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Determinants and consequences of information processing delay: Evidence from the Thomson Reuters Institutional Brokers' Estimate System☆

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ABSTRACT

We present new evidence that highlights the role of information intermediaries in the distribution and processing of earnings estimates in capital markets. We find that the time taken to activate an analyst's earnings forecast in the Thomson Reuters Institutional Brokers' Estimate System is related to measures of investor demand for timely information processing, processing difficulty, and limited attention. Furthermore, we find that forecast announcement returns are muted and post-announcement drift is magnified for forecasts with longer unexpected activation delay and that market inefficiency is concentrated in neglected stocks and potentially exploitable. Finally, analyzing intraday returns, we find that activations facilitate price discovery.

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"…asset pricing models typically assume both that the diffusion of every type of publicly available information takes place instantaneously among all investors and that investors act on the information as soon as it is received. Whether so simple an information structure is adequate to describe empirical asset-price behavior depends on both the nature of the information and the time scale of the analysis." – Robert C. Merton (1987).

1. Introduction

As evidence of market underreaction to public news has accumulated, many researchers have relaxed the assumption that investors use available information instantaneously; researchers instead examine whether the delay in the impounding of public news in security prices is due to investors having limited attention and resources (e.g., Huberman and Regev, 2001; Hirshleifer, Lim, and Teoh, 2009; DellaVigna and Pollet, 2009; Frederickson and Zolotoy, 2016), or information being inherently difficult to process (e.g., Engelberg, 2008; Cohen and Lou, 2012). By showing that measures of limited attention and information processing complexity are associated with various

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pricing phenomena, this literature has both highlighted the limitations of the traditional assumption of instantaneous information use and provided valuable insights into the mechanism by which information is impounded in security prices.

A basic institutional feature of capital markets is the existence of intermediaries tasked with collecting, processing, and distributing available information. For instance, while information about earnings and earnings estimates is available through newswires and broker research platforms, many investors choose to acquire this information through a third party (e.g., Thomson Reuters, Capital IQ, and Bloomberg). Since the success of information intermediaries rests on their ability to facilitate information use, a systematic analysis of the determinants and the consequences of their activities is essential to understanding the mechanism by which information is reflected in security prices, yet this analysis is absent from the academic literature.

In this study, we seek to fill this gap in the literature by focusing on the Thomson Reuters Institutional Brokers' Estimate System (I/B/E/S, henceforth). Our motivation is twofold. First, there is much evidence that the short-term reaction to earnings forecast revisions is incomplete (Givoly and Lakonishok, 1979; Stickel, 1991; Gleason and Lee, 2003), consistent with investors processing forecast revisions with a delay. Second, I/B/E/S forecasts are a principal source of analyst detail and consensus data in capital markets,[1] and we can observe when Thomson Reuters' information processing begins and ends: I/B/E/S reports forecast announcement times (when forecasts are provided to Thomson Reuters) and forecast activation times (when forecasts are activated in I/B/E/S data sets for distribution to I/B/E/S clients). We refer to the length of time between these two timestamps as "activation delay." With many investors relying on Thomson Reuters to process information, I/B/E/S activation delay offers a unique opportunity to directly measure information processing time, allowing more refined tests of its determinants and its capital market consequences.

Our study examines a comprehensive sample of 983,143 one-year-ahead earnings per share (EPS) forecast revisions made by I/B/E/S-tracked analysts covering U.S. publicly listed companies between the years 2003–2013. We find that the mean (median) activation delay, defined as the difference between activation time and announcement time, is 1,547 (551) minutes. Perhaps more importantly, there is a wide degree of variation in activation delay: from nine minutes at the 5th percentile of our sample distribution to 7,176 minutes (just under five days) at the 95th percentile. The median I/B/E/S activation delay is nonmonotonic over the years in our sample period and generally *increasing* over the majority of the sample period.

We first explore whether variation in I/B/E/S activation delay reflects variation in investor demand for timely processing, difficulty of information processing, and Thomson Reuters' limited attention and resources. We consider a comprehensive set of variables suggested in prior work (e.g., Gleason and Lee, 2003; Hirshleifer et al., 2009; DellaVigna and Pollet, 2009; D'Souza, Ramesh, and Shen, 2010) as well as variables that capture aspects of information processing difficulty unique to our setting. For example, when the difference between I/B/E/S actual earnings and GAAP (Generally Accepted Accounting Principles) earnings is large, Thomson Reuters needs more time to ensure the revising analyst follows the firm on the same basis as other analysts. Additionally, after a merger or acquisition and after a stock split, more time is needed to verify the revising analyst has properly accounted for these events.

Among variables that capture investor demand for timely processing, we find that firm size and major index membership have the largest impact on activation delay. For example, we estimate that forecasts for firms in the Standard and Poor's (S&P) 500 index are activated 8.7% faster than forecasts for other firms, ceteris paribus. In addition, we find that higher levels of institutional ownership and analyst following are associated with faster processing. We also find that information processing difficulty has a considerable impact on activation delay. For example, revisions following stock splits are associated with roughly a 44% increase in activation delay, while revisions following merger and acquisition (M&A) announcements are associated with a 14.57% increase in delay, ceteris paribus. Among our proxies for limited attention and resources, we find that activation delay increases on days with larger numbers of concurrent forecast announcements and on Fridays, consistent with capacity constraints and limited attention levying a toll on Thomson Reuters' information processing speed. Collectively, our results strongly validate I/B/E/S activation delay as a general measure of information processing time.

Using our determinants model to decompose I/B/E/S activation delay into expected and unexpected activation delay, we explore whether the latter reflects investor processing delay or noise. If unexpected activation delay indeed reflects investor processing delay, there should be a negative (positive) relation between unexpected activation delay and the amount of information incorporated in prices during the announcement (post-announcement) window.

As predicted, we find that forecasts with longer unexpected activation delay have both muted three-day size-adjusted announcement returns and magnified one-month post-announcement drift. For example, in a bivariate portfolio sorts analysis, the average one-month return spread between the highest and lowest deciles of analyst forecast revisions increases from 0.63% for forecasts in the lowest tercile of unexpected I/B/E/S activation delay to 1.38% for forecasts in the highest tercile of unexpected activation delay.[2] Moreover, our results are most pronounced among neglected stocks: smaller in market capitalization, followed

[1] According to Thomson Reuters' own marketing materials, I/B/E/S estimates "are the industry standard, relied on by over 70% of the top US and European asset managers and the most quoted by major media outlets" (http://thomsonreuters.com/en/products-services/financial/company-data/estimates.html, accessed January 2, 2016).

[2] The hedge return of 74.9 basis points is significant at the 1% level (t-stat=2.93). We find similar results across both the announcement and post-announcement windows when we estimate monthly Fama and MacBeth (1973) regressions including additional control variables.

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