The Allocation of Corporate News*

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Abstract

This paper studies the macroeconomic consequences of selected information supply by news media. We document empirically that media's reporting of business news is concentrated, particularly among the largest firms. News coverage is associated with higher likelihood of obtaining financing, higher investment, and greater profitability. In a quantitative model with a media sector that matches these facts, media reporting alleviates asymmetric information in financial markets for reported firms. However, media coverage concentrates on large firms who are not financially constrained. Therefore, reallocating media coverage would promote firm growth, since small and young firms who benefit the most from media's information revelation are currently under-reported.

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1. Introduction

Financial media disseminates firm news to investors, influencing investor behavior towards reported firms (Peress, 2014; Ahern and Peress, 2023). However, the allocation of news coverage is not random, as it is chosen by newspaper editors (Gentzkow and Shapiro, 2008; Nimark and Pitschner, 2019). In this paper, we study the determinants of firm newsworthiness and the macroeconomic implications of media's selective news reporting.

We document empirically that media coverage is associated with a greater likelihood of raising financing, a higher rate of investment, and higher profitability. However, media's reporting of corporate news is concentrated, particularly among the largest firms. Motivated by these empirical facts, we introduce a media sector to a macro-finance model with heterogeneous firms, in which asymmetric information between firms and investors limits firms' ability to raise financing for investment. With a news-reporting function matched to the data, media plays a limited role in alleviating this asymmetric information, because corporate news is mostly allocated to large firms who are not financially unconstrained. In a counterfactual where the reporting resource is evenly distributed across firms, media plays a substantially larger role in promoting business dynamism.

We begin by constructing a firm-level measure of news coverage, which tracks the timing and frequency of coverage in major US newspapers for the universe of publicly traded firms over a 30-year period. We document that corporate news coverage is highly concentrated, and the variation in news coverage can be mostly accounted for by firm-specific factors. Among the set of observable firm characteristics, news coverage displays a particularly strong nonlinear relationship with firm size. The largest 10% of firms account for more than 85% of all news coverage. This concentration is unique to firm size. Media coverage is substantially less concentrated by other firm characteristics.

Combining media coverage data with financial data from CRSP/Compustat, we find that media coverage is correlated with a higher likelihood of subsequently raising equity financing, a higher rate of investment, and higher profitability, consistent with media reporting alleviating information asymmetry in financial markets. The strength of these effects increases with the financial focus of a newspaper and are not present after coverage on social media. We complement the US evidence with evidence from France, where media strikes create exogenous variation in media coverage. Among firms that have issued equity during media strikes, those with higher previous media coverage go on to invest less compared to other firms with less media exposure, consistent with firms relying on media to alleviate information frictions.

Motivated by these empirical results, we introduce a media sector to a macro-finance model with heterogeneous firms, and use the model to evaluate the macroeconomic consequences of selective corporate news reporting. Managers maximize the value of their firm to existing shareholders. They have the option to invest by raising external equity from retail investors, who face asymmetric information about firms' heterogeneous asset qualities. Without media reporting, adverse selection arises and limits equity issuance, as in the large literature pioneered by Myers and Majluf (1984). Media outlets observe full information about firms, but are constrained to only report a subset of them. Once a firm appears in news reports, full information about the firm is revealed to investors. Reporting by media outlets therefore alleviates the asymmetric information in the equity market, but only for certain firms.

The effect of media reporting depends critically on which firms the media outlets choose to cover. To quantify the effects of selective news reporting, we allow outlets to select which firms to report based on their observable characteristics, and match the resulting news-reporting function to our data. Under our calibration, media outlets are more likely to report on large firms, consistent with the empirical evidence. However, large firms are mostly financially unconstrained, and therefore do not issue equity or increase their investment in response to media's alleviation of their information asymmetry. Financially constrained firms would benefit from news reporting, because information asymmetry leads to high cost of equity issuance which prevents them from obtaining external financing to invest and grow. However, these firms are mostly smaller, and so are rarely reported by the media.

The allocation of media reporting is therefore not conducive to firm growth. Reporting decisions are taken based on a firm's current size, and do not take account of firms' need for financing and potential to grow. This misalignment between media's incentive to report and firms' benefits from being reported implies that media is substantially less effective at reducing financial frictions caused by information asymmetries than it would be if reporting was distributed evenly across firms. A counterfactual in which all firms are equally likely to be reported would increase the average firm size by 0.25%. This eliminates 10% of the total effects of asymmetric information, almost doubling the effect of media on firm size. Our results highlight the macroeconomic importance of the allocation media reporting.

Literature Our paper is related to to three strands of the literature. First, we contribute to the literature on the macroeconomic consequences of news media.[1] Several papers have shown that when media reports on macroeconomic news, the choice of stories and the narratives used to communicate them have substantial consequences for macroeconomic outcomes (Nimark, 2014; Larsen, Thorsrud and Zhulanova, 2021; Macaulay and Song, 2022; Andre, Haaland, Roth and Wohlfart, 2022; Bui, Huo, Levchenko and Pandalai-Nayar, 2022). Bybee, Kelly, Manela and Xiu (2020) show that news media can be used to forecast a range of macroeconomic time series. Chahrour, Nimark and Pitschner (2021) study which production sectors receive news coverage, and find that changes in sectoral news reporting can drive business cycle fluctuations. Hu (2024) provides empirical evidence that financial news production can be influenced by factors unrelated to the arrival and demand of information. In this paper, we study news coverage at the firm level, showing that there is substantial heterogeneity in news coverage at the firm level and that news coverage affects firm financing and outcomes.[2]

Second, a number of recent papers have analysed the extent of selectivity in media reporting in other types of news, and proposed explanations. In journalism, this selectivity is known as "gatekeeping", and is documented extensively in e.g. Shoemaker and Vos (2009). Within economics, selective reporting has been documented across political and other forms of news (Gentzkow and Shapiro, 2008; Nimark and Pitschner, 2019). We extend this by showing that a similar selectivity exists in firm-level corporate news reporting, and characterizing which firms are most likely to be selected. The selectivity we document is consistent with recent theoretical work on incentives in the news industry (Chiang, 2022; Martineau and Mondria, 2022; Perego and Yuksel, 2022; Denti and Nimark, 2022, among others).

[1]This literature on media and media outlets is distinct from the literature on news shocks, in which news typically refers to signals obtained by agents about future productivity, with the signals arriving from an unspecified source (see Beaudry and Portier, 2014, for a review).

[2]Our finding that news coverage is highly concentrated among a few firms is consistent with recent literature on granularity (Gabaix and Koijen, 2020; Di Giovanni and Levchenko, 2012; Galaasen, Jamilov, Juelsrud and Rey, 2020; Jamilov, Kohlhas, Talavera and Zhang, 2024), where fluctuations in large granular firms lead to macro consequences.

Finally, we contribute to the broader literature on the effects of financial frictions on firm dynamics and investment, e.g., Cooley and Quadrini (2001), and see Brunnermeier, Eisenbach and Sannikov (2012) for a survey. Our work builds on this extensive literature and extends the scope to study the role of news media in shaping firm dynamics. By explicitly modeling the financial friction micro-founded by asymmetric information, we study how media reporting can facilitate firms' financing and investment by alleviating their financial friction and how the allocation of media reporting resources can play an active role in shaping the firm distribution and dynamics.

Road map The rest of the paper proceeds as follows: in Section 2, we describe our data, document stylized facts on the structure of corporate news, and study its effects on firm outcomes; in Section 3, we present a model of corporate news reporting; in Section 4, we use the model to quantify the effects of selective news reporting; Section 5 concludes.

2. Empirical Evidence

This section provides a set of empirical facts on corporate news coverage. We document that news coverage is highly concentrated, particularly among the largest firms. Variation in news coverage is associated with higher equity issuance probability, investment, and profitability.

2.1. Data

We collect the frequency of firm news coverage in three largest US newspapers by circulation—*The Wall Street Journal*, *The New York Times*, and *USA Today*—from Dow Jones Factiva, a news aggregator.[3] News coverage frequency is matched to firm financial data from CRSP/Compustat using firm names based on a fuzzy match algorithm (Levenshtein et al., 1966).[4] With this procedure, we construct a measure of firm-level media coverage for the

[3]Factiva is a widely used databased for measuring the frequency of news coverage (see, for example, Chahrour et al., 2021; Bui et al., 2022). Our search parameter closely follow those used by Chahrour et al. (2021), which provides media coverage of the top 100 firms by news coverage in each newspaper.

[4]Factiva provides named entity tags identifying entities mentioned in each news article. These entities include not only firms, but also organizations such as the United Nations and Harvard University. Using a fuzzy matching algorithm based on the Levenshtein distance, we match firm names in Factiva with those of publicly traded US firms in Compustat. Factiva named entities often include slight variants of the same firm (e.g., "AT&T Inc" and "AT&T Inc."). Our algorithm recognizes that both names refer to the same firm. To ensure match quality, we perform manual checks on each of the matches.

universe of publicly traded firms in the US. Our sample consists of 375,627 articles on 18,809 unique firms from 1990 to 2021.

To compare curated news provided by newspapers with social media coverage on Twitter, we identify 3,111 publicly traded firms that have official Twitter accounts and collect the frequency that a firm is tagged (e.g., `@Microsoft`) each quarter from 2014 (when Twitter became a popular platform) to 2022 using Twitter's academic API.

Finally, we complement the US analysis with data from France, where we focus on periods of media strikes that cause variation in media coverage. Our French sample is based on four major newspapers: *Les Echos*, *Le Monde*, *La Tribune*, and *Le Figaro*. We obtain firms mentioned in news outlets using the same Factiva search algorithm described above for the US, and we use firm names to fuzzy match media coverage to firm variables from Compustat Global. The merged sample for France is quarterly from 2005 (when Compustat Global becomes available) to 2021.

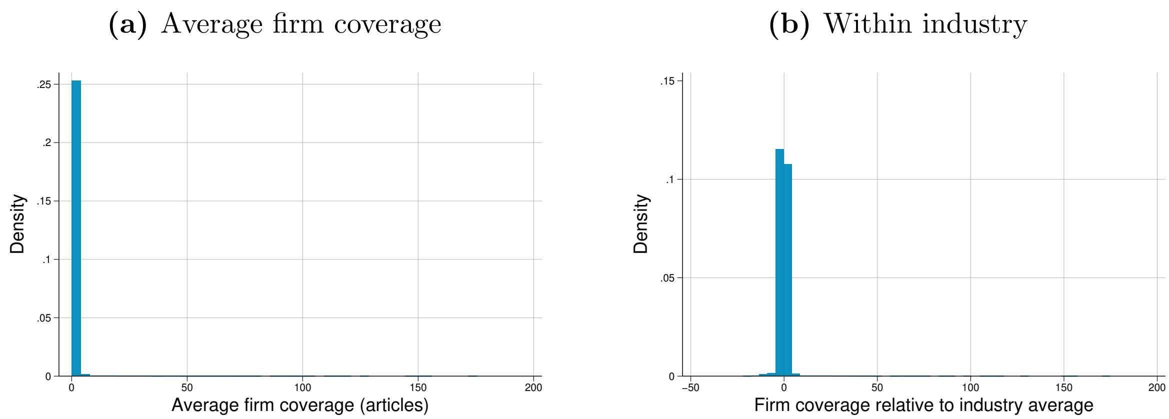
2.2. Concentration of corporate news coverage

We begin by documenting the concentration of corporate news coverage, particularly among the largest firms. Panel (a) in Figure 1 reports the distribution of average firm article counts over the sample period. Approximately a quarter of firms have zero coverage, while firms in the top percentile appear 3.5 times on average every quarter in major newspapers.[5] The distribution appears to be highly skewed, which shows that news coverage is concentrated in a small number of firms. To ensure that the pattern is not driven by firms with zero coverage, Appendix Figure A.1 restricts the sample to firms with positive coverage and finds a similarly skewed distribution.

Panel (b) in Figure 1 accounts for sectoral variation in news coverage documented by Chahrour et al. (2021) and reports within-industry distribution of firm news coverage. We demean news coverage by industries, measured by 4-digit NAICS, and report the residuals. Zero values represent quarterly coverage that equals industry average, and positive (negative) values represent coverage above (below) industry average. We find that the skewness in distribution is not driven by differences in industry-specific coverage. More than 20% of

[5] Table A.1 in the Appendix lists the top 20 firms by total frequency of media coverage. The top firms are household names such as General Motors and Microsoft, whose brand recognition may attract attention from readers who do not necessarily have a specific interest in business news.

Figure 1: Distribution of corporate news coverage



Notes: This figure reports the distribution of average firm news articles. Panel (a) reports the distribution of average articles in major US newspapers for firms in our sample. Panel (b) demeans news coverage by 4-digit NAICS industry and reports the distribution of average residuals for firms in our sample.

firms' coverage is at industry average, while the top percentile of firms within an industry is covered 2.4 times more than remaining average firms.

In light of the concentration in news coverage, we next study factors associated with media coverage. We first estimate a panel regression

$$h_{it} = \alpha_{st} + \alpha_i + \varepsilon_{it}, \tag{1}$$

where h_{it} is article counts containing firm i in major newspapers in quarter t, α_{st} is sector-by-time fixed effects, and α_i is firm fixed effects. We include fixed effects iteratively and report standard deviations of the residuals, ε_{it}, and resulting R^2 of the regression.

Table 1 reports the resulting decomposition of the variation in news coverage using (1). The left panel shows that 69% of variation in media coverage can be accounted for by firm-specific characteristics. Industry explains 5% of the variation, while the time dimension plays little role. The right panel alternatively measure news coverage with the probability of coverage, $\mathbb{1}(h_{it} < 0)$, which is a binary measure and takes the value of 1 if a firm appears in major newspapers in a given quarter. Similarly, firm-specific characteristics explain a sizable variation of the probability of coverage. It should be noted that Table 1 shows that some 28% of the variation in media coverage and 38% of the variation in the probability of coverage are unexplained by the aforementioned factors, which is the variation we will use to study the relationship between media coverage and firm outcomes in the next section.

Table 1: Variance Decomposition

	Mean	SD	R^2		Mean	SD	R^2
Articles per quarter	0.51	6.939	0.0000	Probability of coverage	1.27%	0.112	0.0000
Time		6.938	0.0003			0.112	0.0000
Industry		6.763	0.0500			0.109	0.0665
Firm		3.889	0.6859			0.073	0.5728
Industry $\times$ Time + Firm		3.686	0.7214			0.070	0.6178

Notes: This table reports the standard deviation of ε_{it} and the R^2 from estimating (1): $h_{it} = \alpha_{st} + \alpha_i + \varepsilon_{it}$, where h_{it} is article counts containing firm i in major newspapers in quarter t, α_{st} is sector-by-time fixed effects, and α_i is firm fixed effects.

To understand firm characteristics associated with media coverage, we next consider media coverage along four dimensions: firm size, firm age, financial conditions, and marginal product of capital.[6] Figure 2 reports binned scatter plots of news coverage by firm characteristics. Each bin represents a decile of firm-quarter observations. Figure A.2 further accounts for the role of industries by demeaning each firm characteristic by its industry average. Since patterns are similar across all firms and within industries, we focus our discussion below on untransformed series.

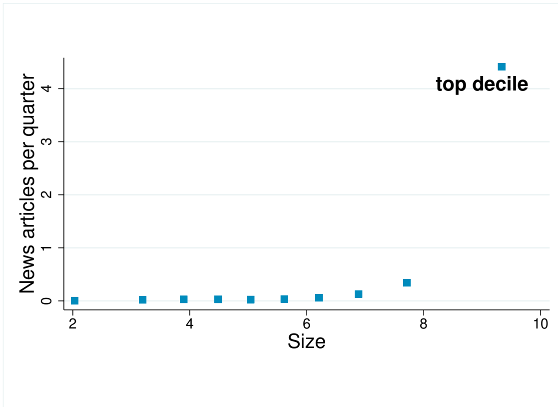
Panel (a) in Figure 2 reports the binned scatters by firm size, measured with log real assets. The relationship between news coverage and firm size appears to be highly nonlinear. Media coverage is concentrated in the largest 10% of firms, while the remaining firms receive almost no coverage. Appendix Figure A.2a shows that within an industry, measured with 4-digit NAICS, it is still the case that only the top decile of firms receive media coverage. Market capitalization is closely related to firm size, and because of its prevalence in popular press likely receives more attention from business readers. In Appendix Figure A.3, we alternatively measure firm size with market capitalization and find a similar concentration of media coverage in the top decile of largest firms.

This concentration of media coverage in the top decile appears to be unique to firm size. Panel (b) reports the relationship between news coverage and firm age, measured with years since IPO. Unlike the pattern with firm size, media coverage increases linearly over the life cycle of a firm. Appendix figure A.2b shows the relationship after conditioning for industry. In both cases, young and medium-aged public firms are also featured in the news, not just

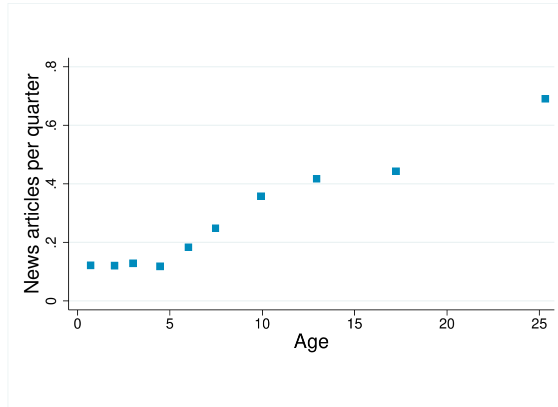
[6]These firm characteristics are considered important for business cycle fluctuations and the transmission of macroeconomic policy (e.g. Ottonello and Winberry, 2020; Cloyne, Ferreira, Froemel and Surico, 2023).

