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The role of the media in disseminating insider-trading news

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Abstract We use the process through which insider trading (SEC Form 4) filings are made public to investigate whether media coverage affects the way securities markets assimilate news. To do this, we use recent changes in disclosure rules governing insider trades as well as the initiation of coverage by Dow Jones to cleanly identify media effects. Using high-resolution intraday data, we find clear effects of media dissemination on the way prices and volume respond to insider trading news in the minutes after its release. These results help to resolve open questions regarding the role of the media in capital markets, including why apparently second hand news affects securities prices.

Keywords Insider trading · Disclosure · Dissemination · Media

JEL Classification G14 · G18 · M40

1 Introduction

A growing literature explores the role of the media in financial markets and in particular whether and how the media influences prices and trading. While there is a growing consensus that the media helps discipline managers, reduces information asymmetry

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among market participants, and affects the market response to information, we still lack an exact understanding of how this occurs.[1] Many settings of interest to researchers make it difficult to separate the various roles of the media. In the context of earnings announcements, for example, the release of the underlying earnings news results almost immediately in additional related content, in the form of discussion and analysis by the media, by securities analysts, and, more recently, by other actors on social media.

The dissemination of insider trading news via the SEC's EDGAR system is a useful setting for understanding the role of the media. First, details of insiders' trades first become available through SEC (Form 4) filings, which are simple, standardized forms, resulting in limited managerial discretion as to the timing or content of the news. In contrast, management has discretion over both timing and content of earnings announcements (Dellavigna and Pollet 2009; Doyle and Magilke 2009). Second, the media coverage that immediately follows insider filings simply regurgitates basic facts about the trade—who made it, when, how many shares, and at what price—without generating additional content. For earnings announcements, additional related content is almost immediately produced and disseminated by the media. Media coverage of earnings announcements, like media coverage more generally, is fundamentally endogenous, with the existence, nature, and extent of coverage likely to depend on informational attributes of the news. Because of the mechanical nature of the media coverage we use as well as our natural experiment (described below), our approach enables us to cleanly identify media coverage effects, and so provides a useful complement to existing approaches in the literature.

Around 2002, the SEC made two changes to regulations that govern the filing and dissemination of insider trades. First, the SEC substantially shortened the time between an insider's trade and when information about that trade had to be filed with the SEC. Before this change, insiders had up to 10 days after the end of the calendar month in which the trade occurred to file the requisite information (Form 4) with the SEC. This often led to delays of more than a month between the trade and its disclosure to the public (e.g., Seyhun 1986). After the rule change, insiders were required to make these filings within two business days of the trade, and most filings are now made within this period (Brochet 2010; Rogers et al. 2015). Second, before 2002, it was not clear exactly when outsiders could access the information in SEC filings, which helps explain why researchers were unable to find significant market effects at the time of the filings.[2] In June 2003, the SEC required that these filings be made electronically, via its online EDGAR system, meaning that the information is quickly available to outside investors and that there is much less ambiguity about when the data becomes publicly available.[3] Rogers et al. (2015) provide details of the EDGAR dissemination process.

[1] See Miller and Skinner (2015) for a recent summary of this research, which we describe further in Sect. 2.

[2] Lakonishok and Lee (2001) discuss the fact that CDA/Investnet's Insider Trading Monitor, a vendor that specializes in insider information, often took several days to report the filing information. Studies of other types of SEC filings often had to make assumptions about when these filings became available to the public (Carter and Soo 1999; Alford et al. 1994).

[3] Some firms voluntarily filed Form 4 documents electronically prior to the required June 2003 date. The SEC added the time-stamp to the actual filings in May 2002.

Although these changes improved the timeliness of insider filings, it is unclear whether the market will fully respond to the news until it is widely disseminated to market participants. Recent evidence on investor inattention and the role of the media in securities markets suggests that how news is disseminated affects the speed and completeness of the market response. If investors pay less attention to less visible information (Barber and Odean 2008; Dellavigna and Pollet 2009), dissemination of news over prominent wire services, as opposed to public but less visible availability via EDGAR, may cause investors to pay attention and prices to respond. These arguments suggest that frictions impede the market's ability to quickly and fully impound news, which provides a role for the media in price formation (e.g., Davies and Canes 1978; Huberman and Regev 2001; Tetlock 2011).[4] The economic role of dissemination is also discussed by Easley and O'Hara (2004), who show that greater dispersion of private information among investors lowers firms' cost of capital. We view the new disclosure regime for insider trading as a clean setting to test these ideas and use two approaches to identify the effect of media coverage on the market response to insider trading news, both of which offer relatively strong internal validity.

First, we gather precise (to the second) intraday information on the timing of both the underlying SEC filing and subsequent media coverage of that news, which allows us to separate the public release of news from its coverage by the media. We download Form 4 filings from the SEC's EDGAR database and use the approach of Rogers et al. (2015) to ascertain when the filing first becomes available to outsiders, which occurs either by posting to the SEC website or through a subscriber feed to the EDGAR Public Dissemination System (PDS). We then examine whether dissemination of that news over Dow Jones newswires a short time after its initial release generates an incremental market response. This test exploits the precision of our knowledge of the timing of both when the news is initially released and its dissemination by the media, as well as high-resolution intraday trading data, to identify the effect of media coverage.

Second, we exploit a natural experiment in which Dow Jones abruptly initiated coverage of insider trading filings in early 2004. This initiation of media coverage/dissemination is plausibly exogenous with respect to the underlying production and content of the news and so offers a clean way of identifying the effect of that coverage, as discussed further below.

The insider trading setting offers a number of advantages for investigating the effect of media dissemination and investor inattention on security prices. First, a large fraction of Form 4 filings are made during the trading day, which facilitates tests based on intraday data. In contrast, our evidence (unreported) indicates that over 90 % of earnings announcements are now reported outside of trading hours.

Second, insider trading news is less likely to be accompanied by ancillary information produced by other market agents. In contrast, the release of earnings news quickly results in the production of various forms of analysis by market

[4] For example, Ng et al. (2008) show that transactions costs help explain post-earnings announcement drift by restricting the ability of informed traders to trade on earnings information and slowing its incorporation into price.

commentators, including the media, analysts, and investors, as well as information about the firm, its business, and its management (e.g., Bushee et al. 2010). This makes it hard to separate the effect of the news from the way it is disseminated because more news is immediately produced and that production is likely to affect, and be affected by, the nature of the earnings news. Managers have incentives to strategically time the release of earnings news, which further complicates identification (e.g., Patell and Wolfson 1982; Bagnoli et al. 2002; Doyle and Magilke 2009). In contrast, it is not clear why managers would strategically time Form 4 filings.

Third, Dow Jones' coverage of these filings is mechanical and does not reflect the media's incentives to cover more newsworthy events. Dow Jones typically disseminates the news 20–30 s after it is made available by EDGAR and does so as a matter of routine once it has decided to cover a firm/insider. Consequently, unlike many other settings, there is no media coverage selection effect to potentially confound inference.

Finally, filings of insider trades with the SEC are important informational events. It has long been known that trading on inside information is associated with significant abnormal returns (Lorie and Niederhoffer 1968; Seyhun 1986). Using data from the new regulatory regime (described above) and daily returns, Brochet (2010) reports that there is a positive and significant reaction to filings of insider purchases in the new regime but that there was little evidence of a reaction in the period before 2003. This more pronounced reaction is likely due to both the more timely filings and the fact that we now know precisely when the news is released through EDGAR.

Both sets of evidence support the conclusion that there is a pure dissemination effect of the media. First, we find that intraday prices and volume respond to the release of insider trading news when it is disseminated by Dow Jones, which typically occurs 20–30 s after it first becomes available to outsiders. Second, the results of our natural experiment, which compares the way intraday prices respond to the release of insider trading news in periods with and without Dow Jones coverage, also shows that there is a media dissemination effect over and above the response of the market to the initial release of the news. In some ways, our evidence provides a lower bound on the importance of dissemination in capital markets: because insider news is relatively easy for informed traders to obtain and analyze (as compared to longer, more complex disclosure documents such as Form 10-Ks), the dissemination effects we document are likely to be smaller than for other types of disclosures.

As we discuss in the next section, our setting affords a number of advantages that strengthen our inferences that the media's dissemination of news directly affects market prices. Consequently, our study extends research on the role of the media in capital markets. Section 3 details our sample and data. Section 4 reports our tests. Section 5 concludes.

2 Previous literature

2.1 The insider trading literature

There is a large literature on the profitability of insider trading for insiders as well as whether outsiders can profit from public information about these trades (these are tests of strong form and semi-strong form efficiency, respectively; see Lorie and Niederhoffer 1968; Finnerty 1976; Seyhun 1986; Lakonishok and Lee 2001; Cohen et al. 2012). This literature finds that insider trading is profitable for insiders, who earn significant abnormal returns, as well as for outside investors. The evidence generally shows that the positive returns associated with insider purchases are larger in absolute value than the negative returns associated with insider sales. These differences are attributed to the fact that insiders often sell to meet liquidity needs and to the litigation risk associated with insider sales (Rogers 2008). Brochet (2010) finds an economically significant market response to filings of insider purchases—the abnormal return is 1.89 % over a three-day filing window, with volume 12 % higher than normal—but not sales (Brochet's evidence is for the period after Sarbanes-Oxley changed the filing deadlines for insider trades, as described in Sect. 1, and corresponds to the filing regime that we study). We examine both purchases and sales in our tests but expect stronger effects for purchases.

2.2 Research on the role of the media and dissemination in capital markets

A large body of work investigates the role of the media in capital markets. As early as the 1970s, researchers uncovered evidence that the media influences how the market responds to news. Davies and Canes (1978) find that the market responded to analysts' stock recommendations published in *The Wall Street Journal's* "Heard on the Street" column, even though that information was available to the analysts' clients days or even weeks before. Huberman and Regev (2001) show that news about the successful development of a new cancer drug by EntreMed caused a substantial market response when published in the Sunday edition of *The New York Times*, even though the news had been published months before in other media outlets, including *Nature*. These papers raise questions about market efficiency and have stimulated much research on whether media coverage affects how markets assimilate new information.

