Within this definition, we argue that media has three main roles: 1) distribute unedited information to users, 2) editorial selection of information in response to users' limited attention, and 3) the creation of new content.

In broad brush strokes, our review of the literature suggests that media helps people make better decisions. Greater media coverage improves market efficiency, with faster price discovery and less adverse selection. Media coverage also serves as a monitor of corporate governance. Of course, there are cases in which the media's own incentives can lead to suboptimal outcomes, such as market overreactions caused by inaccurate information or biased media coverage.

Our historical review of the prior literature provides perspective on a number of avenues for future research on the media and financial decision-making. First, the preponderance of existing research focuses on the role of media on publicly traded securities. However, the media is likely to play a large role in many household financial decisions, such as mortgages, school loans, and retirement savings. Second, as data expands exponentially and the cost of data storage falls, the role of the media as an editor is likely to become even more critical for financial decision-making. Third, as consumer data allows firms to more precisely target their customer base, the incentives of the media are likely to exaggerate polarization among the population. In this context, understanding the costs and benefits for consumers, the potential for spreading false information, and the potential effects on financial decision-making are more important than ever.

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