Figure 2: Firm characteristics and media coverage

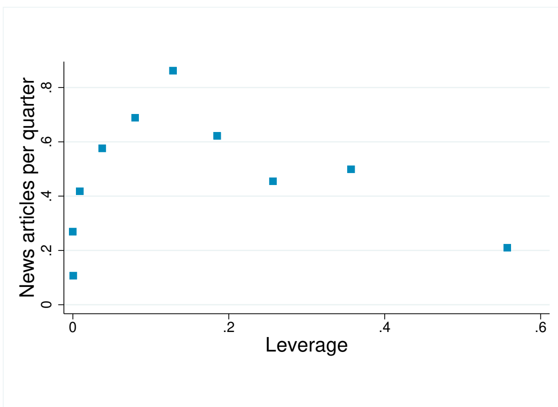
(a) Size



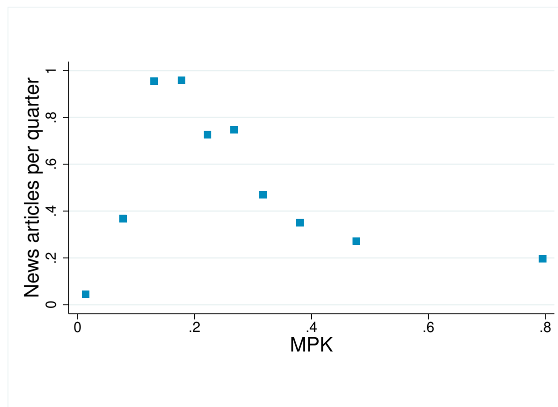
(b) Age



(c) Leverage



(d) MPK



Notes: This figure reports bin scatters between news articles per quarter and firm characteristics. Each bin consists of a decile of firm-quarter observations. Size is measured with log real assets, age is measured with years since IPO, leverage is measured with market leverage, and MPK is measured with revenue over assets.

the oldest firms.

Panel (c) studies the role of firms' financial positions, measured with market leverage. News coverage seems to increase with leverage for firms with low levels of leverage. However, for firms within a given industry, the relationship between leverage and news coverage is much weaker. Appendix Figure A.2c shows that after conditioning for industries, leverage does not seem to play a big role.

Panel (d) provides suggestive evidence that news coverage may not align with firms' return on capital, measured with marginal product of capital (MPK). We follow Gilchrist, Himmelberg and Huberman (2005) and Bai, Lu and Tian (2018) to measure MPK with revenue over assets. For firms with low returns on capital, news coverage increases with the levels of MPK. However, the relationship reverses for firms with return on capital above 0.2, which indicates that firms with higher returns on capital are featured less in major newspapers. The pattern hold within industries, as Appendix Figure A.2d shows, which suggests a potential form of misallocation in news coverage.

2.3. News coverage, equity financing, and firm investment

In this section, we estimate the dynamic relationship between media coverage and firm outcomes using the variation in media coverage that is unexplained by observable firm characteristics. In addition, we use episodes of media strikes as exogenous variation to test the effects of media reports on firm outcomes.

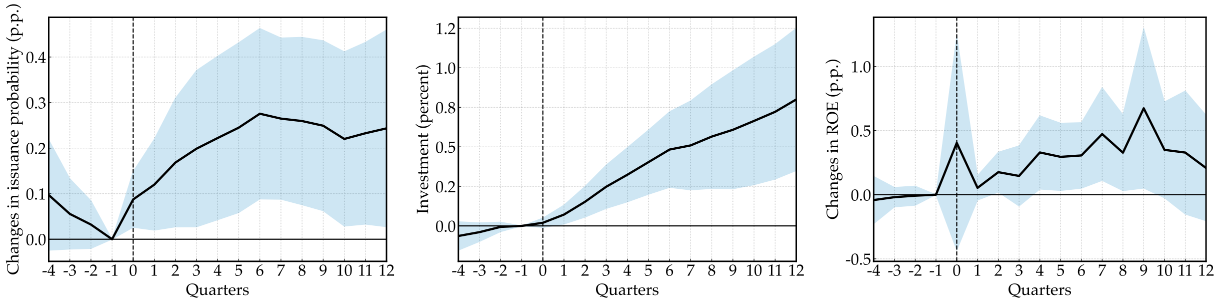
Empirical model For firm i's outcomes h quarters from quarter t, we estimate the local projection

$$y_{it+h} - y_{it-1} = \alpha_{st} + \alpha_i + \beta_h \nu_{it} + \Gamma' Z_{it} + u_{it+h}, \tag{2}$$

where y_{it} is the firm outcome of interest; ν_{it} is the news coverage of firm i major US newspapers mention quarter t, demeaned at the firm level and standardized so that the unit can be interpreted as one standard-deviation within-firm change in media coverage; $\{\alpha_{st}, \alpha_i\}$ are sector-by-quarter and firm fixed effects; $Z_{i,t}$ is a vector firm controls including sales growth, size (log real assets), and current assets as a share of total assets; and u_{it+h} is a random error. We consider three firm outcomes of interest: the investment rate, $\Delta \log k_{it}$, is defined as the log change in the book value of the firm's tangible capital stock; the cumulative probability of equity issuance, $\mathcal{E}_{it}$, is an indicator variable that takes the value 1 if a firm issues new equity during quarter t, and firm profitability is measured with the return on equity, ROE_{it}, defined as income before extraordinary items over shareholders' equity.

The source of variation in (2) is within-firm variation over time in the media coverage of each firm. The estimates for β_h capture the relationship between a one standard-deviation increase in media coverage and the firms' cumulated outcome of interest over h quarters since the coverage.

Figure 3: Newspaper coverage, corporate finance, and firm outcomes



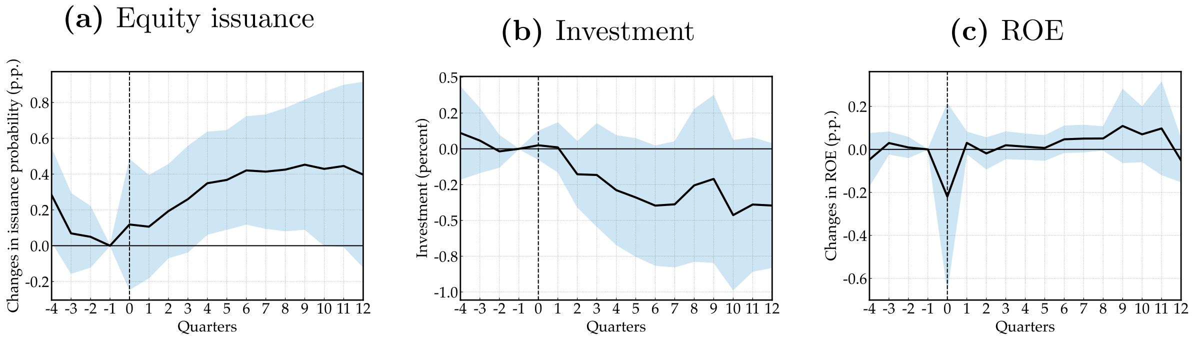
(a) Equity issuance **(b)** Investment **(c)** ROE

Baseline results Figure 3 reports our baseline findings. Panel (a) shows that an increase in a firm's media coverage is associated with a higher probability of raising financing from the equity market. During the quarter of news coverage, one standard deviation higher media coverage is associated with 0.1% higher likelihood of issuing equity. The effect rises gradually to a peak effect of around 0.3% after 6 quarters. Panel (b) shows that when firms receive more coverage, the additional equity financing translates into higher investment, and the effects are persistent throughout the estimation horizon. Panel (c) shows that receiving more coverage is associated with small increases in profitability. The effects are most pronounced in the medium term, around 7 quarters after new coverage. For all outcome variables, the pretrends are statistically insignificant at the 10% confidence level. These results suggest that media coverage may be the reason for the subsequent responses in firms' financing, investment, and profitability.

Additional analysis We conduct two additional analyses to study the role of the financial focus of newspapers and to compare curated news coverage with social media coverage.

First, the three newspapers included in our sample all have large circulations, but specialize in different types of content and appeal to different audiences. *The Wall Street Journal* is the main financial newspaper in the US. It specializes in financial news and often breaks exclusive corporate news. *The New York Times* reports on a broader set of issues, but it maintains a dedicated section on business news. *USA Today* is the least finance-focused newspaper among the three. It appeals to a broad audience and does not have a separate business-news section. In Appendix Figure A.4, we study whether the type of newspaper affects the effects of coverage, repeating regression (2) but replacing ν_{it} with the frequency of

Figure 4: Twitter coverage, corporate finance, and firm outcomes



coverage in each newspaper individually. Coverage in *the Wall Street Journal* has the largest association with firm outcomes. The likelihood of equity issuance rises when firm coverage is high in the Journal. The equity issuance corresponds to higher future investment and higher future profitability, as in the baseline results. Coverage in *The New York Times* is associated with a higher probability of equity issuance and higher investment. However, it is uninformative of firm profitability. In contrast, *USA Today*'s coverage does not have a significant association with firm outcomes. Overall, the effects of newspaper coverage increase with the degree of specialization in financial news, consistent with specialized coverage receiving the most attention from financial market participants.

Second, we compare curated news with social media, which has become a major alternative to traditional news media with the spread of information technology. The content generation process on social media platforms differs markedly from traditional newspapers. While newspaper articles are produced by trained journalists and curated by editors, tweets are produced by individual users and are largely unmoderated. Twitter coverage should therefore contain less firm information than coverage in a major financial newspaper. To test this, we replace ν_{it} in (2) with twitter frequency.[7]

Panel (a) in Figure 4 shows that as with the traditional press, Twitter coverage is associated with a higher likelihood of equity issuance. Firms with one-standard-deviation higher Twitter mentioning is associated with 0.35% higher likelihood of equity issuance in the following year. At peak, the coverage is associated with a 0.45% higher equity issuance probability. If anything, the association between social media coverage and equity issuance

[7] We collect the frequency at which corporate Twitter display names are tagged by any user. These frequencies are demeaned at the firm level and standardized in the same way as the measure of newspaper coverage

is somewhat stronger than that of newspaper coverage (Figure 3a). However, unlike the traditional press, the extra equity issuance does not translate into fundamentals. Responses of investment and profitability are statistically insignificant at the 10% level. Indeed, point estimates of investment display a slight downward trend after the coverage. Our results indicate that major newspapers play a special role in disseminating information. Even though social-media coverage might be informative of investor sentiment and relate to higher equity issuance, newspaper coverage alone is associated with greater investment and profitability.

Media strikes A concern with interpreting the estimates from (2) as the effects of news coverage is that coverage is endogenous to a firm's activities. Newspapers, for instance, may be more inclined to cover a firm if it is about to issue equity or embark on an investment project. To address this concern, we use media strikes to introduce variation in media coverage that is unrelated to firm choices (Peress, 2014).

Since large-scale media strikes are rare in the US, we turn to evidence from France.[8] We identify 6 episodes large-scale media strikes in France using the criteria developed by Peress (2014), detailed in Appendix Table A.2.[9] We focus on sector-wide strikes but not strikes by individual newspapers. These media strikes occur not because of individual newspaper or non-media firm factors, but rather as a response to government and policy changes, such as Nicolas Sarkozy broadcasting-advertising reform and Emmanuel Macron's pension reform.

To facilitate comparison with the US evidence, we first estimate effects of media coverage using the same local projection as in (2).[10] Appendix Figure A.6 report estimates that are consistent with the US evidence: Greater media coverage in France is associated with higher

[8]Appendix Figure A.5 reports the landscape of corporate news coverage in France, which displays both similarities and differences with the US. French corporate news coverage has been declining over time, as we documented for the US. The distribution of media coverage is also concentrated, but to a lesser degree than in the US.

[9]We search Factiva for keywords containing (i) "strike" and "journalist", or (ii) "strike" and "broadcaster", as well as their French translation. Using Factiva's tagging, we restrict the region to be France, the industry to be Media/Entertainment, and the subject to be Labor Dispute. We focus on national strikes and exclude strikes in individual newspapers. The 6 strike episodes are reported in Appendix Table A.2. They are concentrated in 5 quarters: 2005Q4, 2008Q1, 2008Q4, 2013Q1, and 2018Q2.

[10]For horizons $-4 \leq h \leq 12$, we estimate $\Delta_h y_{it+h} = \alpha_{st} + \alpha_i + \beta_h \nu_{it} + \Gamma' Z_{it} + u_{ith}$. As with the US analysis, the dependent variables consist of cumulative changes in equity issuance probability, investment, and ROE; and the explanatory variable, ν_{it}, measures firm coverage in the 4 major French newspapers and is demeaned at the firm level and standardized. We include firm fixed effects α_i and sector-by-quarter fixed effects α_{st}. We classify sectors using 2-digit rather than 4-digit NAICS levels, because the French equity market is far smaller than the US market (959 unique publicly traded firms in our French sample compared to 13,207 firms in our US sample). The vector Z_{it} controls for firm sales growth, size (log real assets), current assets as a share of total assets.

equity issuance probability, investment, and profitability.

During strikes, journalists stop writing articles for their employers, potentially reducing the amount of information provided by the media sector. The hypothesis we test is whether news reports affect firm outcomes. We do so by focusing on the subset of firms that have issued equity during the sample period and estimate

$$\log k_{it+4} - \log k_{it} = \alpha_j + \beta S_t + \delta\theta_{it} + \gamma\theta_{it}S_t + \Gamma' Z_{it} + u_{it}, \tag{3}$$

where the dependent variable is firm i's cumulative investment a year after equity issuance, α_s is a sector fixed effect, S_t is an indicator for media strikes in quarter t, θ_{it} is firm i's exposure to the strike, defined as the firm's average news coverage in the year before the strike, and Z_{it} is a vector of controls including firm sales growth, size, current assets as a share of total assets, fiscal year end, real GDP growth, and inflation.[11]

The parameter of interest is γ. Among firms that have issued equity during media strikes, γ measures the differential impact of the strike on a firm's investment depending on the firm's reliance on media coverage. If news media disseminates firm news to investors, firms that tend to receive more coverage are expected to suffer a bigger impact during strikes compared to their peers with little coverage to begin with. The specification in (3) allows for the possibility that strikes tend to happen in economic downturns by using the cross-sectional variation in firms' exposure to the same strike.

Table 2 report the results. Column 1 reports the baseline estimates without any controls. Columns 2 and 3 add macro and firm controls iteratively. Column 4 excludes firms that share a common owner with a major newspaper, to account for a possible direct effect of the labor disputes behind media strikes on the investment of firms in our sample. Specifically, *Les Echos* and *Le Figaro* are owned by LVMH and Dassault Group respectively. These groups are also the parent companies of some of the non-media firms in our sample.[12] Strikes in newspapers can arise from disputes with their owners, which potentially affects the investment decision of their non-media subsidiaries for reasons other than media coverage.

[11] We retrieve GDP (CLVMNACSCAB1GQFR) and inflation (CPHPTT01FRM659N) series from FRED.

[12] In our sample, subsidiaries of Dassault group (parent of *Le Figaro*) include Dassault Aviation and Dassault Systems; and the subsidiaries of LVMH (parent of *Les Echos*) include Bulgari, and Moet. *La Tribune* was owned by LVMH from 1993 to 2007 and is currently owned by individuals. *Le Monde* belongs to Groupe Le Monde, which does not have other subsidiaries in our sample.

Table 2: Equity issuance during media strikes and exposure to media coverage

	(1)	(2)	(3)	(4)
	Investment after issuance (1yr)			
Exposure	0.004	0.004	0.005	0.005
	(0.004)	(0.005)	(0.005)	(0.005)
Strike	-0.173	-0.132	-0.135	-0.170*
	(0.106)	(0.087)	(0.083)	(0.099)
Exposure × Strike	-0.042*	-0.043**	-0.045**	-0.044**
	(0.021)	(0.021)	(0.022)	(0.021)
Observations	1024	1024	1007	1006
R^2	0.039	0.041	0.043	0.042
FE	naics2	naics2	naics2	naics2
Double-clustered SE	yes	yes	yes	yes
Macro controls	no	yes	yes	yes
Firm controls	no	no	yes	yes
Remove common ownership	no	no	no	yes

Notes: This table reports the coefficient γ from estimating: $\log k_{it+4} - \log k_{it} = \alpha_j + \beta S_t + \delta\theta_{it} + \gamma\theta_{it}S_t + \Gamma' Z_{it} + u_{it}$, where t is the quarter in which a firm issues equity, the dependent variable $\log k_{it+4} - \log k_{it}$ is the cumulative investment 4 quarters after equity issuance, α_j is a sector fixed effect, S_t is an indicator for media strikes, θ_{it} is the average media coverage of firm i 4 quarters before the strike at time t, and Z_{it} is a vector of controls containing sales growth, size, current assets as a share of total assets, real GDP growth, and inflation. * ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$).

We account for this possibility by removing these subsidiaries.

We focus our discussion on Column 4 in Table 2, which provides the most conservative estimates. Firms that issue equity during media strikes invest 17% less compared to firms that issue during nonstrikes. Firms with higher historical coverage suffer more from the sudden loss of coverage. Compared to other firms that issue equity during strikes, a firm with one-standard-deviation higher historical coverage invest another 4% less after the equity issuance. The economic magnitude is one-quarter of the average effects from the strike. The results suggest that firms reply more on media coverage to disseminate firm news have to reduce their investment because of the strikes, consistent with the interpretation that media reports can alleviate the information friction firms face and facilitate their financing and investment.

3. A Model of Corporate News Reporting

Motivated by the empirical evidence, we construct a model of corporate news reporting to study its importance for corporate finance and firm life cycles. The model considers firms that raise equity from retail investors in the equity market, with asymmetric information which may be mitigated by information provided by news outlets. We calibrate the news-reporting function to those observed in the data and quantify the importance of news media.

3.1. Environment

Time is discrete, and there is no aggregate uncertainty. The economy consists of four groups of agents: firms, investors, forecasters, and news outlets. Firms produce with capital as the only input. They finance investments by tapping internal cash flows or by issuing external equity from retail investors. After production and before the equity market opens, firm's existing capital receives a capital quality shock. This shock is private information to firm managers and unobserved by investors, which is the source of asymmetric information in the equity market.

Media outlets can potentially alleviate the asymmetric information. Each outlet belongs to a forecaster, whose objective is to minimize forecast errors relative to other forecasters. Through investigative journalism, media uncovers the private capital quality of all firms but can only report on a subset of firms because of newspaper space constraints. Outlets make this editorial decision by maximizing the utility for its forecaster. The information structure is so that each forecaster only reads their own newspaper, but once a firm is reported by any news outlet, its capital quality becomes known to all investors.

Investors form posterior beliefs about firms' capital qualities after observing the reporting decisions of all outlets. At this point, equity market opens. For firms whose asset qualities are unreported, investors offer a single price based on publicly observable characteristics. Then firms make their equity issuance decisions, invest, and form the capital for the next period. At the end of each period, the firms' capital quality is fully revealed. Next, we describe each agent's problem in detail.

Our baseline model assumes that media outlets are owned by forecasters, whose preferences determine media's news-reporting function. It is worth noting that the same news-reporting function can be microfound directly from *investors' demand for information.* Appendix B provides such an alternative formulation, in which noise traders prevent asset prices from aggregating information of informed investors. Investors, therefore, demand information directly from the media, which generates the same news-reporting function.