Researchers also show that the media helps discipline corporate managers by identifying and publicizing questionable or illegal practices. Dyck et al. (2008) provide evidence that the press plays a role in correcting corporate governance problems at Russian firms, while Miller (2006) investigates the role of the press in uncovering accounting frauds. Dai et al. (2015) show how the media disciplines insider trading.

Our work more closely relates to a stream of the investor inattention literature, which argues that the market takes longer to assimilate information that is released at times when investors pay less attention. Dellavigna and Pollet (2009) and Niessner (2015) argue that investors are distracted on Fridays so that the market

takes longer to respond to news released on these days. In our setting, it seems plausible that insider filings released via EDGAR attract less investor attention because it is relatively costly for investors to track EDGAR postings in real time. If so, dissemination of insider trading news by a prominent media outlet such as Dow Jones increases its visibility to investors, which in turn triggers a market response.[5] It is likely to be less costly for market participants to track insider trading news using a prominent source such as Dow Jones than to constantly monitor ("scrape") the EDGAR website or to access the related PDS feed, as described in more detail below.

Because the media naturally has incentives to uncover and disseminate news that is more interesting to readers, media coverage is endogenous, a problem that is well recognized by researchers in this area.

Bushee et al. (2010) examine whether the business press affects information asymmetry around earnings announcements. They view the role of the business press as both "the timely dissemination of firm-initiated information to a broad investor base" and "the creation and packaging of new information" (p. 2) and find that greater press coverage lowers information asymmetry, which they measure using bid-ask spreads and market depth. To isolate the effect of media coverage, they control for various measures of information content, including whether the coverage is firm-initiated, the market's return and volume reaction to the earnings news, firm size, and the presence of other intermediaries such as analysts.

D'Souza et al. (2010) and Li et al. (2011) also examine the role of information intermediaries in financial markets. The former paper examines the role and incentives of a prominent data aggregator, S&P Compustat, and shows that this service delivers accounting information about firms in its database more quickly for firms whose stock is held by certain types of large institutional investors (quasi-indexers) and for firms in major indices. This paper does not examine market effects of dissemination. More similar to our study, Li et al. (2011) analyze the role of Dow Jones Corporate Filing Alerts, a service by which Dow Jones identifies and disseminates information in SEC filings to its clients. The authors show that there is considerable variation in the extent to which SEC filings generate Dow Jones alerts (the number and timing of alerts both vary, and some filings are not covered at all), consistent with the goal of the service being to identify important nuggets of information. The authors find that dissemination of the alerts is associated with significant market effects, consistent with the selection process identifying important information in the filings. This evidence suggests that the media identifies newsworthy information (or that media coverage makes the information newsworthy) but does not address the pure dissemination effect of the news.

Blankespoor et al. (2014) examine whether firms' use of Twitter to more broadly disseminate earnings news lowers information asymmetry around earnings announcements. Consistent with Bushee et al. (2010), they find that broader dissemination of earnings news lowers information asymmetry, as measured by bid-

[5] Our setting is less relevant for a different form of investor inattention, discussed by Hirshleifer et al. (2009), under which investors have limited cognitive ability and so get distracted by competing contemporaneous disclosures, such as a large number of earnings announcements on a particular day.

ask spreads. Similar to Bushee et al., to identify market effects these authors control for various attributes of the news, including its information content, the presence of other intermediaries, market conditions, and firm characteristics. The difference is that Blankespoor et al. (2014) analyze the effect of firm-level decisions to increase dissemination, whereas Bushee et al. (2010) analyze the role of the business press in more broadly disseminating earnings news.

Roughly contemporaneous with our work, Twedt (2016) examines how the dissemination of earnings guidance by Dow Jones Newswires affects the efficiency of the price discovery process associated with that news. Because Dow Jones chooses which earnings guidance to cover (he finds that Dow Jones covers 47 % of the earnings guidance available on First Call), Twedt uses matched sample approaches, including propensity-score matching, to address the endogeneity of Dow Jones' coverage decisions. He shows that coverage by Dow Jones significantly increases the speed of price discovery for earnings guidance news. Similarly, Drake et al. (2014) use a two-stage instrumental variables approach to examine the effect of press coverage on cash-flow mispricing at earnings announcements. These authors find that increased coverage of earnings news by the business press reduces cash flow mispricing. Similar to other studies examining earnings news, these studies do not identify the mechanism (i.e., dissemination versus news creation).

A number of papers exploit exogenous variation in the physical distribution of news to establish media effects. Engelberg and Parsons (2011) use data from retail brokerage accounts to show that whether local newspapers cover news in a particular region affects trading by local investors. Similarly, Peress (2014) shows that newspaper strikes in European countries affect levels of trading and that these effects are stronger for smaller firms. He argues that these results show, consistent with Engelberg and Parsons, that newspaper coverage affects trading by smaller retail investors.

Our work complements and extends this work in several ways. First, our setting allows us to focus exclusively on the dissemination role of the media (separate from its role in producing additional content) because the Dow Jones newswire articles we use do not convey information beyond that in the corresponding Form 4 filing. These articles simply reiterate factual information in the filing without providing additional commentary or analysis, as we demonstrate below. Second, most previous work focuses on liquidity or trading measures (bid-ask spreads, depth, trading volume, etc.), whereas we directly examine the effect of dissemination on the level of prices, which increases confidence about the link between the news and the observed market effect. We can do this because there is little ambiguity about the sign of the news associated with insider trades, particularly purchases. Third, our use of intraday data allows us to directly separate and identify the effects of the initial public availability of news from its dissemination by Dow Jones, which reduces the types of endogeneity concerns that face most previous research. Fourth, as we show below, Dow Jones' coverage of Form 4 filings is plausibly unrelated to informational attributes of these releases and so can be viewed as predetermined, which further strengthens causal inference.

Table 1 Sample construction

	Total trades	Purchases	Sales	% Purchases
Line 1: Starting sample from Thomson Reuters (stock not options, Form 4 including Officers, Directors and Committee members)	97,398	23,128	74,270	23.75
Line 2: Able to match company CIK and insider name to SEC filings on EDGAR	88,841	19,327	69,514	21.75
Line 3: Restrict to a "isolated" Form 4 filings (excluding multiple filings within 15 min of each other)	66,110	15,257	50,853	23.08
Line 4: Filed with SEC 9:40 am to 3:30 pm EST	21,004	6727	14,277	32.03
Line 5: With RavenPack (Dow Jones) coverage and TAQ data	17,064	4098	12,966	24.02
Line 6: Insider's last transaction price within daily trading range on CRSP	16,567	3814	12,753	23.02
Line 7: Time between first dissemination and Dow Jones report is between 0 and 300 s	16,518	3789	12,729	22.94
Line 8: Time between first dissemination and Dow Jones report is between 15 and 300 s	15,346	3469	11,877	22.61

This table describes the sample construction procedures. We begin with Thomson Reuters insider trading data for Form 4 filings between March 1, 2012, and December 31, 2013. We then merge in data from three other sources. First, we add in the Form 4 insider trading time-date stamps obtained from the SEC's EDGAR filing system. Second, we merge in details about the Dow Jones media coverage of the filings. Finally, we incorporate TAQ data. The table provides details on sample attrition for the full sample, as well as for purchases and sales separately

3 Sample, data, and timing of media coverage

We provide details of the sample we use for our first set of tests in Table 1. We obtain Form 4 insider filings from Thomson Reuters and restrict attention to insider stock trades and insiders who are officers or directors. To perform our analysis, we require the precise time Form 4 filings become available to outsiders. As detailed by Rogers et al. (2015), the process through which EDGAR disseminates insider filings means that the EDGAR time stamp is *not* the time filings become available to outsiders. After filings are uploaded to EDGAR, it takes a short period (usually measured in seconds) for filings to be "accepted;" this is the EDGAR time stamp shown in the header. In the typical case, it then takes another 30–40 s before filings are available to outsiders. This occurs in either of two ways. First, in a little over half of all cases, subscribers to the PDS receive the filings before they are posted to the SEC website. In these cases, we take as the time of first dissemination the time filings are first made available to the PDS subscriber from whom we get these data. Second, in the remaining cases the filing is posted to the SEC site before it is available to the PDS subscriber.[6] In these cases, we treat this "posting" time as the

[6] The PDS subscriber has two feeds; we take the first as the time the filing is available to the subscriber. As Rogers et al. (2015) discuss, there were around 40 PDS subscribers during our sample period, so it could be that other PDS subscribers get the data before the time we designate as the time of first public dissemination. To the extent this happens, our measure of the time of first public dissemination is biased

time of first dissemination. Thus we take the earlier of these times as first dissemination to outsiders, measured to the closest second. Rogers et al. (2015) report that the median difference in these times is around 3 s.[7]

The necessity of getting these data from the PDS subscriber limits the sample period to March 1, 2012, through December 31, 2013, and to 97,398 insider filings (trades), of which 23,128 (23.8 %) are purchases. We lose observations we cannot match to SEC filings on EDGAR, which reduces the sample to 88,841 filings.

We also need the precise time the media disseminates filings, which we take as the time (also measured to the nearest second) that Dow Jones first disseminates filing news. We obtain these data from RavenPack (RP), which provides time-stamped data for all news items disseminated via Dow Jones Newswires. This match is complicated by the fact that RP does not include the identity of the insider and so does not allow us to match the article to the SEC filings in cases where there are multiple insider filings by a given firm in a short period. To ensure an unambiguous match, we eliminate observations for which two or more insider filings for a given firm occur within 15 min of each other. This reduces the sample to 66,110 filings.

