



CRA Insights: Financial Markets

CRA Charles River
Associates

August 2014

Price impact of disclosures before, during, or after a trading day: Implications for event studies

Economic experts often use event studies to determine a disclosure's price impact. Although it is typical to evaluate stock price reactions between two days' prices at close of trading, prices can adjust faster than over the course of a trading day. Moreover, the release of multiple pieces of information during a day may confound the analysis of a particular disclosure's price impact. In these circumstances, it may be useful to analyze price reactions throughout the trading day. In this note we discuss the use of intraday prices in the analysis of a disclosure event.

Disclosures during the trading day

The prices of securities that are actively traded typically react reasonably quickly to news. Early studies showed price adjustments occurring in under 15 minutes for certain types of events.¹ The speed of price adjustments is relevant to securities litigation and the analysis of potential price effects of disclosure events.

Sometimes disclosure events are confounded by non-disclosure information within the time period of analysis or "event window." Courts have recognized the need for experts to deal with such confounding in their analysis of disclosure events.² Where such confounding information is not simultaneously released with the disclosure information, analysis of intraday data can help disentangle the impact of each piece of information. The following describes two case examples where intraday price information supported the expert's analysis.

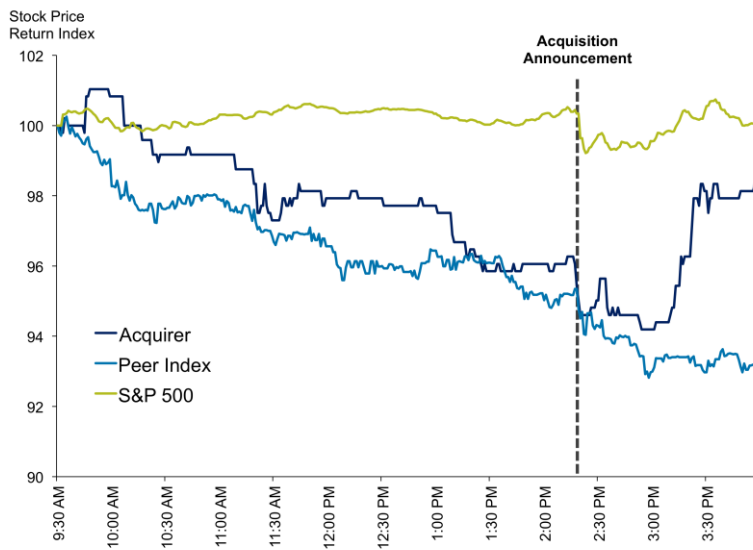
¹ L. Dann, D. Mayers, and R. Raab, "Trading rules, large blocks and the speed of price adjustment," *Journal of Financial Economics*, vol. 4, no.1, 1977, pp. 3–22.

² For example, in the Credit Suisse - AOL Securities Litigation, the Court precluded plaintiff's expert in part for failing to disaggregate the effects of confounding events. *Bricklayers & Trowel Trades Int'l Pension Fund v. Credit Suisse First Boston*, 853 F.Supp.2d 181, 192–93 (D.Mass. 2012).

Example 1: Midday disclosure and confounding event earlier in the day

An expert was asked to determine the value of the market’s reaction to an acquisition announcement. The expert hypothesized that the acquisition was made at a favorable price and would result in a positive price reaction, other things equal. Prior to the market open on that same day, an industry peer revealed a government investigation of fraud allegations. That news appeared to lower the stock prices of all firms in that industry. Looking only at daily closing prices, the acquiring firm’s stock price declined, even on a market-adjusted basis. However, wire services had reported the acquisition in the afternoon, after which prices showed a clear increase while the peers’ prices continued to decrease (see Figure 1). Based on an intraday analysis, there was a stock price gain of approximately \$275 million that was not apparent based on an analysis based only on end of day market data.³

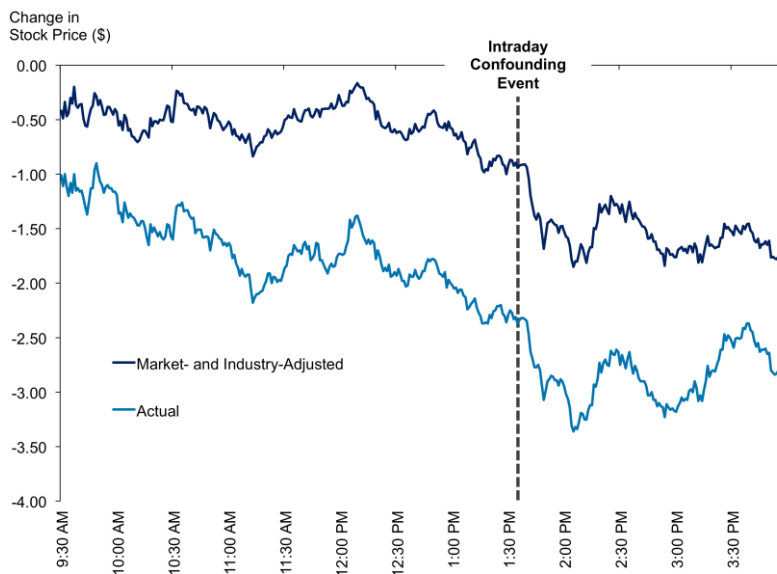
Figure 1



Example 2: Disclosure with subsequent confounding event

Plaintiffs in a securities class action alleged a disclosure occurring before the market opened. Analyzing full-day returns showed a statistically significant stock price decline. The analysis of full day returns overlooked other potentially important news made public during the same day. A review of company-related news indicated that potentially confounding information was revealed to investors when wire services reported on statements by a company executive later that day.