Firms There is a continuum of firms indexed by $j \in [0,1]$, who are heterogeneous in three dimensions: capital quantity k, productivity z, and the productivity of existing capital a. Capital and productivity are public information for any agents in the economy, while existing capital productivity is private information for individual firms. Following the macro-finance literature (e.g., Bigio, 2015; Gertler, Kiyotaki and Prestipino, 2019), we henceforward refer to a as the "capital quality" of a firm.

At the beginning of each period, firm j inherits capital $k_{j,t}$ from the previous period. The firm also observes its idiosyncratic productivity $z_{j,t}$, which evolves according to

$$\ln z_{j,t} = \rho_z \cdot \ln z_{j,t-1} + \epsilon^z_{j,t}, \quad \text{where } \epsilon^z_{j,t} \overset{i.i.d}{\sim} \mathcal{N}(0, \sigma_z^2). \tag{4}$$

Then each firm receives an i.i.d. exit shock $\epsilon^{\texttt{exit}}_{j,t} \sim \texttt{Bernoulli}(\xi)$. Firms that exit liquidate their assets and are replaced by an equal mass of firms drawn from the distribution $\mathcal{F}^{\text{entrant}}(z,k)$. Firms that remain in operation produce using capital as the input with the technology

$$y_{j,t} = Z \cdot z_{j,t} \cdot k_{j,t}, \tag{5}$$

where Z denotes aggregate productivity.

After the production, a firm receives an i.i.d. quality shock (a) to its assets in place and chooses its investment $x_{j,t}$. Its capital evolves according to

$$k_{j,t+1} = (1-\delta) \cdot a_{j,t} \cdot k_{j,t} + x^{\theta}_{j,t}, \quad \text{where } a_{j,t} \overset{i.i.d}{\sim} \mathcal{F}(a). \tag{6}$$

The i.i.d. assumption on the capital quality is important since it prevents investors from inferring it using past information.

A firm has access to external funds through an equity market. It allocates the proceeds from production and equity issuance between investment and dividend payouts. A firm's budget constraint is specified by

$$div_{j,t} + x_{j,t} = y_{j,t} + e_{j,t} - \phi^e \mathbb{1}_{e_{j,t}>0} \tag{7}$$

where $e_{j,t}$ denotes the funding raised from issue new equity and ϕ^e denotes a fixed cost of issuing equity.

Investors There is a continuum of risk-neutral retail investors. They purchase firm equity to maximize their expected return.

When making investment decisions to maximize expected returns, investors observe capital k and productivity z of each firm. They cannot observe the quality of assets-in-place a and must make inference about it based on media reports.[13] When a firm is reported by the media outlets, its asset quality is fully revealed. When a firm is not reported by the media, investors form a posterior belief, μ_t, on a firm's asset quality following Bayes rule

$$\mu_t(a|k,z) = \frac{\mathcal{F}(a)(1-\mathcal{R}_t(k,z,a))}{\int \mathcal{F}(a)(1-\mathcal{R}_t(k,z,a))da}, \tag{8}$$

where $\mathcal{R}_t(k,z,a)$ is the probability that a firm with fundamentals (k,z,a) would be reported in period t, described next.

Media and forecasters There is a continuum of media outlets, indexed by $i \in [0,1]$, who have full information on all firm fundamentals, including asset qualities a_j. Each outlet is owned by a corresponding forecaster, who reads the news in their outlet and does not read other outlets. Each media outlet i decides whether to report each firm j, and these decisions are collected in the variable $\hat{m}_{i,j,t} \in \{0,1\}$. If $\hat{m}_{i,j,t} = 1$, outlet i reports the exact $a_{j,t}$ to its associated forecaster in period t. If $\hat{m}_{i,j,t} = 0$, outlet i does not report on firm j, and transmits no information about $a_{j,t}$. Throughout the paper, we use $\hat{m}_{i,j,t}$ to denote the reporting choices of an individual news outlet i and $m_{j,t}$ the aggregate news reporting outcome for firm i.

[13] Under the set up of classical asymmetric information problems, investors can learn a firm's asset quality through the size of its equity issuance. We focus on the role of the media and assume news reporting is the only source of information for investors.

When deciding which firms to report, outlets are constrained (by physical newspaper space or by forecaster attention capacity). They can only report on a fraction $r \in (0,1)$ of firms each period.

$$\int_0^1 \hat{m}_{i,j,t} dj = r. \tag{9}$$

The information communicated by outlet i is:

$$\mathcal{I}_{i,t}^{\text{news}} = \{a_{j,t} : \hat{m}_{i,j,t} = 1\} \tag{10}$$

Forecaster i observes $\mathcal{I}_{i,t}^{\text{news}}$, along with observables $k_{j,t}, z_{j,t}$. They are also able to observe the reporting decisions of other outlets ($\hat{m}_{i',j,t}$), but not the contents of those reports. Forecaster i therefore does not observe $a_{j,t}$ unless their own outlet reports it ($\hat{m}_{i,j,t} = 1$), regardless of whether that information appears in other media outlets.

Unlike forecasters, investors are not constrained to read a single news outlet, but rather observe all information reported in all outlets.[14] The investor information set therefore consists of observables $k_{j,t}, z_{j,t}$ for all firms j, and the total information reported in the media $\mathcal{I}_t^{\text{news}} = \{a_{j,t} : m_{j,t} = 1\}$, where the aggregate news reporting indicator $m_{j,t}$ is defined as

$$m_{j,t} = \begin{cases} 0 & \text{if } \hat{m}_{i,j,t} = 0 \text{ for all } i \\ 1 & \text{otherwise.} \end{cases} \tag{11}$$

That is, if at least 1 outlet reports on firm j, then investors observe that report, and observe $a_{j,t}$. The assumption that forecasters observe the reporting decisions of all outlets implies they also observe $m_{j,t}$, so $a_{j,t}$ is the only source of uncertainty.

Forecasters use their observed information to form a prediction of the market value of each firm j. Market value is priced by investors once the equity market opens. In Section 3.3 below, we show that market value is a function of firm fundamentals $(k_{j,t}, z_{j,t}, a_{j,t})$, and the aggregate news reporting indicator $m_{j,t}$.

[14] This assumption can be microfounded as follows. Since there is no noise in market prices in this model (unlike e.g. Grossman and Stiglitz, 1980), market prices perfectly aggregate information. If even one investor reads the news published by outlet i, they therefore use that information to trade, and market prices adjust to communicate that information to all other investors.

We denote stock market value as $MV(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t})$, and the associated prediction of forecaster i as $\mathcal{P}(k_{j,t}, z_{j,t}, m_{j,t}, \mathcal{I}_{i,t}^{\text{news}})$. The realized forecast errors of forecaster i are given by

$$FE(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}_{i,t}^{\text{news}}) \equiv \left[\mathcal{P}\left(k_{j,t}, z_{j,t}, m_{j,t}, \mathcal{I}_{i,t}^{\text{news}}\right) - MV(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t})\right]^2 \tag{12}$$

each forecaster derives utility from making more accurate forecasts than their peers, as in the literature on forecaster incentives (see review in Marinovic, Ottaviani and Sorensen, 2013). Specifically, forecaster i experiences utility $U_{i,t}$, which is given by

$$U_{i,t} \equiv -\int_0^1 \left[FE(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}_{i,t}^{\text{news}}) - \bar{FE}_{-i}(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}_{i',t}^{\text{news}})\right] dj, \tag{13}$$

where $\bar{FE}_{-i}(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}_{-i,t}^{\text{news}})$ is the realized average forecast error about firm j from forecasters reading news outlets other than i

$$\bar{FE}_{-i}(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}_{-i,t}^{\text{news}}) \equiv \int_{i' \neq i} \left[\mathcal{P}\left(k_{j,t}, z_{j,t}, m_{j,t}, \mathcal{I}_{i',t}^{\text{news}}\right) - MV(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t})\right]^2 di'. \tag{14}$$

This formulation implies that a forecaster gains utility from having low average ex-post forecast errors, relative to the forecast errors made by other forecasters using news from other outlets. Although we abstract from outlet demand for simplicity, this is consistent with a model in which potential readers compare the quality of news outlets as information sources by comparing their previous forecast performance (as in, e.g., the contest model of Ottaviani and Sørensen, 2006).

Optimal forecasts Forecasters choose $\mathcal{P}\left(k_{j,t}, z_{j,t}, m_{j,t}, \mathcal{I}_{i,t}^{\text{news}}\right)$ to maximize their expected utility, where the expectation is formed conditional on their restricted information set.

$$\mathcal{P}(k_{j,t}, z_{j,t}, m_{j,t}, \mathcal{I}_{i,t}^{\text{news}}) = \arg\max \mathbb{E}(U_{i,t} | k_{j,t}, z_{j,t}, m_{j,t}, \mathcal{I}_{i,t}^{\text{news}}) \tag{15}$$

where $U_{i,t}$ is defined in equation (13).

The forecaster's choice has no effect on realized market values, or on the forecasts of others. $\bar{FE}_{-i}(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}_{-i,t}^{\text{news}})$ is therefore unaffected by the choice of forecaster i.

The optimal forecast is characterized by the first order condition

$$\frac{d\,\mathbb{E}\left(FE(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}_{i,t}^{\text{news}})|k_{j,t}, z_{j,t}, m_{j,t}, \mathcal{I}_{i,t}^{\text{news}}\right)}{d\mathcal{P}(k_{j,t}, z_{j,t}, \mathcal{I}_{i,t}^{\text{news}})} = 0, \tag{16}$$

$$\iff \mathcal{P}(k_{j,t}, z_{j,t}, m_{j,t}, \mathcal{I}_{i,t}^{\text{news}}) = \mathbb{E}(MV(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t})|k_{j,t}, z_{j,t}, m_{j,t}, \mathcal{I}_{i,t}^{\text{news}}). \tag{17}$$

That is, the forecaster simply sets their forecasts equal to the rational expectation of each firm's market value.

For any firm that is reported by outlet i, this optimal forecast is trivial. For such a firm, $\mathcal{I}_{i,t}^{\text{news}}$ contains $a_{j,t}$. As a result, forecaster i observes all of the inputs to firm j's market value, and so can forecast it precisely

$$\mathcal{P}(k_{j,t}, z_{j,t}, 1, \mathcal{I}_{i,t}^{\text{news}}|\hat{m}_{i,j,t} = 1) = MV(k_{j,t}, z_{j,t}, a_{j,t}, 1). \tag{18}$$

Note that here $\hat{m}_{i,j,t} = 1$ necessarily implies $m_{j,t} = 1$ (equation (11)). Substituting this forecast into equation (12) reveals that when $\hat{m}_{i,j,t} = 1$, forecaster i makes no forecast errors: $FE(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t} = 1, \mathcal{I}_{i,t}^{\text{news}}) = 0$.

For any firm that is not reported by outlet i, the optimal forecast is more complicated, for two reasons. First, the forecaster is uncertain about $a_{j,t}$; and second, forecast errors may differ depending on the realization of $m_{j,t}$.

We show in Section 3.3 below that the market value of a firm with $m_{j,t} = 0$ is independent of the realization of $a_{j,t}$. This means that the forecaster's optimal forecast is

$$\mathcal{P}(k_{j,t}, z_{j,t}, 0, \mathcal{I}_{i,t}^{\text{news}}|\hat{m}_{i,j,t} = 0) = \mathbb{E}(MV(k_{j,t}, z_{j,t}, a_{j,t}, 0)|k_{j,t}, z_{j,t}, m_{j,t} = 0) \tag{19}$$

$$= MV(k_{j,t}, z_{j,t}, a_{j,t}, 0). \tag{20}$$

There is no uncertainty here because the expectation is conditioned on every firm state variable that affects market value in the case where $m_{j,t} = 0$. Intuitively, market value is priced by investors, and the information set used to form forecast $\mathcal{P}(k_{j,t}, z_{j,t}, 0, \mathcal{I}_{i,t}^{\text{news}}|\hat{m}_{i,j,t} = 0)$ contains every piece of information available to investors for an unreported firm. As with the case when $\hat{m}_{i,j,t} = 1$, forecast errors are again equal to 0.

The only case where forecaster i makes a non-zero forecast error is therefore when their media outlet does not report on a firm j, but at least one firm does report on it, so $m_{j,t} = 1$.

In this case, realized $a_{j,t}$ affects the firm's market value, but forecaster i does not observe it.

3.2. Markets and decision problems

Equity market Firms issue their equity at a constant price that depends on investors' belief about their asset quality. Since the only information source for investors is media reports, the stock issuance price of a firm will depend on whether it is reported by any media outlets, as summarized in the aggregate reporting indicator defined in equation (11). Normalizing the quantity of existing shares to 1 and denoting the evaluation of a firm's existing shares as $P(k,z,a,m)$, a firm has to issue a further $\frac{e}{P(k,z,a,m)}$ shares to external investors to raise funding e. For the firms which are not reported in the media, their stock issuance price is only conditional on their publicly observable characteristics, so $P(k,z,a,0) = P(k,z,a',0) \equiv \bar{P}(k,z)$ $\forall a \neq a'$.

Firm decisions Managers maximize the net present value of the dividend payments to their existing shareholders. Under this objective, a firm's problem is given by

$$V_t(k,z,a,m) = \max_{e \geq 0} \frac{P_t(k,z,a,m)}{P_t(k,z,a,m)+e} \cdot W_t(ak,\ y + e - \mathbf{1}_{e>0}\phi^e,\ z) \tag{21}$$

$$\text{s.t.} \qquad y = Z \cdot z \cdot k. \tag{22}$$

$W_t(\cdot)$ characterizes a firm's value after equity issuance and is specified by

$$W_t(\hat{k},n,a) = \max_{div \geq 0, x \geq 0} div + \mathbb{E}_t\left[\Lambda \cdot \bar{U}_{t+1}(k',z')|z\right] \tag{23}$$

$$\text{s.t.} \qquad n = div + x \tag{24}$$

$$k' = (1-\delta)\cdot\hat{k} + x^{\theta} \tag{25}$$

$$\bar{U}_t(k,z) \equiv \xi \cdot \hat{V}_t(k) + (1-\xi)\cdot \bar{V}_t(k,z) \tag{26}$$

$$\bar{V}_t(k,z) \equiv \mathbb{E}_t\left[m_t(k,z,a)\cdot V_t(k,z,a,1) + (1-m_t(k,z,a))\cdot V_t(k,z,a,0)\right] \tag{27}$$

where $\hat{V}_t(k) \equiv k$ denotes the capital's liquidation value.

Media outlet decisions Outlet i chooses which firms to report in order to maximize the expected utility of their forecaster, subject to the space constraint. Their problem is given by

$$
\begin{aligned}
\mathbb{E}\, U_{i,t} = \; & \max_{\hat{m}_{i,j,t}} - \mathbb{E} \int_0^1 \left[FE(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}^{\text{news}}_{i,t}) \right. \\
& \left. - \bar{FE}_{-i}(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}^{\text{news}}_{-i,t}) \right] dj \qquad (28)
\end{aligned}
$$

$$
\text{s.t.} \qquad \mathcal{I}^{\text{news}}_{i,t} = \{a_{j,t} : \hat{m}_{i,j,t} = 1\} \qquad (29)
$$

$$
r = \int_0^1 \hat{m}_{i,j,t} dj \qquad (30)
$$

$$
FE(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}^{\text{news}}_{i,t}) = \left[\mathcal{P}\left(k_{j,t}, z_{j,t}, m_{j,t}, \mathcal{I}^{\text{news}}_{i,t}\right) - MV(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}) \right]^2 \qquad (31)
$$

$$
\bar{FE}_{-i}(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}^{\text{news}}_{-i,t}) = \int_{i' \neq i} \left[\mathcal{P}\left(k_{j,t}, z_{j,t}, m_{j,t}, \mathcal{I}^{\text{news}}_{i',t}\right) - MV(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}) \right]^2 di' \qquad (32)
$$

There are two details worth noting at this point. First, outlet i's objective function depends on the reporting behavior of other outlets, both through $\bar{FE}_{-i}(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}^{\text{news}}_{-i,t})$ and realized market values. When choosing reporting $\hat{m}_{i,j,t}$, outlet i takes the reporting decisions of other outlets, $\hat{m}_{-i,j,t}$, as given.

Second, the media outlet maximizes the expectation of $U_{i,t}$, taken before the forecaster observes information and makes their forecasts. This objective is therefore conditional on the information available to the forecaster at the moment when reporting decisions are made. In principle, it is possible to consider an alternative in which the outlets maximize *realized* utility, as they observe all firm state variables before choosing reporting, so they have more information available than their forecasters. We explore this, and other alternative assumptions in the media block of the model, in Appendix C.1. While such a change has an effect on the exact form of the equilibrium reporting decisions of outlets, the key qualitative characteristics of the reporting functions are robust to these alternative assumptions.

3.3. Equilibrium

The equilibrium consists of the paths for firm distribution $\mathcal{F}_t(k, z, a)$, aggregate media reporting $m_t(k, z, a)$, firms' value functions $V_t(k, z, a, m)$, policy functions $\mathbf{e}_t(k, z, a, m)$, $\mathbf{n}_t(k, z, a, m)$, $\mathbf{div}_t(k, z, a, m)$, and $\mathbf{x}_t(k, z, a, m)$, equity issuance prices $P_t(k, z, a, m)$, and firms' stock market value $MV_t(k, z, a, m)$ that satisfy:

1. given the firm distribution $\mathcal{F}_t(k, z, a)$, firms' value functions, and equilibrium prices,

media outlets determine reporting choices $\hat{m}_{i,j,t}$, which in turn determines aggregate media reporting $m_{j,t}$;

2. given the equity prices $P(k,z,a,m)$, firms make their optimal choices of equity issuance $\mathbf{e}_t(k,z,a,m)$, investment $\mathbf{x}_t(k,z,a,m)$ and dividend payout $\mathbf{div}_t(k,z,a,m)$;

3. given the updated belief and firms' financing and investment policies, the equity prices have to satisfy the break-even conditions in the equity markets:

$$\int \frac{\mathbf{e}_t(k,z,a,0)}{\mathbf{e}_t(k,z,a,0)+\bar{P}_t(k,z)} \cdot W_t\left(\hat{k}(k,a),\mathbf{n}_t(k,z,a,0),z\right)\mu_t(a|k,z)da$$
$$= \int \mathbf{e}_t(k,z,a,0) \cdot \mu_t(a|k,z)da, \quad \forall(k,z) \tag{33}$$
$$\frac{\mathbf{e}_t(k,z,a,1)}{\mathbf{e}_t(k,z,a,1)+P_t(k,z,a,1)} \cdot W_t\left(\hat{k}(k,a),\mathbf{n}_t(k,z,a,1),z\right)$$
$$=\mathbf{e}_t(k,z,a,1), \quad \forall(k,z,a). \tag{34}$$

4. firms' stock market value is determined by:

$$MV_t(k,z,a,1) = \begin{cases} P_t(k,z,a,1) & \text{if } \mathbf{e}_t(k,z,a,1) > 0 \\ V_t(k,z,a,1) & \text{otherwise} \end{cases} \tag{35}$$
$$MV_t(k,z,a,0) = \begin{cases} \bar{P}_t(k,z) & \text{if } \int \mathbf{e}_t(k,z,a,0)\mu_t(a|k,z)da > 0 \\ \int V_t(k,z,a,0)\mu_t(a|k,z)da & \text{otherwise} \end{cases} \tag{36}$$

3.4. Equilibrium news reporting function

So far, the reporting decisions of media have only been defined implicitly as the solution to the maximization problem in equations (28)-(32). We now characterize which firms get reported in equilibrium. We focus our analysis on symmetric equilibria in pure strategies for outlets.[15] That is, we consider equilibria in which all outlets make the same reporting decisions, and so $\hat{m}_{i,j,t} = \hat{m}_{i',j,t} = m_{j,t}$ for all outlets i, i' and all firms j.[16] The reporting

[15]Importantly, since all forecasters are identical ex-ante, the motives for media specialization studied in Nimark and Pitschner (2019) and Perego and Yuksel (2022) (among others) are absent in our setting.