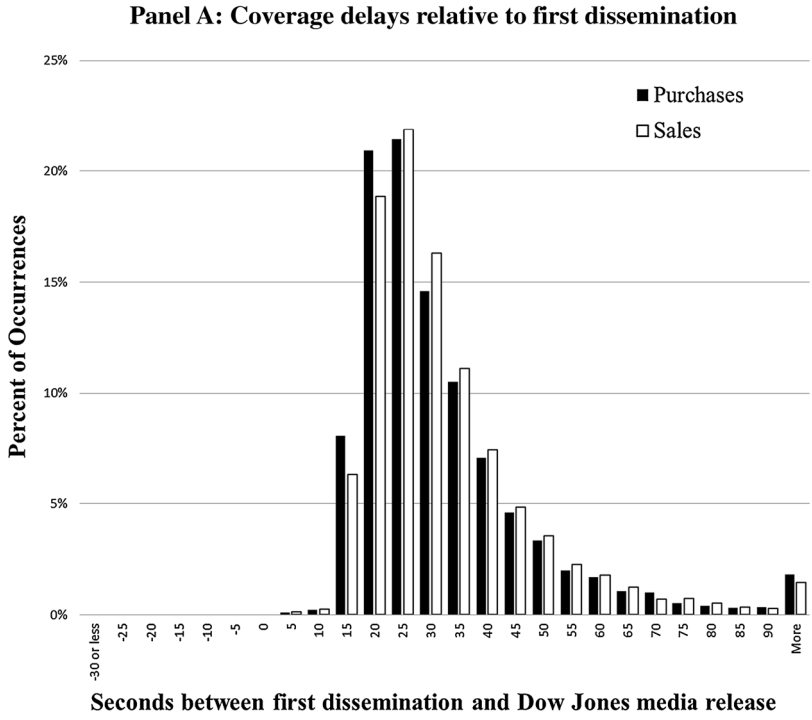
We use TAQ data to measure trading effects and so restrict attention to filings made during the trading day between 9:40 am and 3:30 pm EST, which eliminates possible beginning or end of trading day effects. This reduces the sample to 21,004 filings. We further require that the transaction price be within the CRSP daily trading range. After we impose these requirements 16,567 observations remain, shown on Line 6 of Table 1. We use these data to provide evidence on the timing of media dissemination relative to when filings first become available to outsiders via EDGAR.

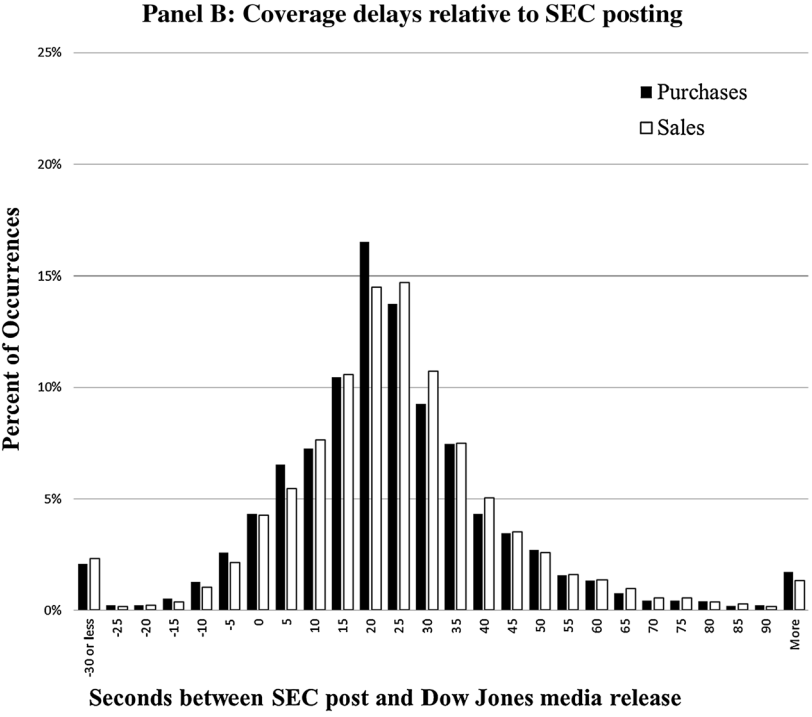
Panel A of Fig. 1 reports a histogram of the delay in seconds from first dissemination to dissemination via Dow Jones, bucketed in 5 s intervals and reported separately for insider purchases and sales. We discuss purchases (dark bars) first. There are very few observations for which the delay is less than 15 s. Around 7 % of observations have a delay of 15–19 s, while most observations (over 20 % in each case) fall into the 20–24 and 25–29 s delay groups. This means that in more than 40 % of cases the delay is around 20–30 s, with an additional 15 % from 30–35 s. This indicates that Dow Jones generally disseminates insider filings quickly, within half a minute or so of EDGAR dissemination (via either the website or the PDS feed). The distribution of delay times has a long tail, with a small number of observations taking more than 90 s before they are disseminated by Dow Jones. The distribution of delays for sales (unshaded bars) is similar, although delays are somewhat longer.

Panel B of Fig. 1 reports, for the same observations, a similar histogram for the time between posting to the EDGAR website and dissemination via Dow Jones (again reported separately for purchases and sales). In this figure, the time

Footnote 6 continued
late, which understates the gap between first public dissemination and dissemination by Dow Jones and adds noise to our tests, making it more difficult to detect market effects.

[7] We have also run our main analyses, as reported in Fig. 3, separately for the two subsamples (that is, "PDS first" and "SEC first" observations). These results, available upon request, support the conclusions of the analyses that we report below.


Panel A: Coverage delays relative to first dissemination
Purchases
Sales
Percent of Occurrences
25%
20%
15%
10%
5%
0%
-30 or less
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
More
Seconds between first dissemination and Dow Jones media release


Panel B: Coverage delays relative to SEC posting
Purchases
Sales
Percent of Occurrences
25%
20%
15%
10%
5%
0%
-30 or less
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
More
Seconds between SEC post and Dow Jones media release

◀**Fig. 1** Histograms of media dissemination delays. Histograms describe the distribution of media coverage delays. In **Panel A**, coverage delay is defined relative to first dissemination (i.e., the earliest of the PDS feeds and SEC posting times). In **Panel B**, coverage delay is based on SEC posting times. The sample is from Line 6 of Table 2. A positive difference indicates that Dow Jones coverage occurs after the respective dissemination time

differences can be negative because in a small fraction of cases, Dow Jones evidently obtains the filing information from a PDS subscriber before its public posting on EDGAR; the figure shows that this happens in approximately 5 % of cases (as discussed above, just over half of the time the EDGAR post occurs after filings are disseminated to PDS subscribers, who quickly disseminate to their clients, which can include media outlets). For most observations, however, the delay is in the 15–35 s range, again indicating that Dow Jones disseminates filings quickly after they become available via EDGAR.

Overall, Fig. 1 indicates that there is significant variation in the time between when filings first become available to outsiders and when they are disseminated via Dow Jones. For many observations, this delay is 20–30 s. But it is shorter for some and longer for others, sometimes much longer. This delay allows us to identify the effect of media dissemination. We use variation in the delay to investigate whether the market fully responds to the news in these filings when they are first disseminated, or whether there is additional market response when Dow Jones subsequently disseminates the news.

It possible that informational attributes of the trades explain variation in how quickly the media disseminates the news. However, these are homogeneous, simple filings, which should be easy for Dow Jones to process and disseminate (this may even be done mechanically without human intervention). If this is correct, informational characteristics of the disclosure will not affect the timing of media dissemination. Indeed, this is what motivates our focus on insider filings as opposed to (say) earnings announcements, where the news being released is likely to generate additional content, affect the way it is disseminated by the media, or both.

Nevertheless, to provide evidence on whether informational attributes of filings affect the timing of media coverage, we regress the coverage delay (in seconds) on variables that measure the information content of the trade—its size, past trades by the same insider over the prior year, firm size, and CFO and CEO dummies. We also include Filing Cluster, which counts the number of other EDGAR filings (of all types) that occur in the minute before the filing becomes available to outsiders, to see whether delays are longer when there are more filings. (This variable is distinct from the others because it does not reflect informational aspects of the filings.) We also include a time trend to examine whether the length of the delay changes over our sample period. We provide variable definitions in Appendix 1.

To perform this regression, we adapt the sample of insider purchases from Line 6 in Table 1. As shown in the last two rows of Table 1, we further limit the sample to observations for which the delay is between 15 and 300 s. This ensures that at least 15 s separates the events so that our intraday event analysis can separately identify market effects. We also exclude those few observations for which the delay seems

excessive (longer than 300 s). This limits the sample to that shown in Line 8 of Table 1 (3469 purchases). The actual sample used in Table 2 is further reduced (to 3294 purchases) when we also require data for the additional regressors.

The results, which we report in Table 2, show that there is a modest time trend in these data: over the sample period (of 22 months), the delay declines by about 1 s, although the t-statistic is only −1.9. The only other significant variables are Filing Cluster and CEO dummy, both of which have positive, statistically significant coefficients, although economic magnitudes are modest. The result on Filing Cluster indicates that dissemination takes slightly longer during busier periods, perhaps implying there is some form of capacity constraint in the process through which Dow Jones accesses, processes, and disseminates filings. Trades by the CEO are typically more informative, so the positive coefficient on the CEO dummy implies that more informative trades take longer to process, although the difference is only 2 s. Overall, however, there is limited evidence that length of the delay in media dissemination reflects informational aspects of filings.

Our first set of tests examines whether the price response varies according to the length of the delay between first dissemination (as defined above) and dissemination via Dow Jones, as summarized in Panel A of Fig. 1. To do this, we sort observations into two equal-sized groups: the short-delay group contains observations for which

Table 2 Determinants of Dow Jones coverage delays

Dependent variable	Seconds delay Panel A		Seconds delay Panel B	
	Coeff	t-stat	Coeff	t-stat
Intercept	33.6573	19.95	26.0558	7.28
Log(1 + Time Trend)	−1.3112	−1.95	−1.3507	−1.92
Log(1 + Firm Size)			−0.0564	−0.42
Log(1 + Filing Cluster)			2.0657	3.45
Log(1 + Prior Trading)			0.0116	0.03
Log(1 + Trade Size)			0.4892	1.38
CEO			2.1616	3.44
CFO			−0.2590	−0.35
R-squared	0.003		0.013	
N	3294		3294	

The regressions show the delay in media coverage by Dow Jones (*Coverage Delay*) regressed on its potential determinants. *Coverage Delay* is defined as the number of seconds between the first public dissemination of the insider trade and the first dissemination by Dow Jones. In the first column, the delay is regressed on a measure of chronological time, equal to 1 for observations from the first month of the sample period, 2 for observations from the second month of the sample period, through 22 for those in the last month of the sample period (*Time Trend*). In the second column, we include total assets, from Compustat, in millions (*Firm Size*); the number of filings posted to EDGAR in the 60 s before the Form 4 posting (*Filing Cluster*); purchase activity, in dollars, that the insider engaged in during the prior 365 days, from Thomson Reuters (*Prior Trading*); the dollar value of the insider purchase, from Thomson Reuters (*Trade Size*); and indicator variables for whether the insider is the *CEO* or *CFO*. Standard errors are clustered at the year-month level

the delay is below the median; the long-delay group contains observations for which the delay is above the median.

Table 3 compares observations in the two groups. First, by construction, delays are significantly longer for the long-delay group: the mean (median) delay for the long-delay group is 43 (37) versus 21 (21) s for the short-delay group. This indicates that there is a significant difference in delay length between the two groups, of 16 s at the median, which is important for our tests.

Table 3 Comparative statistics for insider purchases with long and short media delays

	Short delay		Long delay		Difference (p value)
Panel A: delay descriptives (*in seconds*)					
Mean	21		43		
Median	21		37		
Panel B: trade Size (*in dollars*)					
Mean	64,940		92,688		0.00
Median	19,000		22,210		0.00
Panel C: primary rolecode of insider					
CB (Chairman of the Board)	34	2 %	37	2 %	
CEO (Chief Executive Officer)	294	16 %	310	19 %	
CFO (Chief Financial Officer)	99	5 %	102	6 %	
CI (Chief Investment Officer)	10	1 %	4	0 %	
CO (Chief Operating Officer)	32	2 %	41	2 %	
CT (Chief Technology Officer	3	0 %	3	0 %	
D (Director)	1035	57 %	849	51 %	
DO (Director and Beneficial Owner)	39	2 %	32	2 %	
EVP (Executive Vice President)	0	0 %	1	0 %	
H (Officer, Director, and Beneficial Owner)	1	0 %	2	0 %	
MC (Member of Committee or Advisory Board)	1	0 %	1	0 %	
O (Officer)	194	11 %	201	12 %	
OD (Officer and Director)	17	1 %	24	1 %	
OS (Officer of Subsidiary)	2	0 %	2	0 %	
OT (Officer and Treasurer)	3	0 %	4	0 %	
OX (Divisional Officer)	3	0 %	1	0 %	
P (President)	44	2 %	43	3 %	
VP (Vice President)	0	0 %	1	0 %	
	1811		1658		

This table provides descriptive statistics for trades with long and short Dow Jones coverage delays (*Coverage Delay*) based on the number of seconds between first public dissemination of the trade and coverage by Dow Jones. As in Fig. 3, media coverage delays below the median are classified as "short," and those above the median are classified as "long." Panel A provides the mean and median coverage delay (in seconds) for the two samples. Panel B compares mean and median trade sizes between the two delay groups. The p value for the means is from a t test, and the p value for the medians is from a Wilcoxon rank-sum test. Panel C provides the frequency distribution of the primary role code for the insiders trading within each delay group

Second, the results in Table 3 show that trade size is larger for the long-delay group, although the differences are not large in economic terms. Mean (median) trade size is $92,688 ($22,210) for the long-delay group, compared to $64,940 ($19,000) for the short-delay group (differences significant at the 1 % level). Similar to the CEO dummy result in Table 2, this is some evidence that the delay is longer for more informative trades, although the trade size variable is not significant in the Table 2 regression. The evidence in Table 3 shows little in the way of differences between the groups in terms of insider type, another common indicator of the information content of the trade. Overall, there is limited support for the idea that informational characteristics of the trade affect how quickly it is disseminated via Dow Jones. This is an important advantage of our setting: in many other settings, informational attributes of the news affect both the way it is disclosed and agents' incentives to create additional content and discuss the news, which limits inferences about media effects.

To further emphasize this point, Appendix 2 provides an example of a Dow Jones news release for a typical observation in our sample. The trade in question occurred on Friday, December 20, 2013, and the associated Form 4 was filed on Monday, December 23, 2013 (within the two-trading-day window required by the SEC). Appendix 2 shows both the data we retrieve from RavenPack and the Dow Jones release. The Dow Jones release simply provides basic information about the trade obtained from the Form 4 filing—company name and symbol, identity and role of insider, date of trade, trade type, trade size, trade price, total trade value, and total holdings of the insider—and does not augment the filing data. This example is typical of our sample.

Collectively, this evidence supports our view that the Dow Jones releases we study serve only to disseminate news about insider trades, without augmentation, which allows us to attribute market effects to dissemination.

Another important issue is whether Dow Jones selects filings to cover, as opposed to covering all filings. To investigate this, we begin with the sample shown on Line 4 of Table 1, which comprises 21,004 trades obtained from Form 4 filings. These trades represent 10,758 different individuals, of whom 9060 (84 %) have at least one trade covered by Dow Jones. Of these individuals, 3396 have more than one trade in our dataset, which represents 8447 subsequent trades. Dow Jones covers 8274 (98.0 %) of these trades, which shows that once Dow Jones decides to cover someone, it continues to cover essentially all trades by that person, as opposed to deciding to cover trades based on their likely interest to readers.

The same is true of firms. The 21,004 trades on Line 4 of Table 1 represent 3150 different firms, of which 2488 (79 %) have at least one trade covered by Dow Jones. Of these 2488 firms, 1907 have multiple trades in our dataset. Of the 13,711 subsequent trades for these firms, Dow Jones covers 13,356 (97.4 %). This suggests that, once Dow Jones decides to cover a firm, it continues to cover essentially all trades made by that firm's insiders, regardless of trade characteristics.

These findings strengthen our interpretation that any market effects associated with dissemination of the news by Dow Jones are attributable to dissemination, as opposed to Dow Jones' judgments about informational aspects of the trades or the creation of additional content.

4 Empirical tests

4.1 Intraday analysis of insider filings

Our first set of analyses examines how prices and volume respond to the first dissemination of news and to the subsequent dissemination of the same news by Dow Jones. If the market fully assimilates the news in the Form 4 filing at the time it becomes available to outsiders, there will be no additional response when it is later disseminated via Dow Jones. In contrast, if the dissemination role of the media matters, we will observe additional market response at the time Dow Jones disseminates the news.

We use price and volume changes to measure market activity, both measured on a second-by-second basis using TAQ data.[8] Specifically, we measure and report changes in prices (percentage change in price from first dissemination) and abnormal volumes (percentage abnormal volume relative to typical volume for the 2 min around the dissemination), both in event time.[9] We provide definitions of these measures in Appendix 1.

As a precursor to the tests, Fig. 2 plots the percentage change in prices (Panel A) and volumes (Panel B) for the 2 min period after first dissemination of the filing news (in Panel A, the price measure cumulates the change in price from the time of the insider's trade). We also report changes in spreads (Panel C) but do not include spreads in our tests because it is not clear how they would respond to multiple dissemination events (abnormal spreads are defined analogously to abnormal volume). Each figure shows results for purchases (solid lines) and sales (dashed lines). We are most interested in the results for purchases because there is consistent evidence, described above, that they convey more information than sales.

Consistent with previous research, prices increase in response to insider purchases but do not react to insider sales. Figure 2, Panel A shows that, for purchases, prices increase by 51 basis points (bps) by the time of first dissemination relative to the price at which the insider executes the trade. This is the return available exclusively to the insider. There is then a distinct jump (of around 4 bps) at the time of initial dissemination, followed by upward drift that totals around 15 bps over the 2-min event period. In contrast, the plot for sales (dashed line) shows essentially no movement after first dissemination.

These impressions are reinforced by Panel B, which shows how volume responds to dissemination of the insider trading news. For purchases, we see a very significant response in abnormal volume with a concave shape, so that volume responds quickly to the information release but that the response slows over the 2-min window as the news is impounded. Similar to Panel A, the results for insider sales

[8] Our tests assume that the clocks we use to measure the time of first public dissemination (which comes from our PDS data, described above) and by TAQ are correctly synchronized. Rogers et al. (2015) provide evidence that this is likely to be the case. The tests also assume that there is no delay in recording the quotes using TAQ, which is supported by Rogers (2008).

[9] We take cumulative dollar volume from t = −60 through event second t minus the average volume for the exact same window (calculated over the previous 52 weeks), deflated by the average cumulative volume for the entire 120 s window (again calculated over the prior 52 weeks).