[16]Under pure strategy equilibria, $\hat{m}_{i,j,t}$ is entirely determined by firm j's state variables, and there is no randomness in outlet reporting decisions.

decisions of media are characterized in Theorem 1.

***Theorem* 1.** *There is a unique news-reporting policy that can be sustained in a symmetric equilibrium, which is given by*

$$m_{j,t} = \mathbb{1}(\mathcal{N}(k_{j,t}, z_{j,t}) \geq \mathcal{N}_t^*), \tag{37}$$

where newsworthiness function

$$\mathcal{N}(k_{j,t}, z_{j,t}) = \mathbb{V}[MV(k_{j,t}, z_{j,t}, a_{j,t}, 1)], \tag{38}$$

and the reporting threshold $\mathcal{N}_t^*$ is determined by the space constraint (9):

$$\Pr(\mathcal{N}(k_{j,t}, z_{j,t}) \geq \mathcal{N}_t^*) = r. \tag{39}$$

Proof. Appendix C.2.1 □

Appendix C.2.1 details the proof. To find news-reporting policy, we begin by considering an arbitrary candidate reporting policy. We then show that there is a unique candidate reporting policy from which no outlet would find it optimal to deviate, since any deviation would lead to an inrease in forecast errors.

Theorem 1 specifies media's reporting behavior, and equation (38) defines the equilibrium newsworthiness function. With these, we can calibrate media's reporting to the empirical facts documented in Section 2 to study its macroeconomic importance.

4. Quantitative Analysis

In this section, we first present our calibration of the parameters, paying particular attention to how we use our data on corporate news reporting to discipline the media reporting behavior in the model. Then we discuss how media reporting affects firms' investment and financing, and how media's reporting policy could reshape the firm dynamics.

4.1. Calibration

We calibrate the model quarterly and set the discount rate to be $\beta = 0.99$, which corresponds to a 4% annual real interest rate. Then, we calibrate parameters listed in Table 3a to target empirical moments in Table 3b. The calibrated parameters are divided into five groups. The first three groups are standard parameters on firm dynamics (cash flow, investment technology, and life-cycle dynamics), which we calibrate following existing approaches. The last two groups of parameters govern financial and information frictions in the economy. Given their importance for gauging the role of media, we discuss their calibration in greater detail.

Table 3: Model calibration

(a) Calibrated Parameters

Parameter		Value
Cash Flow		
Z	Level of aggregate productivity	2.28%
ρ_z	Idiosyncratic productivity, persistence	0.91
σ_z	—, innovation standard deviation	0.25
Investment Technology		
δ	Depreciation rate	4.23%
θ	Return-to-scale of investment technology	0.82
Life-cycle Dynamics		
ξ	Exit probability	2.03%
$\mu_{\ln z}^{entrant}$	Entrants, average (log) productivity	-0.5458
$\mu_{\ln k}^{entrant}$	—, average (log) size	1.5211
Information and Financial Friction		
σ_a	Dispersion of capital quality shock	0.15
ϕ^e	Fixed cost to issuing equity	0.57%
Selective Media Reporting		
λ_ξ	Curvature of reporting probability	3.45
$(\lambda_\alpha, \lambda_p)$	Location of reporting probability function	(0.8, 0.4)

(b) Targeted Moments

Moment	Data	Model
Cash Flow (annual, %)		
Operating cash flow rate, mean	10.77	10.79
Log revenue rate, persistence	0.75	0.76
–, std	0.63	0.64
Investment and growth (annual, %)		
Investment rate, mean	6.30	6.06
–, std	9.76	10.53
Growth rate, std	40.23	40.31
Equity financing (annual, %)		
Fraction of firms issuing equity	17.30	17.14
Issuance fee ratio, mean	1.96	1.84
Difference between matured (age$\geq$ 15) and young firms (age$\leq$5)		
Size	0.994	0.994
Log revenue rate	0.173	0.173
News Reports		
$p_{\geq 80\%}/p_{\leq 20\%}$	269	272

Notes: ϕ^e has been normalized by the average annual profit of the firm population. Operating cash flow rate, revenue rate, and investment rate refer to firms' operating cash flow, revenue, and investment normalized by their capital. The issuance fee ratio is measured as the fixed cost paid by the issuing firms normalized by their issuance proceeds. $p_{\geq 80\%}$ and $p_{\leq 20\%}$ denote the average reporting probability of the firms in the top 20% and bottom 20% of market capitalization percentile. When constructing the annual rate in the model, we first simulate a panel of the firms at a quarterly frequency, and then we aggregate the quarterly data into annual data so our model-implied moments are directly comparable to our empirical moments. All the empirical moments are based on Compustat firms between 1990 and 2016.

4.1.1. Firm dynamics

Cash flow level and dynamics The steady-state operating cash flow rate, Z, determines the average level of internal financing a firm can produce. We calibrate it to match the average operating cash flow rate in the data. The idiosyncratic productivity shock, z, is the source of cash flow risk faced by the firms, which shapes firms' ex-post heterogeneity and precautionary motives in investment decisions. We calibrate its persistence and volatility to match the empirical persistence and volatility of the log revenue rate, which is measured by firms' revenue normalized by their capital.

Investment technology and capital accumulation We calibrate the depreciation rate, δ, to match the average investment rate at which firms replenish their depreciated capital and grow. The return-to-scale of investment technology, θ, governs the sensitivity of firms' investment to variations in their capital profitability. We target the cross-sectional standard deviation of the investment rate in the data, and set $\theta = 0.82$. In this model, capital accumulation is driven by two factors: firms' investment and the quality shock to their existing capital. With θ calibrated to match the dispersion of investment rate, we calibrate the dispersion of capital quality shocks to match the standard deviation of the growth rate of total assets in data.

Life-cycle dynamics The ex-post heterogeneity across firms is shaped by both the dynamics of their idiosyncratic productivity and their life-cycle evolution. There are three parameters that govern firms' life-cycle in this model: the exit rate ξ, which determines the firms' age distribution, and the two parameters of the entrant distribution $\{\mu^{entrant}_{\ln z}, \mu^{entrant}_{\log(k)}\}$, which shape the differences between firms across different age groups[17]. We set the exit rate to $\xi = 8.1\%$ to match the average annual exit rate in the data. We calibrate the average size and idiosyncratic productivity of the entrants to match the difference between young (age≤ 5) and matured (age> 5) firms in their size and revenue rate.

4.1.2. Financial and information frictions

Firms' equity financing is subject to two frictions in this model: the explicit fixed cost of issuing equity and the implicit cost arising from asymmetric information that is not perfectly resolved by the media. We first calibrate the equity issuance cost to match the average level of management and underwriting fee as reported in Lee and Masulis (2009). Then, we calibrate

[17]We parameterize the entrant distribution $\mathcal{F}^{entrant}(z,k)$ as a mixture of two independent normal distribution of firms' log productivity and log size: $\ln z \sim \mathcal{N}(\mu^{entrant}_{\ln z}, 0.01)$ and $\ln k \sim \mathcal{N}(\mu^{entrant}_{\ln k}, 0.01)$. Here, we set the standard deviation at 0.01, which is small enough to have negligible effects on the results but make the distribution smooth.

the media reporting function to match the cross-sectional pattern of media reporting and the firms' average probability of issuing equity.

Parameterization of the media reporting policy To translate the optimal reporting policy defined in Section 3.2 to a quantitative setting, we parametrize the media reporting policy as a generalized hazard function

$$\mathcal{R}_t(k, z, a) = \frac{\lambda_p}{\lambda_p + (1 - \lambda_p)(\frac{\lambda_\alpha}{\mathcal{Q}_t(k,z,a)})^{\lambda_\xi}}, \tag{40}$$

where $\mathcal{Q}_t(k, z, a)$ denotes the percentile location of the newsworthiness of a firm with idiosyncratic state (k, z, a), $\lambda_\xi > 1$, $\lambda_\alpha \in (0, 1)$, and $\lambda_p \in (0, 1)$. Under this parameterization, the probability of being reported is monotonically increasing with firms' newsworthiness and lies between 0 and 1.

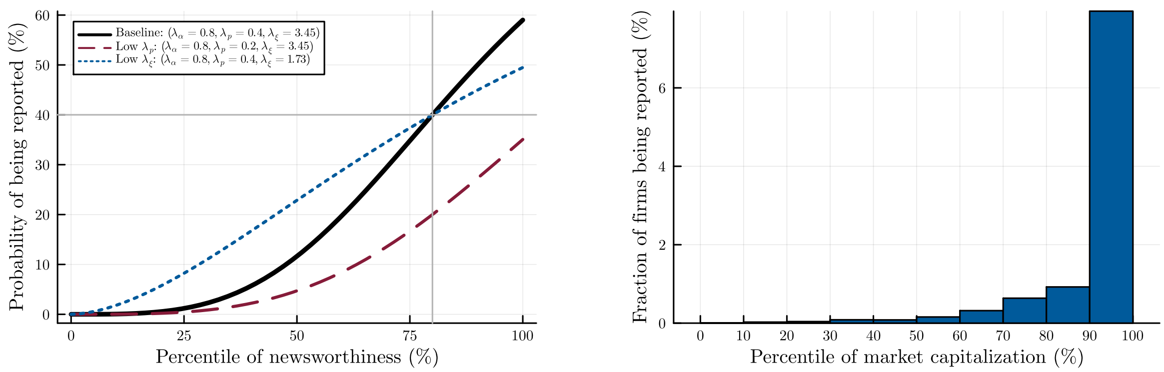
In the limit as $\lambda_\xi \to \infty$, this exactly matches the optimal reporting function from Section 3.2. For finite λ_ξ, however, the probability of being reported becomes a smooth function of $\mathcal{Q}(k, z, a)$. Economically, this can be viewed as assuming that media outlets make errors in reporting decisions with a small probability. This assumption helps us to match the news-reporting function to our media coverage data. In particular, each parameter captures a specific feature of the dependency of reporting probability on the firms' newsworthiness ranking, which provides clear intuition behind their calibration. As illustrated in Figure 5a, $\{\lambda_\alpha,\ \lambda_p\}$ are the location parameters: a firm with newsworthiness percentile of λ_α has a probability of λ_p to be reported by media. When the newsworthiness percentile increases passing λ_α, the corresponding probability of being reported quickly increases. The steepness of this increase is governed by parameter λ_ξ: higher λ_ξ implies a steeper increase in the reporting probability.

Calibration of the media reporting policy The ideal empirical moments for disciplining media-reporting parameters are the relationship between the probability of media coverage and a firm's newsworthiness. However, these moments are not directly measurable for two reasons. First, we do not observe a firm's newsworthiness, because it depends on its potential stock market value both with and without reporting, and only one of these is ever

Figure 5: Calibration of Media Reporting Policy

(a) Parameterization

(b) Data Moment



Notes: Figure 5b is based on the same sample as the empirical facts as presented in Section 2. We first divide the firms into ten quintile groups based on their market capitalization in each quarter. Then we compute the share of firms being reported by the media in each quintile group and report the cross-time average of these shares for each quintile group.

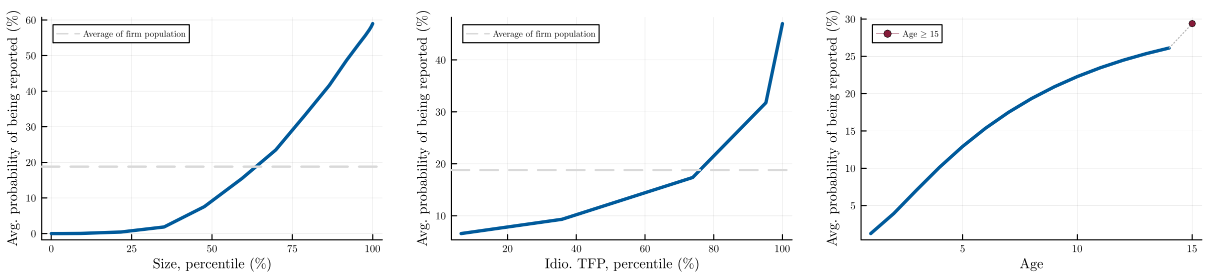
realized. Nor do we observe a firm's probability of being reported because we only observe the realization in the data (either reported or unreported). Second, our newspaper sample does not necessarily represent the entire media sector's coverage of a firm, as we only have data for three newspapers. Our data is therefore a lower bound on how many firms are reported each quarter. Given these challenges, we instead infer the media-reporting function by targeting two groups of moments. The advantage of this calibration strategy is that it is unaffected by these measurement challenges.

First, we calibrate λ_α and λ_ξ to match how the share of firms with newspaper coverage varies across different market-capitalization percentiles. Figure 5b shows that the share of firms with newspaper coverage monotonically increases with the percentile of market capitalization. The average share of firms with news coverage stays low for firms whose market capitalization is below the 80% percentile; at the 80% threshold, the share rises rapidly. Therefore, we fix λ_α at 0.8 to match the shape of the curve, and calibrate λ_ξ to match the ratio between the fraction of being reported for the firms in the top-20% and bottom 20% percentile. In this way we use the cross-sectional patterns from our data, but do not target the overall level of coverage, as our data is necessarily a lower bound on the proportion of firms who are reported.

Second, we calibrate λ_p to target the average share of firms with equity issuance. λ_p controls the average probability of firms being reported. Given a certain fixed cost of equity issuance, the more likely firms are reported by the media, the less severe asymmetric information frictions are, and the more likely firms choose to issue equity. Guided by this mechanism, we use the average fraction of firms issuing equity as our target moment to calibrate the parameter λ_p. Under our calibrated λ_p, the average probability of being reported of the firm population is 14%.

Figure 6: Cross-sectional Pattern of Media Reporting

(a) By Size **(b)** By Idio. Productivity **(c)** By Age



4.2. Patterns of corporate news reporting

Equation (38) specifies that firms associated with larger ex-ante variance in their market value are more likely to be reported by the media. Figure 6 reports the cross-sectional variation in the probability of media coverage under our calibration. We plot the cross-section of firms' coverage probability along three dimensions: their size, idiosyncratic productivity level, and age. Consistent with the stylized facts documented in Figure **??** and **??**, larger and older firms are more likely to be reported by the media, and the concentration is more pronounced in size. Our model also predicts that firms with higher idiosyncratic productivity have a higher probability of being reported by the media. The relationship between news reporting and firm size, age, and productivity directly follows from the equation (38). Newsworthiness scales with firm size and productivity because size and productivity directly determine firms' intrinsic market values. Because firm size and productivity grow over time on average, the positive correlation of firm size and productivity with the probability of media coverage extends to firm age.

4.3. The Effects of cedia reporting on firm investment and financing

Through the lens of our calibrated model, we quantify the effects of media coverage on firms with different asset qualities. We first compute the difference in equity issuance, investment, and stock market value for each firm between two scenarios: when it is reported and when it is not reported. We then compute average differences in these firm outcomes conditional on each level of capital quality. Figure 7 reports the results. To highlight the role of media reporting in shaping firm investment and financing, we divide firms into two groups, constrained and unconstrained firms, based on their publicly observable idiosyncratic state k and z. Precisely, a firm with size k and idiosyncratic productivity z is categorized as a constrained firm if there exists some a such that $\mathbf{e}(k, z, a, 1) > 0$ or $\mathbf{e}(k, z, a, 0) > 0$.

Constrained and unconstrained firms Figure 7a depicts the effects of media coverage on market values. Media reports separate high-capital-quality firms from being pooled with low-quality firms, which boosts firm valuation by investors. In contrast, media reports reveal low-capital-quality firms as lemons, which reduce their valuations. Figure 7b and 7c show that although media reporting leads to responses in market values for all firms, it only leads to responses in equity issuance and investment for constrained firms. For the high-quality constrained firms, the higher market evaluation triggered by the media reporting allows the high-quality firms to issue equity at a lower cost, which stimulates their equity issuance and investment. In contrast, the lower market evaluation of the low-quality constrained firms triggered by the media reporting leads to the dampening effects on these firms' equity issuance and investment.

Figure 7: Treatment Effects of News Reporting

(a) Stock market value **(b)** Equity Issuance **(c)** Investment

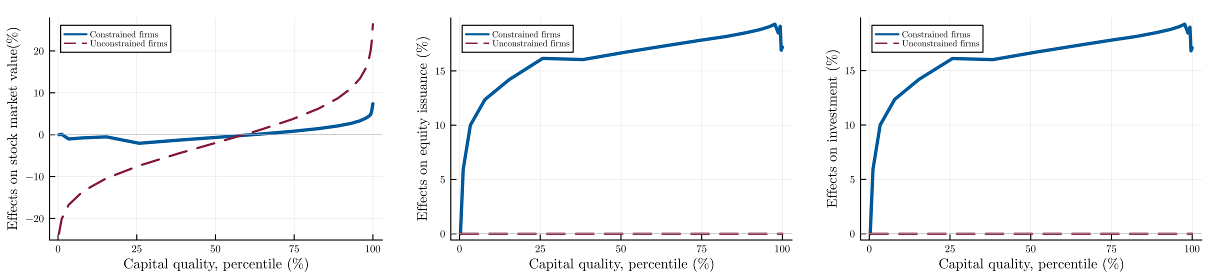


Figure 7 highlights the discrepancy between the media's incentives of corporate news reporting and firms' benefits from being reported on. The media's news-reporting function only depends on firm market values. Under this incentive, they allocate a significant fraction of their limited space to report on unconstrained firms that have large stock market values but don't rely on external financing to invest. For these firms, being reported triggers the responses in their stock market values, but these responses will not pass through to their financing and investment activity. If the media reallocates their reporting on unconstrained firms to constrained firms, news reporting will generate a bigger real effect on the economy. In the next subsection, we quantify how a reallocation of media reporting can affect aggregate financing and investment.