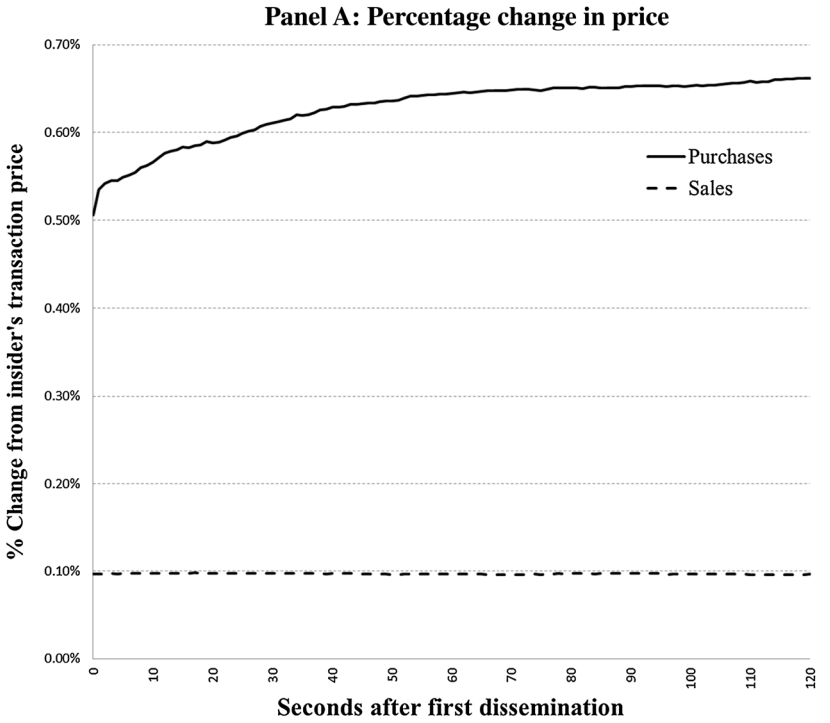


Fig. 2 Price and abnormal volume movements after release of Form 4 insider filings. *Graphs* display the price and volume response following first dissemination of the Form 4. The *solid* (*dashed*) *line* details price and volume movements for insider purchases (sales). The sample is based on the Line 8 sample described in Table 1. The *horizontal axis* is the number of seconds after first dissemination. In **Panel A**, the vertical axis shows the cumulative change in price relative to the insider's transaction price. Thus, for example, the purchase line begins at approximately 0.51 % because, on average, the price is 0.51 % higher at the time of the SEC filing relative to the insider's purchase price. **Panel B** shows percentage change in abnormal volume, while **Panel C** shows percentage change in abnormal spreads

show essentially no response to the news. Because insider sales do not generate any significant market response, we drop them from further analysis and focus on insider purchase transactions.

Panel C reports on abnormal spreads.[10] Once again, there is a clear response to the release of the insider filing news: spreads for purchases jump sharply at the time of initial dissemination. Consistent with a persistent increase in information asymmetry, spreads remain elevated for the full 2-min window but gradually decline, which presumably reflects assimilation of the news by market

[10] Note that the spread plot in Panel C begins 10 s before initial dissemination, while Panels A and B begin at initial dissemination. As the plots shows, spreads begin to move several seconds before initial dissemination, perhaps indicating that some market participants are aware of the forthcoming news.

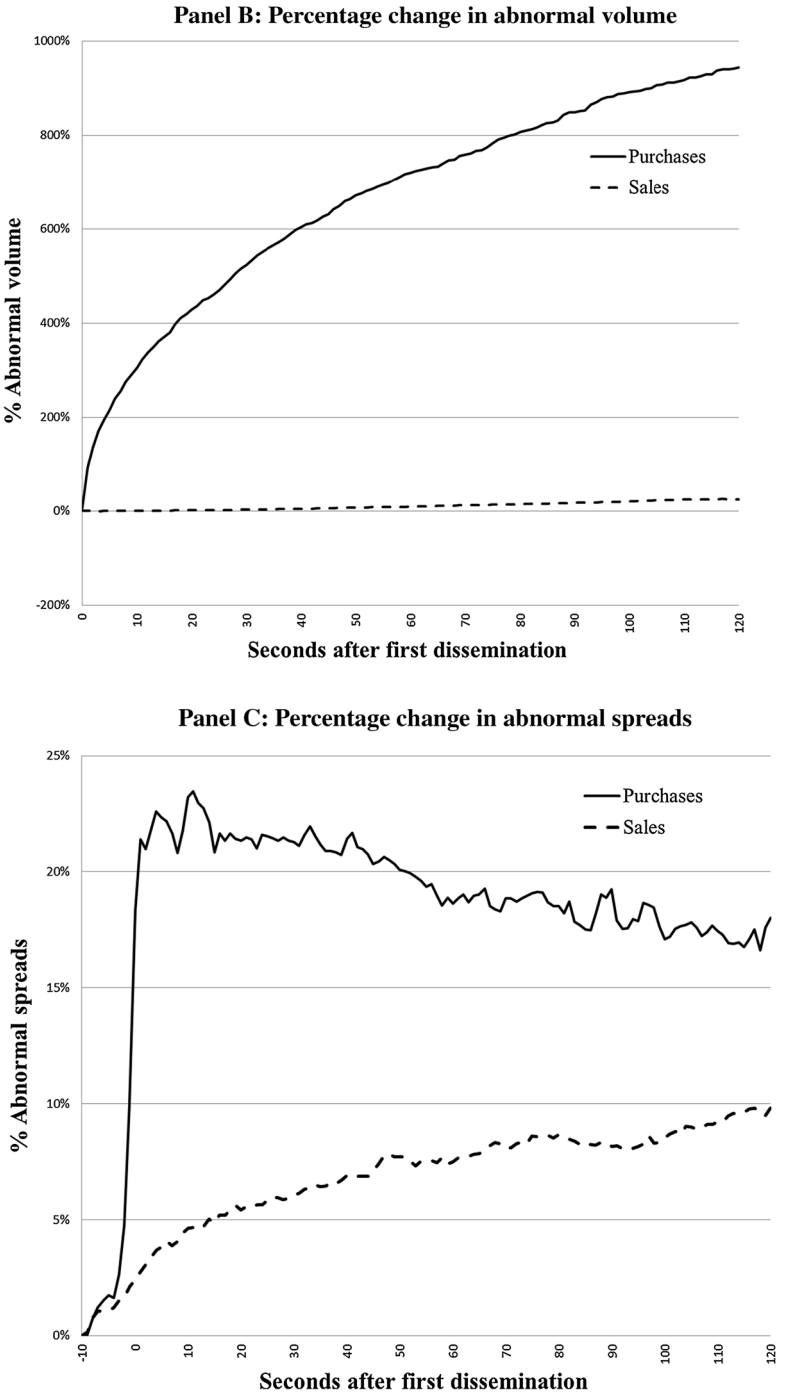
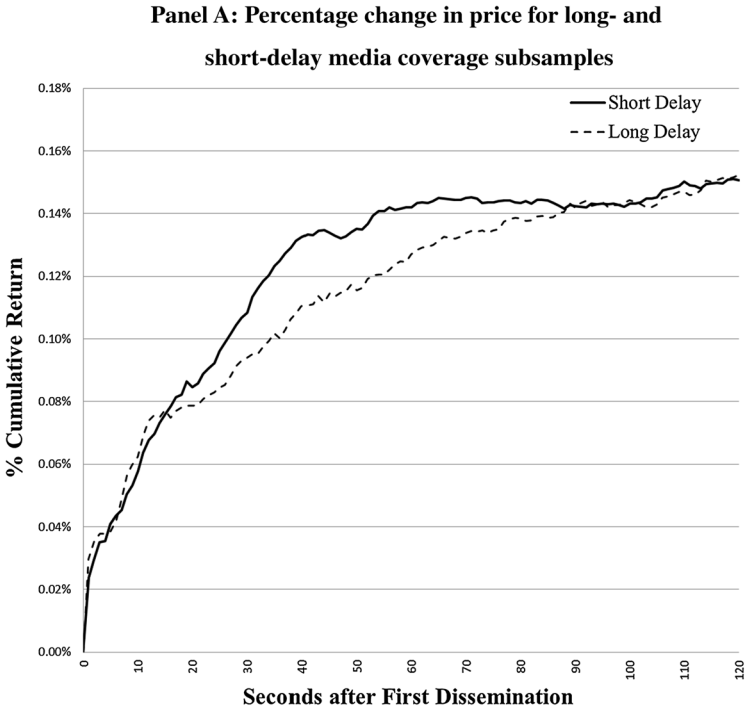
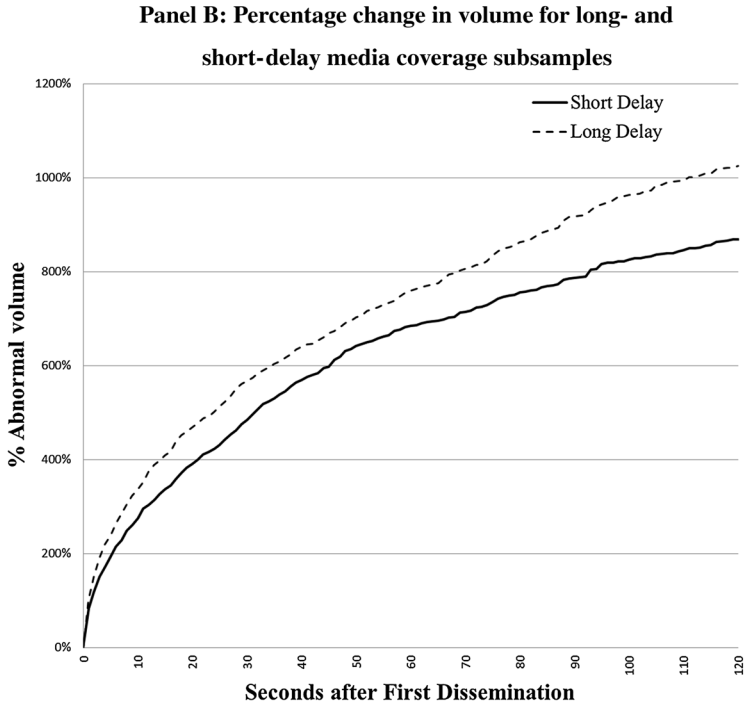


Fig. 2 continued


Panel A: Percentage change in price for long- and short-delay media coverage subsamples
Short Delay
Long Delay
% Cumulative Return
0.18%
0.16%
0.14%
0.12%
0.10%
0.08%
0.06%
0.04%
0.02%
0.00%
0
10
20
30
40
50
60
70
80
90
100
110
120
Seconds after First Dissemination


Panel B: Percentage change in volume for long- and short-delay media coverage subsamples
Short Delay
Long Delay
% Abnormal volume
1200%
1000%
800%
600%
400%
200%
0%
0
10
20
30
40
50
60
70
80
90
100
110
120
Seconds after First Dissemination

◀**Fig. 3** Price and volume movements after release of Form 4 insider filings with sample divided into short-delay and long-delay subsamples. Figures show price and volume movements after the first dissemination for those filings that are covered by the media relatively quickly (short delays) and those that are covered after a longer delay (long delays) for the Line 8 sample in Table 1. Media coverage delays are the number of seconds between the first dissemination of the trade and the first coverage by Dow Jones. Media coverage delays below the median are classified as short, and those above the median are classified as long. **Panels A**, **B** show the percentage change in price and the percentage abnormal volume, respectively, for long and short delay observations in the 2 min following the first dissemination

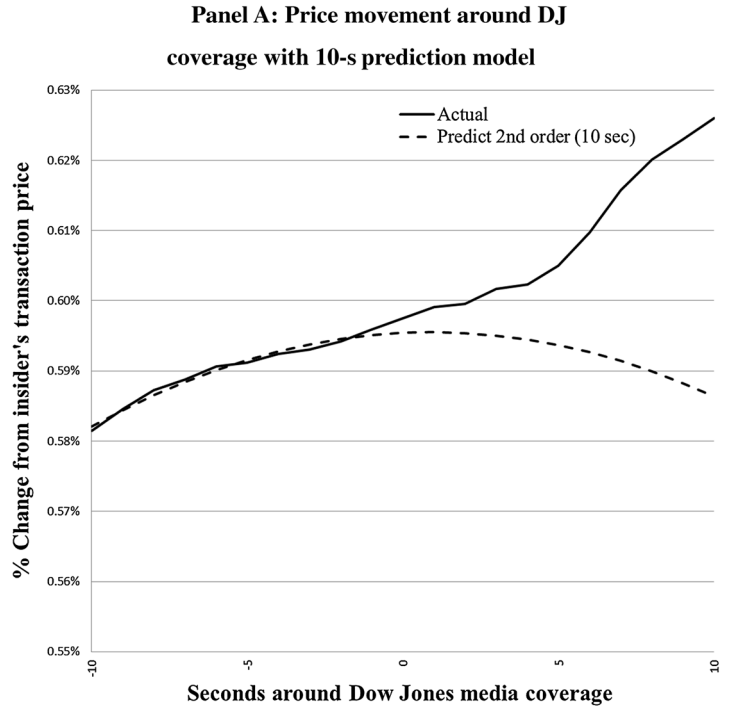
participants.[11] The plot for insider sales shows modest evidence of spread effects, consistent with these filings being less informative.

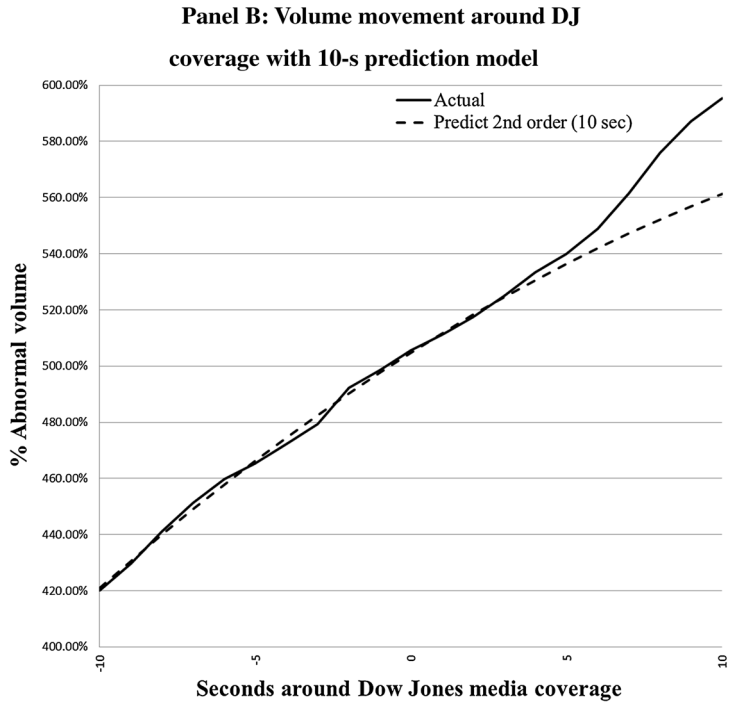
We report our first main test in Fig. 3, which plots price and volume changes in event time relative to first dissemination, with observations divided into the short- and long-delay groups. Panel A reports on prices, while Panel B reports on volume. If media dissemination is important, we expect to see a difference in the timing of the response for the short- and long-delay groups, with more rapid response for the short delay being evidence of a media dissemination effect. We view the price tests as being more informative because the timing of price changes following the revelation of the insider trading news tells us when the news changes investors' beliefs and so provides direct evidence on the timing of dissemination effects. In contrast, volume effects comingle changes in investor beliefs with differences across investors in their beliefs about the implications of the news (Verrecchia 1981; Kim and Verrecchia 1991).

The price results in Panel A of Fig. 3 are consistent with a media effect. First, consistent with an effect of first dissemination, there is a steep increase in price when the news first becomes available to outsiders. This is true for both the short- and long-delay groups, as we would expect if some market participants trade when the news is first available. Second, consistent with the overall information content of the news being similar for the two groups, prices end up in the same place after the full 2 min has elapsed, with the overall price increase over this period being around 15 bps. This provides further assurance that the trades have similar information content. Third, and most important, the price paths diverge noticeably beginning around 20 s, with prices jumping up more strongly for the short-delay group over the period when our earlier (Fig. 1) results tell us that Dow Jones begins to disseminate the news. Differences between the price paths are statistically significant at the 5 % level (two tailed) at seconds 36–38 and at the 10 % level for seconds 31–46, 50, 54, and 55. We interpret this as evidence of a significant Dow Jones dissemination effect.[12]

[11] These results differ from previous papers such as that by Bushee et al. (2010), who show that greater dissemination lowers spreads in daily data. Dissemination may initially increase spreads by exacerbating information asymmetries among market participants (Kim and Verrecchia 1994), but spreads may then recede as more market participants receive and assimilate the news. As discussed above, Rogers et al. (2015) show that, in some cases, the information in insider filings is available to certain market participants (PDS subscribers and their clients) before others, which likely increases information asymmetry.

[12] We also analyze whether these patterns differ for large and small trades. We find that the overall price effect is larger for larger trades and that prices respond more quickly for larger trades. Because trade size is larger for the long-delay group compared to the short-delay group (Table 3), this biases *against* the result we observe in Panel A of Fig. 3.


Panel A: Price movement around DJ coverage with 10-s prediction model
Actual
Predict 2nd order (10 sec)
% Change from insider's transaction price
0.63%
0.62%
0.61%
0.60%
0.59%
0.58%
0.57%
0.56%
0.55%
-10
-5
0
5
10
Seconds around Dow Jones media coverage


Panel B: Volume movement around DJ coverage with 10-s prediction model
Actual
Predict 2nd order (10 sec)
% Abnormal volume
600.00%
580.00%
560.00%
540.00%
520.00%
500.00%
480.00%
460.00%
440.00%
420.00%
400.00%
-10
-5
0
5
10
Seconds around Dow Jones media coverage

◀**Fig. 4** Abnormal price and volume movements (actual and counterfactual) around Dow Jones media coverage of insider purchase filings. These figures show abnormal price movements (**Panel A**) and volume movements (**Panel B**) in event time measured in seconds relative to Dow Jones dissemination of insider purchase filing information. The *solid line* shows actual price movements. The *dashed line* shows the predicted (i.e., counterfactual) path where the predicted values are obtained from a regression of the percentage change in price on a second-order polynomial of time using the actual return data for 10 s before the media coverage (i.e., from −10 to −1 s)

The results using volume (Panel B of Fig. 3) are harder to interpret. Here we see that the overall volume effect is larger for the long-delay group, that there is no clear difference in the evolution of volume between the two groups, and that volume continues to respond over the full window for both groups. Earlier we saw that trade sizes are larger for the long-delay group. We also find (not reported) that trade size is positively associated with the volume response. This makes it likely that the larger volume effect for the long-delay group is due to larger trade sizes. This means that the price results are a more useful test because they are less likely to be confounded by trade size.

In Fig. 3, event time is defined relative to first dissemination. This means that the timing of dissemination by Dow Jones varies across observations, even within the short- and long-delay groups, which makes the effect of Dow Jones dissemination harder to observe; we observe a significant difference in the price response in spite of this. We next examine how prices and volume respond when event time is defined relative to when Dow Jones disseminates the news. We report this test in Fig. 4, with Panel A showing price changes and Panel B showing volume changes. Actual price and volume numbers are reported as solid lines.

The results in Fig. 4, Panel A, are consistent with a Dow Jones dissemination effect. While prices increase gently before the Dow Jones release (consistent with the evidence in Fig. 3, which shows that price begins to move at the time of first public dissemination), there is a pronounced kink at the time of the Dow Jones release. To provide a benchmark for the evolution in price, we use the percentage change in price before dissemination by Dow Jones to predict the slope following dissemination in the absence of media coverage and so provide a counterfactual price response. Specifically, we predict percentage returns after media coverage using the data from 10 s before the media coverage and a second order polynomial of the time elapsed. These counterfactual (no media coverage) responses, calculated for both price and volume, appear as dashed lines in Fig. 4. In Panel A, the difference between the predicted price path and that we actually observe provides clear evidence of a Dow Jones coverage effect.