4.4. Media reporting and firm dynamics

In this section, we study the effects of reallocating media coverage. We compare the firm distribution and life-cycle dynamics under two media-reporting functions: the baseline "selective reporting" and a counterfactual "uniform reporting", under which the media allocates reporting resources equally across firms. The key takeaway from this analysis is that reallocating media resources to firms that actually benefit from the coverage alleviates information frictions, reduces financial frictions, and promotes firm growth.

To interpret the magnitude of the difference between selective reporting and uniform reporting, we first solve two counterfactual cases that share the same structure as our baseline model except for the information friction. The first case features symmetric information between firms and investors, and the second case features the same asymmetric information as in the baseline but is without a media sector. Table 4 reports the difference between the two cases. Compared with the symmetric-information scenario, the no-media case features a smaller flow of equity issuance and investment, which naturally leads to smaller average firm sizes. These differences between these two cases allow us to measure the overall effects of asymmetric information. Next, we discuss how media reporting alleviates the effects of asymmetric information and how different types of media reporting differ on this front.

Firm Distribution Table 4 reports equity issuance, investment, and size for each case. Firms in our baseline model have greater equity issuance, investment, and average firm size compared with the no-media case, which implies that media reporting can alleviate the negative impacts of information asymmetry at the aggregate level. However, the economic magnitude is limited: media reporting in our baseline only alleviates 26% of the asymmetric information's negative impact on the average firm size. This small magnitude can be partially explained by the low average probability of being reported: only 18.8% of the firms are reported by the media in our baseline model. Another important reason for this small magnitude is that the selective-reporting media allocates most of their reporting resources to large firms that have little demand for external financing and thus derive no benefit from the reduction in asymmetric information in the equity market provided by media coverage.

Our counterfactual exercise addresses this second feature of news reporting. If we allocate the limited reporting resources of media evenly across firms, the average firm size will be increased by 1.07% relative to the selective media baseline. This is equivalent to 5.1% of the overall effects of information asymmetry, so this change in reporting function more than doubles the ability of media to remove the effects of information frictions on firm size. The comparison between selection reporting and uniform reporting reveals that the way media resources are allocated plays an important role in determining how much it alleviates the negative impacts of asymmetric information.

Life-cycle Dynamics To further understand the role of media resource allocation in shaping the firm dynamics, we summarize the age profile of firms' average equity issuance, investment, and size under both the selective reporting and the counterfactual uniform reporting in Figure 8. We plot the difference from the symmetric information scenario along age profiles. As a reference, we also plot the age profiles under the no-media case. The baseline selective media reporting alleviates the negative impacts of information asymmetry on firms' financing and investment, but these effects only become pronounced after firms become 2 years old. This is a direct result of the selectivity of media's reporting: young firms are much smaller than older firms, so the media devotes limited resources to disseminating their news. In contrast, when news reporting is evenly allocated across firms, these young and small firms substantially increase equity issuance and investment, even though they are still only reported 18.8% of the time. Since alleviating information friction in the early stage of a firm's life helps firms accumulate more capital, which is important for them to finance their future investment and growth opportunities, reallocating the reporting resources to these

Table 4: Role of Media Reporting in Shaping the Firms' Distribution

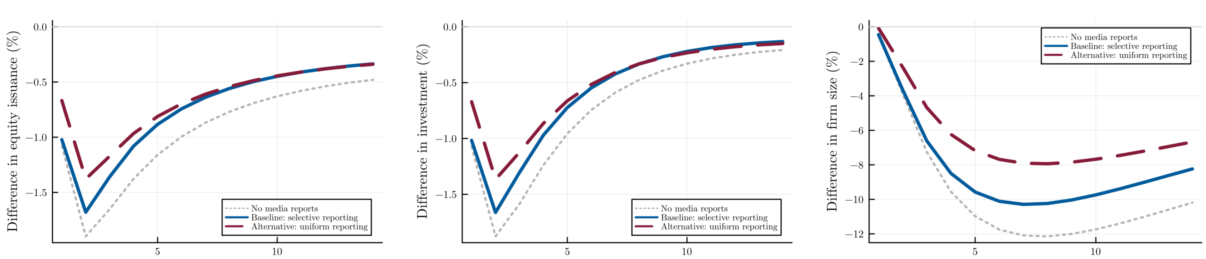
	Symmetric information	No media	Selective reporting	Uniform reporting
	Level	Difference w/ sym-info (%)		
Equity issuance rate (%)				
Average	0.81	-0.62	-0.50	-0.52
Fraction of positive flow	20.25	-4.25	-3.11	-2.10
Investment rate (%)				
Average	8.00	-1.83	-1.94	-1.88
Fraction of large flow ($\geq$ 20%)	13.03	-5.44	-4.80	-4.48
Firm size				
Mean	1.00	-8.24	-6.12	-5.70
Median	0.43	-10.42	-9.08	-7.13

Notes: The equity issuance rate and investment rate are measured as firms' quarterly equity issuance flow and investment normalized by their capital. The population-level average equity issuance and investment are reported in annual rate and weighted by firms' capital. Firms' size is measured by their capital. We normalize the mean and media firm size of different models by the average firm size of the symmetric information model. All models share the same setup and calibration except for the media reporting. Media reports all firms with a probability of 1 in the "*symmetric information*" model and reports all firms with a probability of 0 in the "*no-media*" model. Our baseline model is referred as "*selective reporting*". The "*uniform reporting*" model features the same probability of being reported across all firms that is equal to the firm-population average probability of being reported in our baseline model.

young and small firms can generate long-lasting effects. Figure 8c illustrates that around the age of 8, firms in the counterfactual uniform reporting environment are 2% larger on average than those in the baseline selective reporting case.

Figure 8: The Role of Media Reporting in Shaping Firms' Life-cycle Dynamics

(a) Equity Issuance **(b)** Investment **(c)** Firm size



Notes: The average equity issuance rate, investment rate, and size (log of capital) are all reported as the difference from their counterpart moments from the symmetric information model. All models share the same setup and calibration except for the media reporting. Media reports all firms with a probability of 1 in the "*symmetric information*" model and reports all firms with a probability of 0 in the "*no-media*" model. Our baseline model is referred as "*selective reporting*". The "*uniform reporting*" model features the same probability of being reported across all firms that is equal to the firm-population average probability of being reported in our baseline model.

5. Conclusion

News outlets provide valuable information to their readers, but constraints on space and journalistic resources mean they have to make judgements of which firms are most newsworthy. We find that these judgements overwhelmingly favor reporting on the largest firms in the economy, and found that this selectivity has important effects on firm dynamics and aggregate investment.

When a firm is reported in the media, their probability of issuing new equity in the subsequent quarters rises. They also see a rise in investment and profitability. Evidence from media strikes in France suggests that this is partly due to news coverage alleviating information asymmetries in financial markets. The fact that this coverage is systematically concentrated amongst the very largest firms, therefore, slows down firm growth and depresses aggregate investment.

In a quantitative model with heterogeneous firms, asymmetric information, and a media sector calibrated to our data, we find that selective media coverage increases average firm size and investment relative to a world with no media. But this improvement is fairly minor, because the coverage is concentrated among large firms whose investment and financing are not constrained by information asymmetry. If the limited media reports were spread evenly across firms, the impact of media reporting would be substantially larger.

This highlights the importance of the allocation of media resources. Small and constrained firms benefit most from media coverage because media reporting can alleviate the information friction that constrains their investment. However, media outlets allocate their resources to reporting mostly large and unconstrained firms. This misalignment between the media's incentive to report and the firm's need to be reported substantially affects firm dynamics, financing markets, and business investment.

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Appendices

A. Details for Empirical Anlaysis

A.1. Additional tables and figures

Figure A.1: Distribution of corporate news coverage (firms with nonzero coverage)

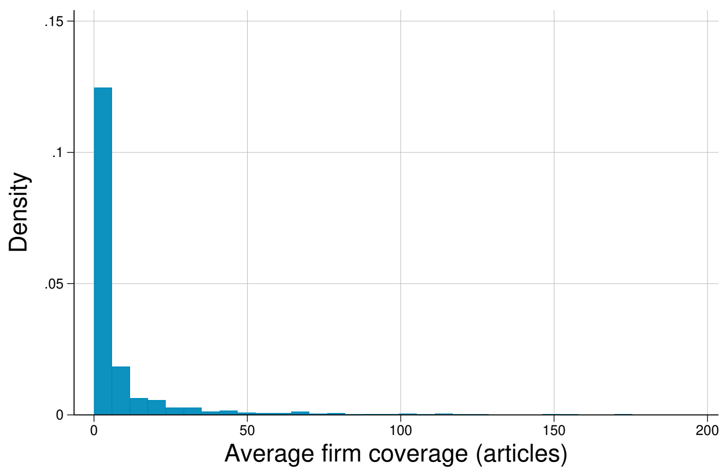


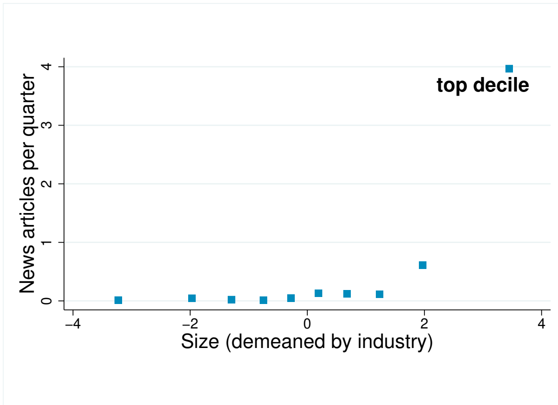
Table A.1: Top 20 firms with media coverage

Rank	Firm	Articles	Rank	Firm	Articles
1	General Motors	18,380	11	Amazon	6,615
2	Microsoft	15,314	12	Bank of America	6,432
3	Apple	13,995	13	Merrill Lynch	6,169
4	Alphabet	10,402	14	Goldman Sachs	6,121
5	Citigroup	9,844	15	American Airlines	5,506
6	Boeing	8,965	16	HP	5,180
7	Time Warner	7,398	17	Delta Airlines	4,574
8	AT&T	7,244	18	US Airways	4,551
9	Walmart	6,887	19	Procter & Gamble	4,309
10	JPMorgan Chase	6,795	20	Altria Group	4,094
Total articles on top 20 firms					158,775
Total articles on remaining firms					216,852

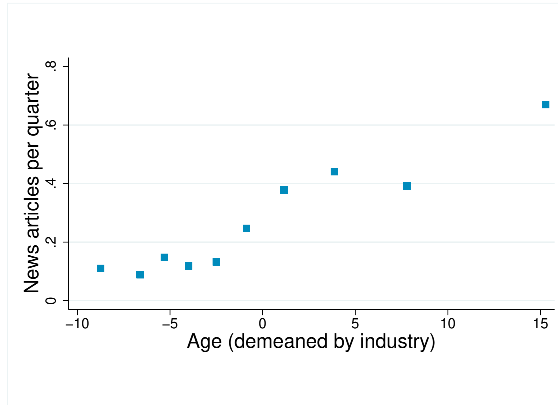
Notes: This table lists the top 20 firms by total number of news articles from 1990 to 2021.

Figure A.2: Media coverage and within-industry firm characteristics

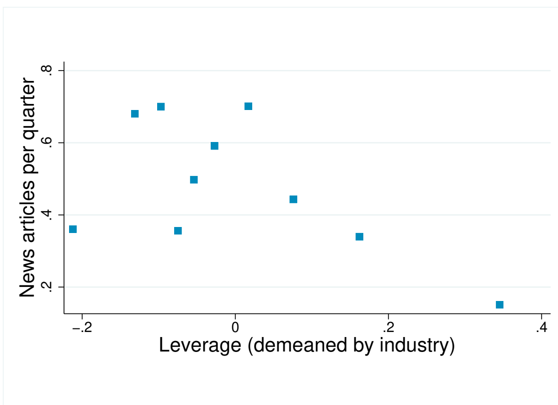
(a) Size



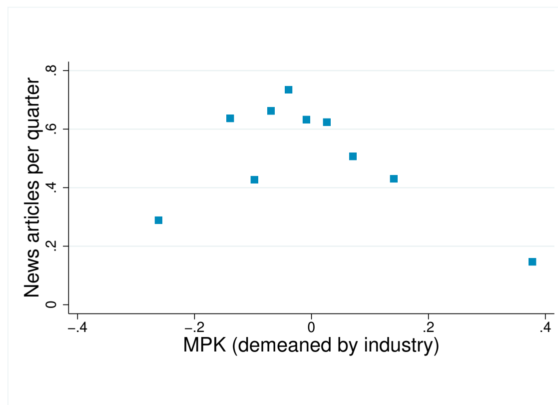
(b) Age



(c) Leverage



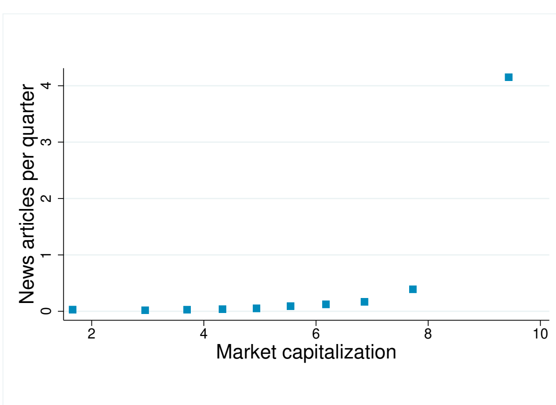
(d) MPK



Notes: This figure reports bin scatters between news articles per quarter and firm characteristics, demeaned by 4-digit NAICS industry. Each bin consists of a decile of firm-quarter observations. Size is measured with log real assets, age is measured with years since IPO, leverage is measured with market leverage, and MPK is measured with revenue over assets.

Figure A.3: Market capitalization and media coverage

(a) Market valuation



(b) Within industry

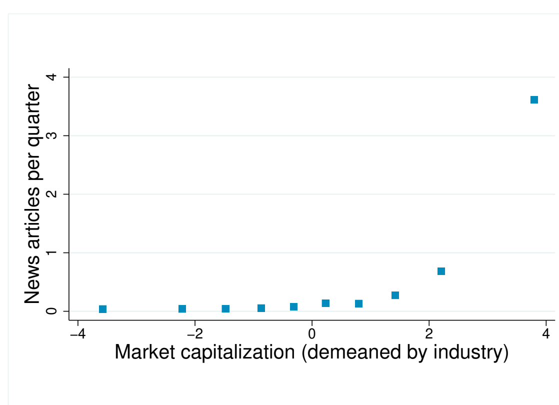
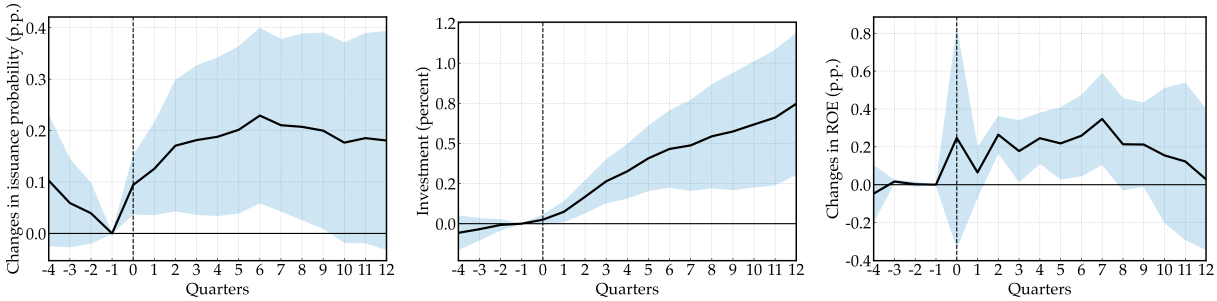
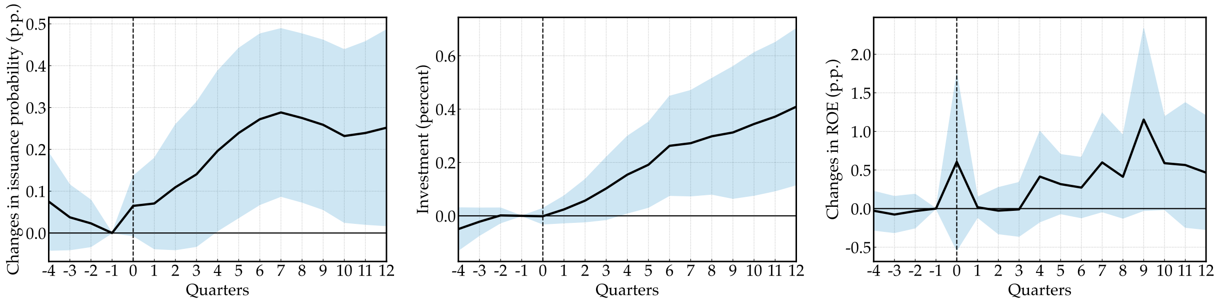


Figure A.4: Effects of coverage by newspaper

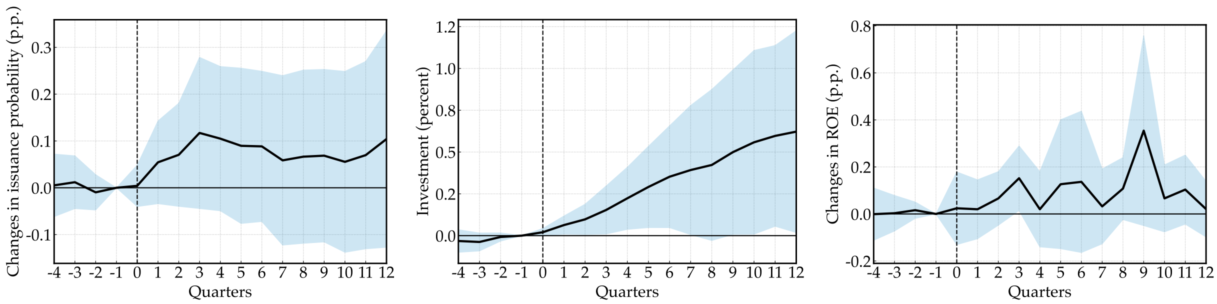
(a) Wall Street Journal



(b) New York Times



(c) USA Today



A.2. Additional international evidence

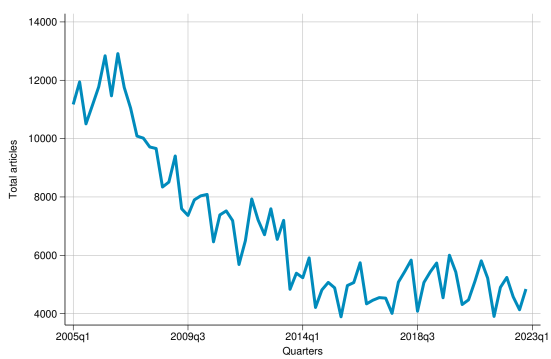
Table A.2: National media strikes in France

Quarter	Date	Description
2005Q4	October 4, 2005	Unions of journalists and technicians in public broadcasting striked as part of the national day of action.
	October 20, 2005	The Agence France-Presse journalists' unions striked to oppose the announced closure of a regional office.
2008Q1	February 13, 2008	Public broadcaster workers striked to protest President Nicolas Sarkozy's media reform.
2008Q4	November 25, 2008	Public broadcaster workers striked to protest bill passed reforming public broadcasting by President Sarkozy.
2013Q1	February 1, 2013	The Agence France Presse journalists' unions striked to call for the withdrawal of the "France Region" project.
2018Q2	April 1, 2018	National strikes, including by broadcasters, against President Emmanuel Macron's reforms to the public sector.

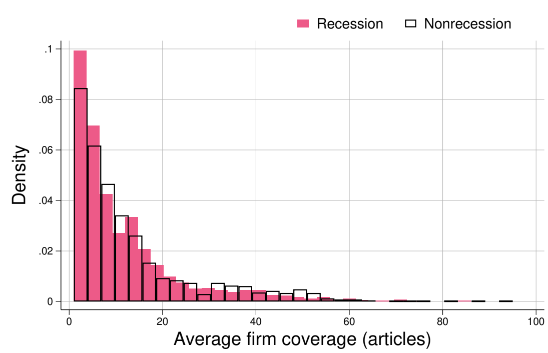
Notes: National media strikes in France from 2005 to 2021 through searching for "((strike or grève) and (journalist or journaliste)) or ((strike or grève) and (broadcaster or diffuseur))" in Factiva, restricting the region to France, industry to Media/Entertainment, subject to Labor Dispute, and excluding strikes in individual newspapers

Figure A.5: Corporate news coverage in major French newspapers

(a) Times series

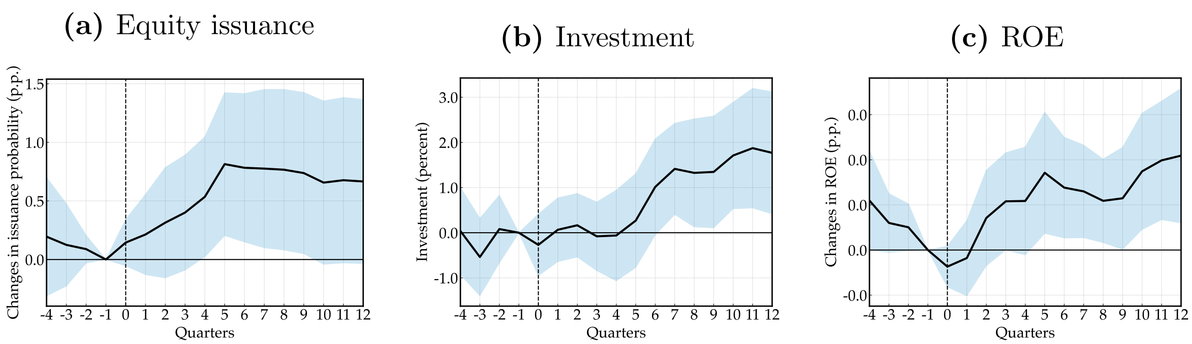


(b) Cross-sectional distribution



Notes: Corporate news coverage in major French newspapers from 2005 to 2022, including Les Echos, Le Monde, La Tribune, and Figaro.

Figure A.6: Media coverage and firm outcomes in France



B. A Model with Investor-Led Media Demand

We here derive a variant of the classic static Grossman and Stiglitz (1980) model with a media sector. A media outlet decides which firms to include in their publication. Unlike our main quantitative model, we now introduce noise traders, who prevent the perfect aggregation of information in asset prices. This causes investors to value information from media.

Investors choose whether to purchase the media publication. The publication contains a lot of information about many firms. Conditional on purchasing the publication, investors must decide how to allocate a limited capacity for processing information among those various signals. As in Van Nieuwerburgh and Veldkamp (2010), ex-ante identical investors specialize in gathering information about different firms. Unlike Van Nieuwerburgh and Veldkamp (2010), the set of firms investors can learn about is chosen endogenously by the media outlet, which responds to investor demand.

To solve this model, we abstract from the firm block of our quantitative model. Instead, holding each firm's equity has a payoff that is independent of media decisions, but which is initially unknown to investors.

B.1. Environment

Assets There is a risk-free asset with fixed return r, and a price of 1 (the numeraire). There are N firms. The equity of the firms are risky assets with payoffs given by the $N \times 1$ vector f, which is distributed according to:

$$f \sim N(\bar{f}, \Sigma_f) \tag{41}$$

where Σ_f is diagonal (firm payoffs are independent).

The prices of these risky assets are collected in the $N \times 1$ vector p. f is exogenous, but p will be determined in equilibrium by investor behavior.

Media There is a representative media outlet, which observes the realization of f before the market opens. The outlet produces a publication in which they report the realized payoffs from a subset of firms' equities. As in Section 3, the outlet has a space constraint, so can only report on $N_r < N$ of the firms. Letting m_j be an indicator equal to 1 if the outlet reports on firm j, and equal to 0 otherwise, the space constraint is:

$$\sum_{j=1}^{N} m_j \leq N_r \tag{42}$$

The outlet sells this publication to investors at a price $c > 0$. For the purposes of this model, we will hold c fixed, and consider only the choice of which firms to include in the publication.

Investors There is a unit mass of investors, indexed i, with exponential utility over final wealth W_i net of the costs of any information acquired cL_i.

$$U_i = -\exp(-\rho(W_i - cL_i)) \tag{43}$$

where $\rho > 0$ is the risk aversion parameter and $L_i \in \{0, 1\}$ is an indicator for if the investor purchased that publication.

Each investor has an endowment of W_0 units of the risk-free asset. Let q_i be the $N \times 1$ vector of quantities of each risky asset purchased by investor i. To buy this portfolio, they must sell $q_i'p$ units of risk-free endowment. Their end-of-period wealth is therefore:

$$W_i = (W_0 - q_i'p)r + q_i'f \tag{44}$$

Investors can observe which firms are reported before they choose whether to purchase the media publication, but can only see the information in the publication if they purchase it. If an investor purchases the publication, they can only process a limited amount of information from its contents. We model this fixed information capacity with the constraint:

$$|\Sigma_i^{-1}| \leq e^{2K} |\Sigma_f^{-1}| \tag{45}$$

where Σ_i is the variance-covariance matrix of investor i's beliefs after processing information, but before observing asset prices. The constant $K > 0$ determines the investor's information capacity. With Gaussian priors and posteriors (verified below), this constraint implies that the mutual information between priors and posteriors cannot exceed K, as is standard in the rational inattention literature (Maćkowiak, Matějka and Wiederholt, 2023).

Market clearing The supply of each risky asset is constant. The demand for risky assets comes from investors and from noise traders, who add a random component to asset demand. Market clearing therefore requires

$$\int_0^1 q_i di + x = \bar{x} \tag{46}$$

where $\bar{x}$ and x are $N \times 1$ vectors of asset supplies and noise trader shocks respectively. Noise trader shocks are distributed according to

$$x \sim N(0, \sigma_x^2 I) \tag{47}$$

where $\sigma_x^2 \geq 0$ is a scalar.

Timing The model consists of a number of stages.

1. f is realized. The media outlet observes it, and chooses which firms to report.
2. Investors decide if they wish to purchase the publication, and (conditional on purchasing) how to allocate their information capacity.
3. Investors observe the realization of their chosen signals.
4. Asset markets open. Investors observe asset prices and choose portfolios. Simultaneously, prices are determined as a function of investor demand.
5. Payoffs are realized.

We solve this by working backwards. The first step is to solve for the asset demands that an investor would make for any given information set. Once we have that, we can then solve the information-choice problem, and finally the media reporting problem.

B.2. Equilibrium with given information sets

In stage 4 of the model timing, equilibrium is a set of asset demands q_i, and prices p, such that:

1. q_i maximizes investor i's expected utility, conditional on the information they have processed and any information contained in p.

2. p is such that asset markets clear.

Portfolio choice When the asset markets open, investors observe p. They also potentially have other information, if they purchased it. We summarize that extra information in $\mathcal{I}_i$. Their expected utility at this point is

$$\mathbb{E}_i[U_i|p, \mathcal{I}_i] = -\mathbb{E}_i[\exp(-\rho(W_i - cL_i))|p, \mathcal{I}_i] \tag{48}$$

Substituting out for W_i using the budget constraint (44) and simplifying:

$$\mathbb{E}_i[U_i|p, \mathcal{I}_i] = -\exp(-\rho r W_0)\exp(\rho c L_i)\,\mathbb{E}_i[\exp(-\rho q_i'(f - pr))|p, \mathcal{I}_i] \tag{49}$$

The first two exponential terms are known positive constants, so do not affect the portfolio choice problem. The simplified objective is therefore

$$\mathbb{E}_i[U_i|p, \mathcal{I}_i] \propto -\mathbb{E}_i[\exp(-\rho q_i'(f - pr))|p, \mathcal{I}_i] \tag{50}$$

Since f is normally distributed, $\exp(-\rho q_i'(f - pr))$ has a log-normal distribution. Assuming all signals from prices and purchased information preserve this distribution (we will verify later), the expectation in equation (50) can be written as

$$-\mathbb{E}_i[\exp(-\rho q_i'(f - pr))|p, \mathcal{I}_i] = -\exp\left(-\rho q_i'(\mathbb{E}_i[f|p, \mathcal{I}_i] - pr) + \frac{\rho^2}{2} q_i' \mathbb{V}_i[f|p, \mathcal{I}_i] q_i\right) \tag{51}$$

where $\mathbb{V}_i[f|p, \mathcal{I}_i]$ is the $(N \times N)$ posterior variance of investor i's beliefs about f.

Maximizing this with respect to q_i gives the asset demand equation

$$q_i = \frac{1}{\rho}(\mathbb{V}_i[f|p, \mathcal{I}_i])^{-1}(\mathbb{E}_i[f|p, \mathcal{I}_i] - pr) \tag{52}$$

Prior information All investors know the distribution of f (equation (41)). If investors have paid for information, they also observe a vector of noisy signals before markets open of the form

$$s_i = f + \varepsilon_i \tag{53}$$

where the noise vector ε_i is idiosyncratic to investor i, independent of f, and is distributed according to

$$\varepsilon_i \sim N(0, \Sigma_{\varepsilon i}) \tag{54}$$

For simplicity we restrict attention to cases where $\Sigma_{\varepsilon i}$ is diagonal (i.e. noise terms in the signal are independent across assets). Incorporating these signals using Bayes' rule, investor i's beliefs about f before the market opens are normally distributed, with:

$$\mathbb{V}_i[f|\mathcal{I}_i] \equiv \Sigma_i = (\Sigma_f^{-1} + \Sigma_{\varepsilon i}^{-1})^{-1} \tag{55}$$

$$\mathbb{E}_i[f|\mathcal{I}_i] \equiv \mu_i = \Sigma_i(\Sigma_f^{-1}\bar{f} + \Sigma_{\varepsilon i}^{-1} s_i) \tag{56}$$

If investor i does not purchase information, they do not observe signals, so $\Sigma_{\varepsilon i}^{-1}$ is a matrix of 0s, and their priors depend on the distribution of f only: $\Sigma_i = \Sigma_f$, $\mu_i = \bar{f}$. If an asset j is not reported by the media, then the j, j'th element of $\Sigma_{\varepsilon i}^{-1}$ is 0 for all investors, as no-one is able learn about asset j.

Information in prices Guess that prices are a linear function of payoffs and noise trader shocks:

$$p = A + Bf + Cx \tag{57}$$

for some $N \times N$ matrices A, B, C. Since there are no links between assets elsewhere in the model, guess that each of these matrices is diagonal.

At this point, it is useful to split assets into two groups depending on whether they are reported in the media or not. We then solve for equilibrium beliefs, asset demands, and the price coefficients A, B, C. Without loss of generality, index the assets that are reported in the media by $n \in \{1, ..., N_r\}$, and let $n \in \{N_r + 1, ..., N\}$ be the unreported firms.

Unreported firms Since no investors have information on realized f_n for unreported firms, prices cannot contain any such information. The final $N - N_r$ rows and columns of B must therefore contain only 0s.

As a result, beliefs about f_n depend on the underlying distribution (equation (41)) only. The demand for equity of an unreported firm is therefore identical across investors, and is given by:

$$q_{ni} = \frac{\bar{f}_n - rp_n}{\rho \sigma_{fn}^2} \tag{58}$$

where σ_{fn}^2 is the nth diagonal element of Σ_f. Substituting this into market clearing (equation (46)) for firm n's equity and rearranging yields

$$p_n = \frac{\bar{f}_n - \rho \sigma_{fn}^2 \bar{x}_n}{r} - \frac{\rho \Sigma_{fn}}{r} x_n \tag{59}$$

This is of the form in equation (57), with the nth diagonal element of B equal to 0.

Reported firms For reported firms, asset prices contain some information, so there is a further step in solving for equilibrium asset demand. Let z_r denote a $1 \times N_r$ vector consisting of the first N_r elements of any vector z, so e.g. f_r denotes the payoffs of reported assets. Similarly, Σ_{rf} and Σ_{ri} denote $N_r \times N_r$ matrices, consisting of the first N_r rows and columns of Σ_f and Σ_i respectively. A_r, B_r, C_r denote the first N_r rows and columns of A, B, C.

From the guessed law of motion for prices, investors can construct an unbiased Gaussian signal about f_r:

$$B_r^{-1}(p_r - A_r) = f_r + B_r^{-1} C_r x \sim N(f_r, \Sigma_{rp}) \tag{60}$$

where

$$\Sigma_{rp} \equiv \sigma_x^2 B_r^{-1} C_r (B_r^{-1} C_r)' \tag{61}$$

Investors use Bayes rule to incorporate this signal into their beliefs. Posteriors are normally distributed, with

$$\mathbb{V}_i[f|p,\mathcal{I}_i] \equiv \hat{\Sigma}_{ri} = (\Sigma_{ri}^{-1} + \Sigma_{rp}^{-1})^{-1} \tag{62}$$

$$\mathbb{E}_i[f|p,\mathcal{I}_i] \equiv \hat{\mu}_{ri} = \hat{\Sigma}_{ri}(\Sigma_{ri}^{-1}\mu_{ri} + \Sigma_{rp}^{-1}B_r^{-1}(p_r - A_r)) \tag{63}$$

Posterior expectations $\hat{\mu}_{ri}$ are therefore simply a weighted average of priors μ_{ri} and the signal $B_r^{-1}(p_r - A_r)$, with the weights determined by the signal to noise ratio. Substituting $\hat{\mu}_{ri}$ and $\hat{\Sigma}_{ri}$ into equation (52) we obtain the asset demand

$$q_{ri} = \frac{1}{\rho}\Sigma_{ri}^{-1}\mu_{ri} + \frac{1}{\rho}(\Sigma_{rp}^{-1}(B_r^{-1} - rI_r) - r\Sigma_{ri}^{-1})p_r - \frac{1}{\rho}\Sigma_{rp}^{-1}B_r^{-1}A_r \tag{64}$$

Substituting out for μ_{ri}, Σ_{ri} using equations (55) and (56) and aggregating across investors, market clearing becomes:

$$\frac{1}{\rho}(\Sigma_{rf}^{-1}\bar{f}_r - \Sigma_{rp}^{-1}B_r^{-1}A_r) + \frac{1}{\rho}\bar{\Sigma}_{r\epsilon}^{-1}f_r + \frac{1}{\rho}(\Sigma_{rp}^{-1}(B_r^{-1} - rI_r) - r\Sigma_{rf}^{-1} - r\bar{\Sigma}_{r\epsilon}^{-1})p + x_r = \bar{x}_r \tag{65}$$

where $\bar{\Sigma}_{r\epsilon}^{-1} = \int_0^1 \Sigma_{r\epsilon i}^{-1} di$ is the average precision of investor signals. This rearranges to the form in equation (57), confirming our guess. Matching coefficients yields solutions for A, B, C.

B.3. Information choice

Having solved the later stage, we now go back a step and solve for investor information choices, taking media reporting as given.

Indirect expected utility In equation (49), we found an expression for expected utility conditional on observing $p, \mathcal{I}$. Substituting out for the expectation using equation (51), and for q_i using asset demand (52), this becomes

$$\mathbb{E}_i[U_i|p,\mathcal{I}_i] = -\exp(-\rho r W_0)\exp(\rho c L_i)\left[\exp\left(-\frac{1}{2}(\mathbb{E}_i[f|p,\mathcal{I}_i] - pr)'\mathbb{V}_i[f|p,\mathcal{I}_i]^{-1}(\mathbb{E}_i[f|p,\mathcal{I}_i] - pr)\right)\right] \tag{66}$$

When the investor makes their information choice, they have not yet observed $p, \mathcal{I}$. We therefore need to take the expectation of equation (66) over these objects, or equivalently over the posterior expectation $\mathbb{E}_i[f|p,\mathcal{I}_i]$.[18] This is an expectation of an exponential of a squared Gaussian distribution, which is given by (see Veldkamp, 2011, ch. 7.3):

$$\mathbb{E}_i[U_i] = -\exp(-\rho r W_0)\exp(\rho c L_i)\left(\frac{|\mathbb{V}_i[f|p,\mathcal{I}_i]|}{|\Sigma_f|}\right)^{\frac{1}{2}} \\ \cdot \left[\exp\left(-\frac{1}{2}\,\mathbb{E}_i[\mathbb{E}_i[f|p,\mathcal{I}_i]-pr]'\Sigma_f^{-1}\,\mathbb{E}_i[\mathbb{E}_i[f|p,\mathcal{I}_i]-pr]\right)\right] \quad (67)$$

The final bracketed term of this expression consists of expectations of posterior beliefs and prices. Investors know that information will make their beliefs more precise, but ex-ante they do not expect it to make their beliefs systematically more or less optimistic. Whether they purchase information or not, this final term is therefore constant. As a result, only the terms in L_i and $(|\mathbb{V}_i[f|p,\mathcal{I}_i]|/|\Sigma_f|)^{-\frac{1}{2}}$ are affected by information choice.