We obtain similar evidence using volume, shown in Fig. 4, Panel B. As is clear from the figure, the actual line diverges from this path in an upward direction, consistent with a volume response to Dow Jones coverage after conditioning on how volume would respond to the news absent coverage. What is a bit less consistent, however, is that the kink does not emerge until about 5 s after Dow Jones dissemination, making the evidence less definitive than in Panel A.

Overall, the evidence in this section clearly indicates that there is an incremental effect of the media on intraday prices and volume, consistent with a pure dissemination effect of the media.

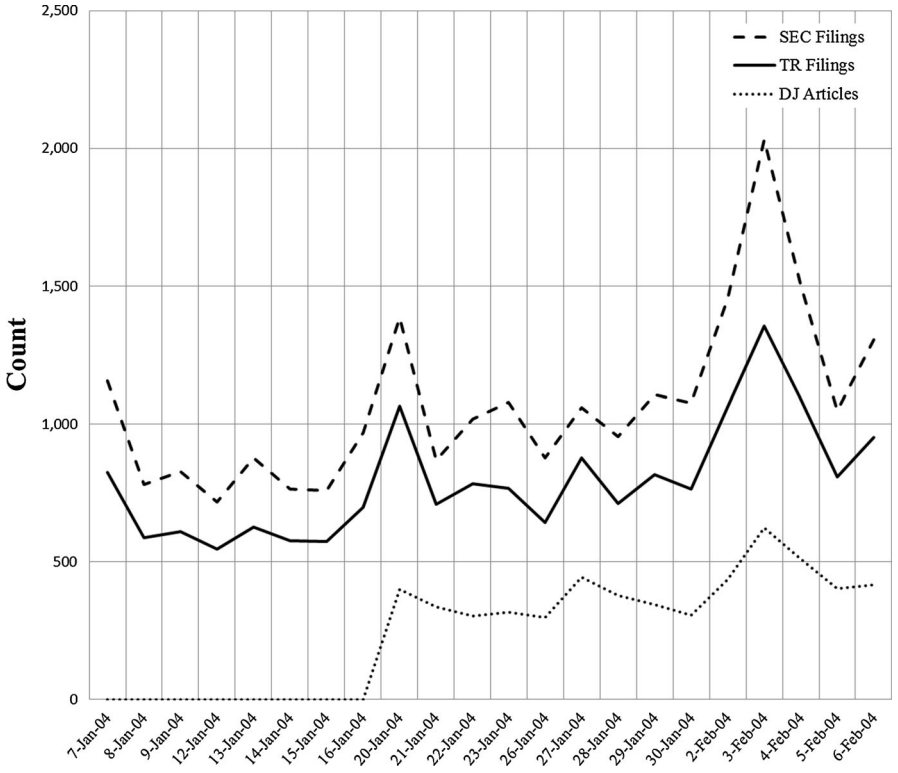


Fig. 5 Dow Jones coverage of insider trading filings around the time coverage is initiated. This figure shows the number of SEC Form 4 filings (SEC filings), insider trading filing events covered by Thomson Reuters (TR filings), and insider trading filings with Dow Jones (DJ) coverage from RavenPack before and after January 20, 2004, when Dow Jones began its coverage of insider trading (Form 4)

4.2 Analysis of presence/absence of Dow Jones coverage

We next use a variation on this setting to provide a different test of the effect of Dow Jones dissemination on the market response to insider trading news. To understand this setting, Fig. 5 plots, for a period of about 1 month that surrounds when Dow Jones initiated coverage of Form 4 filings in early 2004: (i) the full set of SEC Form 4 filings, per EDGAR, (ii) the set of insider transactions available from Thomson Reuters,[13] and (iii) Dow Jones' coverage of the SEC filings, per RP. Dow Jones initiated coverage of these filings in mid-January 2004, 18 months after the regulatory change that required electronic filing and made time stamps available. This allows us to compare the price response to filings before and after initiation of coverage by Dow Jones, where the timing of coverage initiation is plausibly exogenous (i.e., Dow Jones' initiation of coverage is plausibly unrelated to the news content of particular filings). The fact that this coverage begins abruptly (as Fig. 5

[13] We exclude Thomson Reuters trades that have "cleanse indicator" codes of S (i.e., the security does not meet collection requirements) or A (i.e., excessive missing or invalid items).

shows, it goes from 0 to over 400 filings literally overnight) increases our confidence that this change is unrelated to informational attributes of the filings.[14]

To match insider transactions before and after Dow Jones initiates coverage, we restrict attention to firms that report insider purchases 1 year before and after coverage begins on January 20, 2004, and eliminate pairs with large differences in trade size (trade size between the pre and post-DJ coverage windows differs by more than $25,000) or that lack return data. This results in 280 firm/pairs. To assess how well this process matches observations, Table 4 compares observations in the two groups and shows that they are similar with respect to both the titles/position of the insiders and trade size (differences in trade size are not significant at conventional levels).

We report the results of the analysis in Fig. 6 and again report price and volume results. For this analysis, we report the market response in event time (measured in seconds) relative to the time of dissemination by Dow Jones and a pseudo-Dow Jones release time and compare responses between the two groups. For trades not covered by Dow Jones (before coverage begins), we define a pseudo-Dow Jones release time using the delay in media coverage for the matched covered trade. The event period is the 5 min after dissemination by Dow Jones.

Panel A of Fig. 6 shows clear evidence of a coverage effect in prices, with price moving quickly and steadily upwards for the covered ("Dow Jones") observations in the period after dissemination, for an overall increase of around 12 bps. In contrast, for the noncovered ("No Dow Jones") group the plot is essentially flat for the first 2 min, before moving upwards but not nearly to the same degree as for the covered transactions (total increase of around 2 bps). Differences between the series are statistically significant at the 1 % level or better beginning at 7 s and then for the remainder of the period. Overall, Panel A shows clear evidence of a Dow Jones coverage effect in the price response.

Panel B of Fig. 6 reports a similar analysis for the abnormal volume measure. Here we again see a pronounced difference between the Dow Jones and No Dow Jones series. For the Dow Jones series there is clear upward movement in volume after dissemination by Dow Jones. For the No Dow Jones series, the movement takes place later and is less pronounced. Differences between the two series are statistically significant but not as strongly as for the price series, with significance at the 5 % level (one tailed) beginning around 1 min after dissemination and persisting through around 4 min after dissemination.

Overall, the evidence from the initiation of Dow Jones coverage is consistent with that from our first set of analyses. In both cases, the evidence suggests that the market responds to the dissemination of insider trading news by Dow Jones separate

[14] It is clear from Fig. 5 that Dow Jones does not cover all filings. The difference is likely related to Dow Jones' coverage incentives and so to firm size and market interest (Miller 2006). Solomon and Soltes (2012, p. 12) report that "… market capitalization and industry explain between 36 and 41 % of the variation in the number of newswire articles, and between 21 and 26 % of the variation in the number of newspaper articles." This is not a problem for our analysis because our within-firm matching directly controls for any coverage effects.

Fig. 6 Natural experiment: Dow Jones initiation of insider trading coverage. These figures graph price ▶ and volume movements before and after the initiation of Dow Jones coverage of insider purchase filings with the SEC for 280 firms with at least one filing in the 12 months before the initiation of Dow Jones insider trading coverage on January 20, 2004, and at least one filing in the 3 months following this date. When there is more than one possible matching trade before coverage was initiated, we choose that trade that is closest in size (based on dollar-value) to the covered trade and exclude pairs of trades that differ in size by more than $25,000. **Panel A** shows the distribution of cumulative returns following the initial Dow Jones coverage of the trade and for a similar period following the noncovered matched trade. **Panel B** shows the same information for abnormal volume

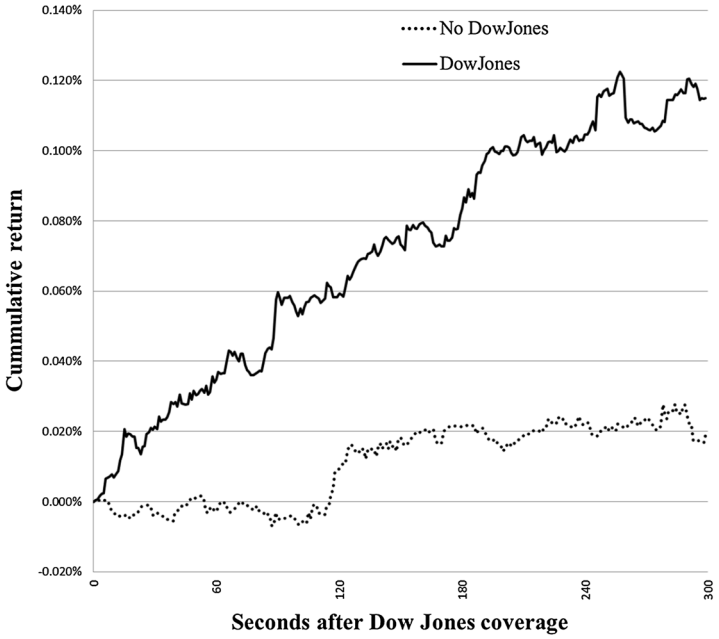
Table 4 Natural experiment: comparison of trades before and after Dow Jones' initiation of insider trading coverage

	DJ coverage	No DJ coverage	Difference (p value)
Panel A: trade size (in dollars)			
Mean	18,729	18,024	0.70
Median	10,958	9899	0.45
Panel B: primary rolecode of insider			
CB (Chairman of the Board)	3	7	
CEO (Chief Executive Officer)	29	35	
CFO (Chief Financial Officer)	23	14	
CI (Chief Investment Officer)	1	2	
CO (Chief Operating Officer)	5	5	
D (Director)	159	150	
DO (Director and Beneficial Owner)	6	5	
H (Officer, Director and Beneficial Owner)	0	1	
O (Officer)	37	42	
OB (Officer and Beneficial Owner)	0	1	
OD (Officer and Director)	1	2	
OS (Officer of Subsidiary)	2	3	
OT (Officer and Treasurer)	5	3	
OX (Divisional Officer)	1	1	
P (President)	8	9	
	280	280	

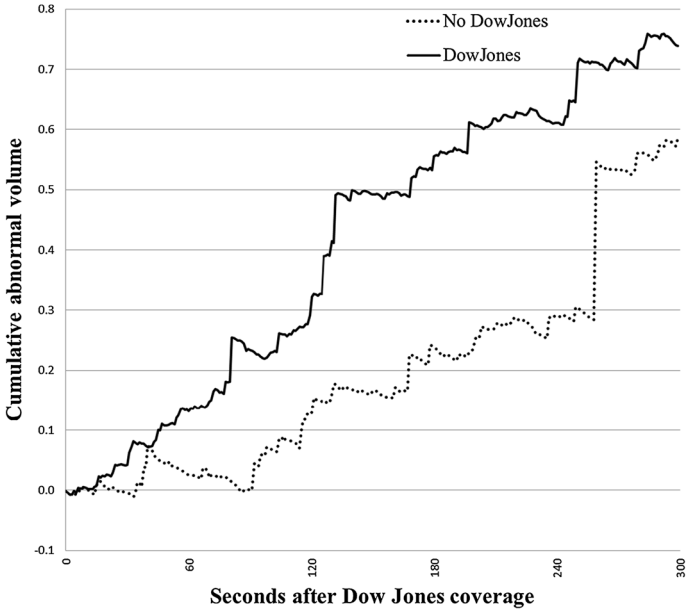
This table compares trades made under the Dow Jones coverage and noncoverage regimes used in the natural experiment. The "No Dow Jones" window covers the 3 months before Dow Jones started covering insider filings (on January 20, 2004). The "Dow Jones" window covers the 12 months after Dow Jones started covering insider filings. The sample consists of the 280 firms that had insider purchase filings during both windows. Panel A compares mean and median trade sizes between the two regimes. The p value for the means is from a t test, and the p value for the medians is from a Wilcoxon rank-sum test. Panel B provides the primary role code for the title of the insiders trading within each regime

from the effect that occurs when the news first becomes publicly available through EDGAR. We interpret this evidence as consistent with there being a pure dissemination effect of the media.

Panel A: Cumulative return before and after initiation of Dow Jones coverage



Panel B: Cumulative abnormal volume before and after initiation of Dow Jones coverage



5 Conclusion

We use a change in the regime under which insiders file and report their trades with the SEC to obtain precise data on when filing news first becomes available to outsiders through EDGAR. We also obtain precise data on when that news is first disseminated by the media, which we take as when it is disseminated by Dow Jones. An important advantage of this setting is that Dow Jones' coverage of insider trading filings simply regurgitates basic facts from the filing without providing additional content or analysis. Moreover, Dow Jones' coverage is predetermined and plausibly unrelated to informational attributes of the trades. This allows us to examine whether the dissemination of news by the media after its public release generates incremental market effects, an important issue given recent interest in the role of the media and the importance of various frictions that result in puzzling inefficiencies in the way that securities markets process public information, such as the apparent response to second hand news.

To do this, we use the insider trading disclosures in two ways that allow us to directly assess the effect of the dissemination of insider trading news on prices and volumes. Both sets of evidence show that the existence and timeliness of media coverage affects the speed of price adjustment—prices adjust more rapidly to SEC filings of insider trading news when there is accompanying media coverage and that coverage is more timely. Overall, our evidence suggests that the media plays an economically important role in price formation in securities markets by disseminating news more widely. Our evidence complements other recent work, such as Bushee et al. (2010) and Drake et al. (2014), which shows that the business press plays an important role in how the market responds to new information but that does not distinguish between the media's role in creating content and disseminating news.

Acknowledgments We are grateful to an anonymous referee, Holly Yang (RAST conference discussant), and workshop participants at Colorado, Cornell, the HBS IMO Conference, Melbourne, Ohio State, Singapore Management University, Syracuse, UCLA, UC-San Diego, University of New South Wales, University of Queensland, and the RAST conference at LBS for comments on previous versions. This research was funded in part by the Accounting Research Center and the Fama-Miller Center for Research in Finance at the University of Chicago Booth School of Business.

Appendix 1: Variable definitions

Independent variables (*Tables*)

Note: all continuous variables winsorized at 1 and 99 %.

Trade size	= The dollar value of the insider purchase, from Thomson Reuters
Firm size	= Total assets, from Compustat, in millions
Filing cluster	= The number of filings posted to EDGAR in the 60 s before the Form 4 posting
Prior trading	= The total amount of purchase activity, in dollars, that the insider engaged in during the prior 365 days, from Thomson Reuters
CEO	= 1 if the insider is the CEO, 0 otherwise

CFO = 1 if the insider is the CFO, 0 otherwise
Time trend = a measure of chronological time, equal to 1 for observations in the first month of the data and 22 for those in the last month

Market reaction variables (*Figures*)

Returns = The percentage change in price where price is defined as the midpoint of the bid-ask spread, measured at time t, deflated by price at t=0, where t=0 is defined in specific tables/figures
% Abnormal volume = Cumulative dollar volume from t = 0 to through event second t minus the average of the same for the exact same window (calculated over the prior 52 weeks), deflated by the average cumulative volume for the entire 120 s window (again calculated over the prior 52 weeks)
% Abnormal spreads = The percentage abnormal spread, measured as (actual spread − normal spread for time t)/(normal spread at 60 s before dissemination)

Appendix 2: Example of a randomly chosen insider purchase filed on a Form 4 and covered by Dow Jones

SEC Form 4

FORM 4

UNITED STATES SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

OMB APPROVAL
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STATEMENT OF CHANGES IN BENEFICIAL OWNERSHIP

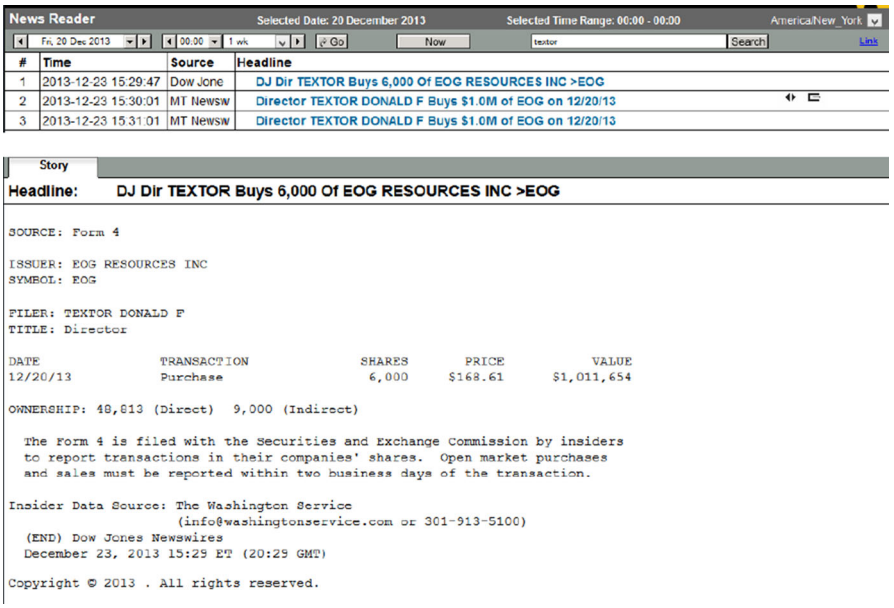
Filed pursuant to Section 16(a) of the Securities Exchange Act of 1934 or Section 30(h) of the Investment Company Act of 1940

☐ Check this box if no longer subject to Section 16. Form 4 or Form 5 obligations may continue. See Instruction 1(b).

1. Name and Address of Reporting Person*	2. Issuer Name and Ticker or Trading Symbol	5. Relationship of Reporting Person(s) to Issuer (Check all applicable)
TEXTOR DONALD F	EOG RESOURCES INC [EOG]	X Director; 10% Owner; Officer (give title below); Other (specify below)
(Last) (First) (Middle): 381 LATTINGTOWN ROAD	3. Date of Earliest Transaction (Month/Day/Year): 12/20/2013	
(Street): LOCUST VALLEY NY 11560	4. If Amendment, Date of Original Filed (Month/Day/Year)	6. Individual or Joint/Group Filing (Check Applicable Line): X Form filed by One Reporting Person; Form filed by More than One Reporting Person
(City) (State) (Zip)		

Table I - Non-Derivative Securities Acquired, Disposed of, or Beneficially Owned

1. Title of Security (Instr. 3)	2. Transaction Date (Month/Day /Year)	2A. Deemed Execution Date, if any (Month/Day /Year)	3. Transaction Code (Instr. 8)		4. Securities Acquired (A) or Disposed Of (D) (Instr. 3, 4 and 5)			5. Amount of Securities Beneficially Owned Following Reported Transaction(s) (Instr. 3 and 4)	6. Ownership Form: Direct (D) or Indirect (I) (Instr. 4)	7. Nature of Indirect Beneficial Ownership (Instr. 4)
			Code	V	Amount	(A) or (D)	Price			
Common Stock	12/20/2013		P		1,000	A	$168.609 (1)	1,500	I	Family Trust (KRT)
Common Stock	12/20/2013		P		1,000	A	$168.609 (1)	1,500	I	Family Trust (KFT)
Common Stock	12/20/2013		P		1,000	A	$168.609 (1)	1,500	I	Family Trust (CT)
Common Stock	12/20/2013		P		1,000	A	$168.609 (1)	1,500	I	Custodial Account (KRT)
Common Stock	12/20/2013		P		1,000	A	$168.609 (1)	1,500	I	Custodial Account (KFT)
Common Stock	12/20/2013		P		1,000	A	$168.609 (1)	1,500	I	Custodial Account (CT)
Common Stock								48,813.266	D	



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