Expected utility for an uninformed investor, who does not purchase information, is therefore proportional to:

$$\mathbb{E}_U[U_U] \propto -\left(\frac{|\mathbb{V}[f|p]|}{|\Sigma_f|}\right)^{\frac{1}{2}} \quad (68)$$

For an informed investor, who does purchase information, expected utility is proportional to:

$$\mathbb{E}_i[U_i] \propto -e^{\rho c}\left(\frac{|\mathbb{V}_i[f|p,\mathcal{I}_i]|}{|\Sigma_f|}\right)^{\frac{1}{2}} \quad (69)$$

where $\mathbb{V}_i[f|p,\mathcal{I}_i]$ may differ across investors i depending on how they choose to allocate their information capacity.

Information capacity allocation An investor who purchases the media publication chooses how to allocate their limited capacity for processing information. As in the rational inattention literature (Maćkowiak et al., 2023), investors choose the properties of their noisy signals ((53)) to maximize their expected utility ((67)) subject to their capacity constraint ((45)). Since priors are Gaussian, equation (53) is the optimal signal structure, and the

[18] The posterior variance $\mathbb{V}_i[f|p,\mathcal{I}_i]$ is unaffected by the realization of signals or prices. Investors therefore know the $\mathbb{V}_i[f|p,\mathcal{I}_i]$ they will face with and without information purchase when they make that decision.

investors only have to choose the noise variance matrix $\Sigma_{\varepsilon i}$.

The important step here is to note, as shown in e.g. Veldkamp (2011), that the objective function is convex, implying there are gains to specialization. The optimal information capacity allocation is for the investor to devote all of their capacity to learning about a single firm's equity.

The investor's signal is therefore such that all elements of $\Sigma_{\varepsilon i}^{-1}$ are zero, except for one. If an investor learns about firm n^*, the capacity constraint implies:

$$\sigma_{\varepsilon in^*}^{-2} = (e^{2K} - 1)\sigma_{fn^*}^{-2} \tag{70}$$

where $\sigma_{\varepsilon in^*}^2, \sigma_{fn^*}^2$ are the n^*th diagonal elements of $\Sigma_{\varepsilon i}$ and Σ_f respectively.

Since Σ_f and $\mathbb{V}_i[f|p, \mathcal{I}_i]$ are diagonal, equation (69) can be written:

$$\begin{aligned}
\mathbb{E}_i[U_i] &\propto -e^{\rho c} \prod_{n=1}^{N} \left(\frac{\mathbb{V}_i[f_n|p_n, \mathcal{I}_i]}{\sigma_{fn}^2} \right)^{\frac{1}{2}} && (71) \\
&= -e^{\rho c} \prod_{n=1}^{N_r} \left(\frac{\sigma_{fn}^{-2} + \sigma_{\varepsilon in}^{-2} + \sigma_{pn}^{-2}}{\sigma_{fn}^{-2}} \right)^{-\frac{1}{2}} && (72) \\
&= -e^{\rho c} \left(\frac{|\mathbb{V}[f|p]|}{|\Sigma_f|} \right)^{\frac{1}{2}} \left(\frac{\sigma_{fn^*}^{-2} e^{2K} + \sigma_{pn^*}^{-2}}{\sigma_{fn^*}^{-2} + \sigma_{pn^*}^{-2}} \right)^{-\frac{1}{2}} && (73)
\end{aligned}$$

The first of these equalities uses the observation that for all unreported firms, $\mathbb{V}_i[f_n|p_n, \mathcal{I}_i] = \sigma_{fn}^2$. The second uses the fact that investor i uses all of their information capacity to learn about a single firm, denoted n^*, with information precision given in equation (70).

Investors therefore learn about the firm with the highest 'learning index' $\mathcal{L}_n$, defined as:

$$\mathcal{L}_n \equiv \frac{\sigma_{fn}^{-2} e^{2K} + \sigma_{pn}^{-2}}{\sigma_{fn}^{-2} + \sigma_{pn}^{-2}} \tag{74}$$

This is strictly increasing in σ_{fn}^{-2}, and strictly decreasing in the precision of information contained in prices σ_{pn}^{-2}. Investors prefer to learn about assets where prices do not contain much information, as then the value-added of learning is greater.

We will show below that if more investors learn about asset n, its price will contain more information, and σ_{pn}^{-2} falls. All else equal, investors therefore prefer to learn about assets that other investors are not learning about.

Mixed strategy equilibrium We follow Van Nieuwerburgh and Veldkamp (2010) and look for an equilibrium in mixed strategies. Since investors wish to learn about assets which other investors are not learning about, ex-ante identical investors specialize by randomizing the use of their information capacity.

Suppose that conditional on paying c and buying news, investors devote their information processing capacity to learning about asset n with probability π_n. For such a mixed strategy to be optimal, it must be the case that investors are indifferent between any of the strategies in the mix. That is, the expected utility from learning about firm n must be equal to the expected utility from learning about n', given all other investors are playing the same mixed strategy. From equation (**??**), this implies that the learning indices must be equal for all assets which investors learn about with positive probability:

$$\mathcal{L}_n = \mathcal{L}_{n'} \quad \text{for all} \;\; (n, n') \, \text{such that} \;\; \pi_n, \pi_{n'} > 0 \tag{75}$$

This is exactly as in Van Nieuwerburgh and Veldkamp (2010), except for the extra constraint that investors can only learn about assets reported in the media, and only if they purchase the media publication.

Learning indices in equilibrium To make further progress on the factors required for condition (75) to hold, we return to equilibrium prices to solve for σ_{pn}^{-2}. Equation (61) shows that the precision of information in prices depends on the coefficient matrices B_r, C_r.

Let λ_n be the fraction of investors who process information about firm n, equal to π_n multiplied by the fraction of investors purchasing the media publication. The average precision of investor signals about firm n is then:

$$\bar{\sigma}_{n\epsilon}^{-2} = \lambda_n (e^{2K} - 1) \sigma_{fn}^{-2} \tag{76}$$

Substituting this into row n of equation (65) and rearranging, we obtain:

$$p_n = (\sigma_{pn}^{-2}(b_n^{-1} - r) - r\sigma_{fn}^{-2}(1 + \lambda_n(e^{2K} - 1)))^{-1}\Big[(\rho\bar{x}_n + \sigma_{pn}^{-2}b_n^{-1}a_n - \sigma_{fn}^{-2}\bar{f}_n) \\ - \lambda_n\sigma_{fn}^{-2}(e^{2K} - 1)f_n - \rho x_n\Big] \tag{77}$$

Matching coefficients between equations (57) and (77), we obtain:

$$b_n = -\frac{\lambda_n\sigma_{fn}^{-2}(e^{2K} - 1)}{\sigma_{pn}^{-2}(b_n^{-1} - r) - r\sigma_{fn}^{-2}(1 + \lambda_n(e^{2K} - 1))} \tag{78}$$

$$c_n = b_n \cdot \frac{\rho}{\lambda_n\sigma_{fn}^{-2}(e^{2K} - 1)} \tag{79}$$

Using equation (61) (and the fact that all matrices here are diagonal), the variance of noise in the price of asset n is:

$$\sigma_{pn}^2 = \sigma_x^2(b_n^{-1}c_n)^2 = \frac{\rho^2\sigma_x^2\sigma_{fn}^4}{\lambda_n^2(e^{2K} - 1)^2} \tag{80}$$

This clearly showcases the earlier point that σ_{pn}^2 is smaller (and so σ_{pn}^{-2} is larger) when λ_n rises. When more investors are informed about an asset, its price is a more precise signal of its returns. Substituting this into equation (74) and simplifying, the learning index is given by

$$\mathcal{L}_n = 1 + \frac{e^{2K} - 1}{1 + \lambda_n^2\sigma_{fn}^{-2}\sigma_x^{-2}\rho^{-2}(e^{2K} - 1)^2} \tag{81}$$

Many of the elements of this formula for the learning index are common across assets. Condition (75) is therefore satisfied if and only if:

$$\frac{\lambda_n^2}{\sigma_{fn}^2} = \frac{\lambda_{n'}^2}{\sigma_{fn'}^2} \quad \text{for all} \quad (n, n') \, \text{such that} \quad \lambda_n, \lambda_{n'} > 0 \tag{82}$$

This is the key indifference condition for the mixed strategy equilibrium. For two assets with the same prior variance, the fraction of informed investors λ_n must be equal. Otherwise, assets with a greater prior uncertainty will have a greater proportion of informed investors.

A final implication of these results is that investors learn about all firms included in the media publication with positive probability. To see this, suppose no investor learns about firm $n0$, so $\lambda_{n0} = 0$. In equation (81), that firm's learning index would be $\mathcal{L}_{n0} = \exp(2K)$. This is strictly greater than the learning index for any firm with positive λ_n. As a result, if $\lambda_{n0} = 0$, an investor could always increase expected utility by deviating from the mixed strategy of other investors, and learning about $n0$ with probability 1. It is therefore not possible for a mixed strategy equilibrium to exclude some reported firms entirely.

Media purchase Using equations (68) and (73), the expected utility gain from purchasing the media publication is:

$$\mathbb{E}_i[U_i] - \mathbb{E}_U[U_U] = \left(\frac{|\mathbb{V}[f|p]|}{|\Sigma_f|}\right)^{\frac{1}{2}} (1 - e^{\rho c}\mathcal{L}_{n^*}^{-\frac{1}{2}}) \tag{83}$$

where $\mathcal{L}_{n^*}$ is the learning index of any of the assets over which investors mix.

Investors purchase information if this is positive. The proportion of investors who purchase the publication is therefore such that investors are indifferent between purchasing information and not doing so. This occurs at

$$\mathcal{L}_{n^*} = e^{2\rho c} \tag{84}$$

A given value of c therefore pins down a unique learning index.

B.3.1. Media reporting decision

The media outlet chooses which firms to report on to maximize profits. Let q be the proportion of investors who purchase the outlet's publication, so profits are revenues cq minus costs, which we assume are independent of which firms the outlet chooses to report. Since c is taken as given, the outlet chooses reporting decisions to maximize their readership q.

To find the optimal reporting strategy, it is helpful to note that condition (82) implies that λ_n can be expressed as:

$$\lambda_n = \lambda_0 \sigma_{fn} \tag{85}$$

where λ_0 is identical for all firms n. Substituting this into equation (81), we find that λ_0 is uniquely determined by parameters common to all n and the learning index $\mathcal{L}_n$, which in turn is fixed by c (equation (84)). We can therefore treat λ_0 as fixed.

Recall that λ_n is the proportion of investors who process information about firm n, which is given by the proportion who buy the media publication, multiplied by the probability an informed investor devotes their information capacity to that firm:

$$\lambda_n \equiv q\pi_n \tag{86}$$

Summing over all reported firms, and using the fact that $\sum_{n=1}^{N_r} \pi_n = 1$, we have:

$$q\sum_{n=1}^{N_r} \pi_n = \sum_{n=1}^{N_r} \lambda_n \tag{87}$$

$$\implies q = \lambda_0 \sum_{n=1}^{N_r} \sigma_{fn} \tag{88}$$

Since λ_0 is fixed by c, the outlet maximizes q by reporting on the N_r firms with the most volatile payoffs, i.e. with the highest σ_{fn}.

B.3.2. Relationship to the quantitative model

To solve this model, we abstracted from firm decisions. This means that the variance of payoffs from holding equity of firm n is fixed at σ_{fn}^2. In the quantitative model, media reporting affects firm decisions, and thus affects that variance.

The appropriate analogue to the reporting policy derived here is that media outlets report on firms with large payoff variances *conditional* on being reported. To see why, consider an outlet choosing between reporting firms j and j'. If the outlet reports firm j, investors observe that, and evaluate the benefits of purchasing the outlet publication based on the resulting variance of asset j's payoff. If the outlet does not report j, but instead reports j', then the value of the publication to investors is determined by the variance of asset j', given that j' was reported. The appropriate comparison is therefore between the variances of payoffs conditional on the firm being reported. This is exactly the reporting policy derived in Section 3.4 in the quantitative model.

Since the model is static, we also do not consider the business cycle in this model. However, note that Bloom, Floetotto, Jaimovich, Saporta-Eksten and Terry (2018) and many others have shown that the variance of idiosyncratic shocks to firms rises in recessions.

In this model, assuming c is fixed, a rise in firm-level volatility implies greater demand for news: equations (85) and (88) show that more investors purchase the media publication, and the proportion of investors who are informed rises for every asset. We have taken N_r here as given, but in a dynamic setting it is plausible that outlets would respond to this greater demand for firm-level news by providing more of it, as we observe in the data.

C. Details for the Quantitative Model

C.1. Alternative assumptions on outlets and forecasters

Here we consider two plausible alternative assumptions in the derivation of the media reporting policy in Section 3.4. The resulting newsworthiness function changes slightly from equation (38), but the qualitative properties remain unchanged.

C.1.1. Outlet objective function

In Section 3, we assumed that media outlets maximize the expected utility of their forecaster. However, media outlets observe all realizations of $a_{j,t}$, and observe the reporting decisions of other outlets. Outlets are therefore able to predict the *realized* utility of their forecaster when they make their reporting decisions. If we allow the outlet to maximize this realized utility, their problem is as in Section 3.2, except that the objective function changes to:

$$U_{i,t} = \max_{\hat{m}_{i,j,t}} - \int_0^1 \left[FE(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}_{i,t}^{\text{news}}) - \bar{FE}_{-i}(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}_{-i,t}^{\text{news}})\right] dj \tag{89}$$

subject to equations (29)-(32).

In this case, a vector $\boldsymbol{m}_t$ can be sustained as a symmetric reporting equilibrium in pure strategies if and only if:

$$\hat{U}_{i,t}(j, j') \leq 0 \tag{90}$$

for all pairs of reported and unreported firms j, j'. This differs from equation (100) in that there is no longer an expectation operator present.

The results on realized forecast errors derived in Section 3.4 continue to hold, as nothing has changed in the forecaster problem. $\hat{U}_{i,t}(j, j')$ is therefore given by:

$$\begin{aligned}\hat{U}_{i,t}(j, j') =& \left[\mathbb{E}(MV(k_{j',t}, z_{j',t}, a_{j',t}, 1)|k_{j',t}, z_{j',t}, m_{j',t} = 1) - MV(k_{j',t}, z_{j',t}, a_{j',t}, 1)\right]^2 \\ &- \left[\mathbb{E}(MV(k_{j,t}, z_{j,t}, a_{j,t}, 1)|k_{j,t}, z_{j,t}, m_{j,t} = 1) - MV(k_{j,t}, z_{j,t}, a_{j,t}, 1)\right]^2\end{aligned} \tag{91}$$

The unique symmetric pure strategy reporting equilibrium is therefore as in Section 3.4, except that the newsworthiness function is modified to:

$$\mathcal{N}(k_{j,t}, z_{j,t}, a_{j,t}) = \left[\mathbb{E}(MV(k_{j,t}, z_{j,t}, a_{j,t}, 1) | k_{j,t}, z_{j,t}, m_{j,t} = 1) - MV(k_{j,t}, z_{j,t}, a_{j,t}, 1) \right]^2 \quad (92)$$

Like the form in equation (38), this is increasing in firm size. The key difference is that the newsworthiness function now also depends on realized $a_{j,t}$.

C.1.2. Forecaster information

In Section 3.1 we assumed that forecasters can observe the reporting decisions of outlets other than their own. This allowed for a simple characterization of the equilibrium reporting policy, but it is not essential for our results. Here we derive the equilibrium reporting policy under the alternative assumption that forecaster i does not observe the reporting decisions of other outlets, as in e.g. Nimark and Pitschner (2019). We continue to assume, as in the previous derivation, that the outlet maximizes the realized utility of their forecaster. The outlet problem is therefore unchanged: their objective is as in equation (89), and the constraints are as in equations (29)-(32). A vector $\boldsymbol{m}_t$ can be sustained as a symmetric pure strategy equilibrium if and only if condition (90) holds for all pairs of reported and unreported firm j, j'. The key way this alternative assumption changes the model is that forecasters no longer necessarily observe the aggregate media indicator $m_{j,t}$.

As in Section 3.1, if outlet i reports on a firm j, then $m_{j,t} = 1$. Moreover, forecaster i can infer that $m_{j,t} = 1$ for certain: they see that their outlet has reported on firm j, which is sufficient to imply $m_{j,t} = 1$ (equation (11)). As in Section 3.4, we therefore have:

$$FE(k_{j',t}, z_{j',t}, a_{j',t}, m_{j',t}, \mathcal{I}_{i,t}^{\text{news}}) = \overline{FE}_{-i}(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}_{-i,t}^{\text{news}}) = 0 \quad (93)$$

The utility change from deviating therefore reduces to:

$$\begin{aligned} \hat{U}_{i,t}(j, j') = & \left[\mathbb{E}(MV(k_{j',t}, z_{j',t}, a_{j',t}, m_{j',t}) | k_{j',t}, z_{j',t}, \hat{m}_{i',j',t} = 0) - MV(k_{j',t}, z_{j',t}, a_{j',t}, 1) \right]^2 \\ & - \left[\mathbb{E}(MV(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}) | k_{j,t}, z_{j,t}, \hat{m}_{i,j,t} = 0) - MV(k_{j,t}, z_{j,t}, a_{j,t}, 1) \right]^2 \quad (94) \end{aligned}$$

This differs from equation (91), because the expectations are formed without the knowledge of the true $m_{j,t}, m_{j',t}$. In both cases, all the forecasters know is what their own outlets have printed. In the first of the expectations, this is the expected market value of firm j' formed by forecasters other than forecaster i, whose outlets did not report on j' ($\hat{m}_{i',j',t} = 0$). In the second expectation, it is the expected market value of firm j formed by forecaster i, whose outlet has deviated and is not reporting firm j ($\hat{m}_{i,j,t} = 0$). In both cases, the true aggregate reporting indicator is $m_{j,t} = m_{j',t} = 1$: outlet i reports firm j', and all other outlets report firm j. As the outlets can still observe each others' reporting choices, each outlet is aware of this fact. It is only the forecasters who are not.

Using the law of iterated expectations we have:

$$\begin{aligned}
&\mathbb{E}(MV(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t})|k_{j,t}, z_{j,t}, \hat{m}_{i,j,t} = 0) \\
&\quad = \Pr(m_{j,t} = 1|k_{j,t}, z_{j,t}, \hat{m}_{i,j,t} = 0)\, \mathbb{E}(MV(k_{j,t}, z_{j,t}, a_{j,t}, 1)|k_{j,t}, z_{j,t}, m_{i,j,t} = 0, m_{j,t} = 1) \\
&+ (1 - \Pr(m_{j,t} = 1|k_{j,t}, z_{j,t}, \hat{m}_{i,j,t} = 0))\, \mathbb{E}(MV(k_{j,t}, z_{j,t}, a_{j,t}, 0)|k_{j,t}, z_{j,t}, m_{i,j,t} = 0, m_{j,t} = 0)
\end{aligned} \tag{95}$$

where $\Pr(m_{j,t} = 1|k_{j,t}, z_{j,t}, \hat{m}_{i,j,t} = 0)$ is the perceived probability that forecaster i attaches to $m_{j,t} = 1$, conditional on their observations.

Intuitively, $\Pr(m_{j,t} = 1|k_{j,t}, z_{j,t}, \hat{m}_{i,j,t} = 0)$ denotes: from the point of view of a forecaster observing that their outlet *did not* report on a firm, what is the probability that some other outlet *did* report on that firm this period? The forecasters have rational expectations, so this probability is formed using their restricted information set, and a full knowledge of the equilibrium data generating process behind $m_{j,t}$. That is, although forecaster i does not observe the reporting decisions of the outlet belonging to forecaster i' (and vice versa), they are able to understand the policy function driving that other outlet's decisions, and thus the process for determining $m_{j,t}$.

At this point, the fact we focus on symmetric equilibria becomes critical. Under rational expectations, forecasters understand that they are in a symmetric media equilibrium. Therefore, when they observe that their own outlet has not reported on a particular firm, they infer that no outlet has done so. Formally, we have

$$\Pr(m_{j,t} = 1|k_{j,t}, z_{j,t}, \hat{m}_{i,j,t} = 0) = 0 \tag{96}$$

There is one nuance here that is worth noting. Forecasters infer that $m_{j,t} = \hat{m}_{i,j,t}$

because they have rational expectations, so they have full knowledge of the equilibrium. In equilibrium, their inference on $m_{j,t}$ is therefore correct. However, in equation (94) we are considering a deviation from that equilibrium. The implicit assumption here is that if such a deviation were to happen, forecasters would not be able to identify that it had happened. In other words, they continue to forecast $m_{j,t} = \hat{m}_{i,j,t}$ with certainty, even though this will be incorrect under the deviation. This is in line with rational expectations: in any equilibrium, such a deviation is a probability-zero event, and so it is rational to attach no weight to it. All the forecaster observes is $k_{j,t}$, $z_{j,t}$, and $\hat{m}_{i,j,t}$, and none of this reveals that a deviation is occurring. This is one key reason why deviations create forecast errors, as they lead forecasters to make errors about $m_{j,t}$.

Finally, note that in equation (20) we showed that $\mathbb{E}(MV(k_{j,t}, z_{j,t}, a_{j,t}, 0)|k_{j,t}, z_{j,t}, m_{i,j,t} = 0, m_{j,t} = MV(k_{j,t}, z_{j,t}, a_{j,t}, 0))$. Applying these results to equation (94), the utility change from deviating becomes

$$\begin{aligned} \hat{U}_{i,t}(j, j') =& \big[MV(k_{j',t}, z_{j',t}, a_{j',t}, 0) - MV(k_{j',t}, z_{j',t}, a_{j',t}, 1)\big]^2 \\ &- \big[MV(k_{j,t}, z_{j,t}, a_{j,t}, 0) - MV(k_{j,t}, z_{j,t}, a_{j,t}, 1)\big]^2 \end{aligned} \tag{97}$$

The unique symmetric pure strategy reporting equilibrium is therefore as in Section 3.4, except that the newsworthiness function is modified to:

$$\mathcal{N}(k_{j,t}, z_{j,t}, a_{j,t}) = \big[MV(k_{j,t}, z_{j,t}, a_{j,t}, 0) - MV(k_{j,t}, z_{j,t}, a_{j,t}, 1)\big]^2 \tag{98}$$

A firm is more newsworthy if news coverage would substantially alter the beliefs of forecasters and investors, and so would lead to a large change in market values.

Like the form in equation (38), this is increasing in firm size. As in equation (92), the newsworthiness function now also depends on realized $a_{j,t}$.

C.2. Proofs

C.2.1. Proof of Theorem 1

Proof. We show that there is a unique reporting policy that can be sustained as a symmetric equilibrium. To find this, we begin by considering an arbitrary candidate reporting policy. We then show that there is a unique candidate reporting policy from which no outlet would find it optimal to deviate.

The candidate reporting policy is characterized by a vector of reporting choices $\boldsymbol{m}_t = \{m_{j,t}\}_{j=0}^{1}$, which satisfies the space constraint (9). Without loss of generality, assume that $\boldsymbol{m}_t$ involves all outlets reporting on firm j, and not reporting on firm j'.

Forecaster utility at equilibrium Since this is a symmetric reporting policy, all outlets make the same reporting decisions. This means all forecasters have the same information set, and make the same forecast errors. As a result

$$FE(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}_{i,t}^{\text{news}}) = \bar{FE}_{-i}(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}_{-i,t}^{\text{news}}), \tag{99}$$

and thus $U_{i,t} = 0$.

Outlet deviations A minimal deviation from $\boldsymbol{m}_t$ consists of an outlet i ceasing to report on firm j, and instead reporting on firm j'. $\boldsymbol{m}_t$ can only be sustained in equilibrium if no outlet finds it optimal to deviate in this way. Since in the absence of any deviation we have obtained that $U_{i,t} = 0$ with certainty, a sufficient condition for $\boldsymbol{m}_t$ to be an equilibrium is that

$$\mathbb{E}\, \hat{U}_{i,t}(j, j') \leq 0, \tag{100}$$

where $\hat{U}_{i,t}(j, j')$ is the utility of forecaster i if outlet i deviates. If this condition holds for all pairs of reported and unreported firms j, j', outlets never deviate, and $\boldsymbol{m}_t$ is an equilibrium.

We now proceed to find an expression for $\mathbb{E}\, \hat{U}_{i,t}(j, j')$. First, notice that the deviation would have no effect on firms other than j and j'. From the definition of forecaster utility (equation (13)), we therefore have

$$\begin{aligned}\mathbb{E}\,\hat{U}_{i,t}(j,j') = &-\mathbb{E}\left[FE(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}^{\text{news}}_{i,t}) - \bar{FE}_{-i}(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}^{\text{news}}_{-i,t})\right] \\ &- \mathbb{E}\left[FE(k_{j',t}, z_{j',t}, a_{j',t}, m_{j',t}, \mathcal{I}^{\text{news}}_{i,t}) - \bar{FE}_{-i}(k_{j',t}, z_{j',t}, a_{j',t}, m_{j',t}, \mathcal{I}^{\text{news}}_{-i,t})\right]\end{aligned} \tag{101}$$

The first two terms give the utility change due to no longer reporting on firm j. Other forecasters are still reporting on j, and so it remains the case that $m_{j,t} = 1$, and the realized market value of firm j is unchanged. The average forecast error of other forecasters $\bar{FE}_{-i}(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}^{\text{news}}_{-i,t})$ therefore remains unchanged at 0. However, the forecast of forecaster i does change, as their information set no longer contains $a_{j,t}$. Specifically,

$$FE(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}^{\text{news}}_{i,t}) = \left[\mathcal{P}(k_{j,t}, z_{j,t}, 1, \mathcal{I}^{\text{news}}_{i,t} | \hat{m}_{i,j,t} = 0) - MV(k_{j,t}, z_{j,t}, a_{j,t}, 1)\right]^2. \tag{102}$$

Substituting out for the optimal forecast using equation (17), and taking expectations, we obtain

$$\begin{aligned}\mathbb{E}[FE(k_{j,t}, z_{j,t}, a_{j,t}, m_{j,t}, \mathcal{I}^{\text{news}}_{i,t})] &= \mathbb{E}\left[\,\mathbb{E}(MV(k_{j,t}, z_{j,t}, a_{j,t}, 1) | k_{j,t}, z_{j,t}, m_{j,t} = 1)\right. \\ &\qquad \left. - MV(k_{j,t}, z_{j,t}, a_{j,t}, 1)\right]^2, \qquad (103) \\ &= \mathbb{V}[MV(k_{j,t}, z_{j,t}, a_{j,t}, 1)]. \qquad (104)\end{aligned}$$

where $\mathbb{V}[.]$ denotes the variance with respect to $a_{j,t}$.

The second two terms of equation (101) give the utility change due to reporting firm j'. Recall that investors observe a firm's asset quality if at least one outlet reports it (equation (11)). Since outlet i has reported on firm j', that firm's asset quality $a_{j',t}$ is transmitted to investors, and so $m_{j',t} = 1$. As a result, forecaster i observes all of the determinants of firm j's market value, and is able to make an accurate forecast (equation (18)). Forecaster i therefore makes a zero forecast error about firm j'.

However, although forecaster i makes no forecast error about j' under this deviation, the same is not true of other forecasters. Their outlets have not reported on j' ($\hat{m}_{i',j',t} = 0$), and so they do not have sufficient information to infer the market value of j' precisely. This generates a forecast error, given by

$$\bar{FE}_{-i}(k_{j',t}, z_{j',t}, a_{j't}, 1, \mathcal{I}^{\text{news}}_{-i,t}) = \int_{i'\neq i} \left[\mathcal{P}(k_{j',t}, z_{j',t}, \mathcal{I}^{\text{news}}_{i',t} | \hat{m}_{i',j,t} = 0) - MV(k_{j',t}, z_{j',t}, a_{j',t}, 1)\right]^2 di' \tag{105}$$

All outlets i' are identical, so using the same steps as those used to derive equation (104) the expectation of this average forecast error becomes:

$$\mathbb{E}\,\bar{FE}_{-i}(k_{j',t}, z_{j',t}, a_{j't}, 1, \mathcal{I}^{\text{news}}_{-i,t}) = \mathbb{V}[MV(k_{j',t}, z_{j',t}, a_{j',t}, 1)] \tag{106}$$

Substituting these results into equation (101), the utility of deviating in this way is

$$\mathbb{E}\,\hat{U}_{i,t}(j, j') = \mathbb{V}[MV(k_{j',t}, z_{j',t}, a_{j',t}, 1)] - \mathbb{V}[MV(k_{j,t}, z_{j,t}, a_{j,t}, 1)]. \tag{107}$$

Condition (100) is therefore satisfied, and the candidate $\boldsymbol{m}_t$ can be sustained as a symmetric equilibrium, if and only if

$$\mathbb{V}[MV(k_{j',t}, z_{j',t}, a_{j',t}, 1)] \leq \mathbb{V}[MV(k_{j,t}, z_{j,t}, a_{j,t}, 1)] \tag{108}$$

for all pairs of reported and unreported firms j, j'.

□

C.2.2. Invariance of reporting probability ratios

For any given firm j, suppose the probability of this firm being reported by a newspaper is $\bar{p}_j$, then the probability of this firm being reported by n newspaper will be:

$$p_{j,n} = 1 - (1 - \bar{p}_j)^n,$$

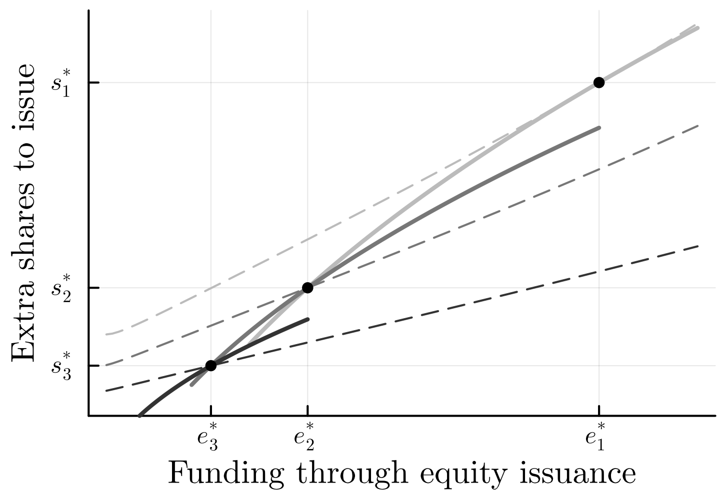
which implies that

$$\frac{\ln(1-\bar{p}_j)}{\ln(1-\bar{p}_{j'})} = \frac{\ln(1-p_{j,n})}{\ln(1-p_{j',n})} \approx \frac{p_{j,n}}{p_{j',n}}, \quad \forall n.$$

Since $\frac{p_{j,n}}{p_{j',n}}$ is independent of the number of newspaper n, we use the ratio of different firm groups' average reporting probability observed in our data sample as the target moment for model calibration.

D. Equity Market Equilibrium under Asymmetric Information

Figure D.1: Equity Issuance Choices of Different Types of Firms in the Equilibrium



Notes: This figure depicts the separating equilibrium within the general setup with many levels of capital quality. e_1^* is determined by the tangent point between the iso-cost curve for the lowest types and the lowest-types' iso-value curves. Given the type-η_ι firms' issuance choice (e_ι^*, s_ι^*), the issuance choice of the type-$\eta_{\iota+1}$ is determined by the intersection between the iso-cost curve for type-$\eta_{\iota+1}$ firms and the type-η_ι firms' iso-value curve that passes their issuance choice. Solid lines are the iso-value curves of various firm types, and dashed lines are the iso-cost curves for different firm types. The lighter the lines' color, the lower the corresponding capital quality.

Theorem 2. *The equilibrium issuance choices of firms that share the same publicly observable information Ω can be determined by the following sequential algorithm:*

0. *Denote the equity issuance of type-η_ι firms under symmetric information as $(\hat{e}_\iota^*, \hat{s}_\iota^*)$, i.e.,*

$$
\begin{aligned}
(e_\iota^*, s_\iota^*) \equiv \arg\max_{e\geq 0, s\geq 0} \frac{1}{1+s} \cdot \mathcal{W}(\eta_\iota, e) \qquad (109)\\
s.t. \quad \frac{s}{1+s} \cdot \mathcal{W}(\eta_\iota, e) = e.
\end{aligned}
$$

1. *Firms with the lowest capital quality η_1 choose their equity issuance as in the full-information environment–i.e.,*

$$e_1^* = \hat{e}_1^* \tag{110}$$

$$s_1^* = \hat{s}_1^* \tag{111}$$

2. *If firms with η_ι choose issuance $(e_\iota^* > \phi^e, s_\iota^* > 0)$, then the choice of firms with $\eta_{\iota+1}$ is bounded by the intersection of type-η_ι firms' iso-value curve and type-$\eta_{\iota+1}$ firms' iso-cost curve–i.e., $(\bar{e}_{\iota+1}, \bar{s}_{\iota+1})$ that satisfies $\bar{e}_{\iota+1} \leq e_\iota^*$ and*

$$\frac{1}{1+\bar{s}_{\iota+1}} \cdot \mathcal{W}(\eta_\iota, \bar{e}_{\iota+1}) = \frac{1}{1+s_\iota^*} \cdot \mathcal{W}(\eta_\iota, e_\iota^*) \tag{112}$$

$$\frac{\bar{s}_{\iota+1}}{1+\bar{s}_{\iota+1}} \cdot \mathcal{W}(\eta_{\iota+1}, \bar{e}_{\iota+1}) = e_{\iota+1}^* \tag{113}$$

Its optimal choice is

$$e_{\iota+1}^* = \min\{\hat{e}_{\iota+1}^*, \bar{e}_{\iota+1}\} \tag{114}$$

$$s_{\iota+1}^* = \frac{e_{\iota+1}^*}{\mathcal{W}(\eta_{\iota+1}, e_{\iota+1}^*) - e_{\iota+1}^*} \tag{115}$$

if $\frac{1}{1+s_{\iota+1}^*} \cdot \mathcal{W}(\eta_{\iota+1}, e_{\iota+1}^*) > \mathcal{W}(\eta_{\iota+1}, 0)$; otherwise, firms with $\eta_{\iota+1}$ will choose not to issue equity.

3. *If firms with η_ι choose not to issue equity, all firms with capital quality $\eta > \eta_\iota$ will also not issue equity.*

The belief to support this equilibrium outcome is

$$\mathcal{B}^*(\eta; e) = \begin{cases} \mathbf{1}_{\eta=\eta_1} & \text{if } e > e_2^* \\ \mathbf{1}_{\eta=\eta_{\iota-1}} & \text{if } e \in (e_\iota^*, e_{\iota-1}^*],\ \forall e_\iota^* > \phi^e \\ \frac{\mathcal{G}(\eta_\iota)}{\sum_{\iota:\{e_\iota^*=0\}} \mathcal{G}(\eta_\iota)} \cdot \mathbf{1}_{\eta=\eta_\iota} & \text{if } e \leq e_{\bar{\iota}}^*. \end{cases} \tag{116}$$

and the associated equity issuance contract is

$$\mathcal{S}^*(e) = \begin{cases} \frac{e}{\mathcal{W}(\eta_1, e) - e} & \text{if } e > e_2^* \\ \frac{e}{\mathcal{W}(\eta_{\iota-1}, e) - e} & \text{if } e \in (e_\iota^*, e_{\iota-1}^*] \text{ where } \iota \leq \bar{\iota} \\ \frac{e}{\frac{\sum_{\iota \geq \bar{\iota}} \mathcal{W}(\eta_\iota, e) \cdot \mathcal{G}(\eta_\iota)}{\sum_{\iota \geq \bar{\iota}} \mathcal{G}(\eta_\iota)} - e} & \text{if } e \leq e_{\bar{\iota}}^* \end{cases}, \tag{117}$$

where $\bar{\iota}$ denotes the index of the smallest type that chooses not to issue.

Proof. See cite the equity paper for the detailed proof. □