Figure 2



³ Because the acquisition was announced late during market trading hours, the expert analysis was also extended through the following trading day to confirm that the immediate price reaction was not subsequently reversed, as investors had more time to digest the acquisition information.

Relative to the previous day's close, the company's stock price declined immediately on the market open and continued to decline throughout the day (Figure 2). Partitioning the market reaction into intraday periods changed the assessment of investor losses tied to the disclosure event. Specifically, the price impact during the morning could be attributed to the pre-opening disclosure event and the afternoon hours could be attributed to the executive's statements. As a result, the magnitude of the alleged corrective disclosure was decreased by the use of intraday price information, as shown in the table below. In addition, the price decline appeared to be statistically significant on a full-day basis, but not on an intraday basis.

	Full Day	Intraday
Actual return	-7.0%	-5.0%
Excess return	-3.8%	-1.2%
p-value	0.02	0.24

Speed of price reaction

There are a number of considerations in implementing intraday price analyses. First, any intraday analysis requires accuracy in measuring the time when news is released. News sources which carry reliable time and date stamps satisfy this criterion, although leakage or dissemination delays can influence the determination of when the news is fully impounded into the price. Staggered dissemination of analyst reports is an example of dissemination delay.⁴

Market efficiency and liquidity are important requirements for analysis of intraday price reaction. Without them, the price may react too slowly for there to be benefits of an intraday analysis. The degree of complexity of the information being released may also affect the speed of price reaction.⁵ Because the complexity of the news affects the time for the price to fully adjust, it affects the time interval over which the analysis is appropriately performed.

Trading volumes and bid-ask spreads can be informative indicators of the speed of market adjustment to new information. After-hours and pre-market trading may suffer from illiquidity. Consequently, prices during such trading times may not accurately reflect the impact of news. When a disclosure happens outside of regular trading hours, the reported price might only fully reflect the disclosed information when the market opens. Even during regular trading hours there may be periods of low trading activity or other reasons to be cautious in using price data over very short time intervals.

⁴ Analyst reports often do not have time stamps associated with them. In such cases, absent the corroborating evidence indicating the timing an analyst report was released (e.g., mention in news articles), intraday analysis will be of more limited use.

⁵ Jennings and Starks (1985) showed that the informativeness of earnings plays a role in the speed of price adjustment. R. Jennings and L. Starks, "Information content and the speed of stock price adjustment," *Journal of Accounting Research*, vol. 23, no.1, 1985, pp. 336–350.

Statistical testing of intraday returns

It is also worth noting that statistical testing of returns at an intraday frequency may require statistical methods different from those used in customary event studies over days. Because intraday returns typically do not follow a normal distribution, significance tests might not rely on an assumption of normality of returns, as studies at daily frequency often do.⁶

It is also typical in event studies to evaluate returns in excess of benchmarks or risk factors, such as the returns in the overall market. However, the short intervals of intraday analyses might not allow enough time for market factors to move enough to have a material effect on the stock price being analyzed. In such cases, the benchmark return may be very close to zero. There must be due care to examine if that is the case. Adjustment of the price impact of disclosures during a trading day to reflect performance relative to a market benchmark may be challenging depending on the length of the time period being analyzed.

Conclusion

Intraday prices are readily available and there are established techniques to examine their statistical properties. Within reasonable parameters of market efficiency or speed of reaction to information, intraday analyses are a useful tool that allows for disentangling the causes of price changes. This is especially well suited for examining the price effects of potentially confounding news made public at various times on a single day. Courts are beginning to recognize the potential of intraday data to examine the impact of confounding news. For example, in the Credit Suisse – AOL securities litigation, the court found that “an intra-day trading analysis is not proof of a causal relationship but it provides a fact finder with a basis for determining whether and to what extent a single news release impacted the price of a stock on an otherwise confounded event day.”⁷

Contacts

For more information about this *CRA Insights*, please contact the authors:

Aaron Dolgoff
Principal
+1-617-425-3623
adolgoff@crai.com

Tiago Duarte-Silva
Principal
+1-617-425-3128
tduarte@crai.com

⁶ Two approaches used in the literature are bootstrapping (Barclay and Litzenberger, 1988) and nonparametric tests (e.g., Harris 1986, Lee 1992). M. Barclay, and R. Litzenberger, “Announcement effects of new equity issues and the use of intraday price data,” *Journal of Financial Economics*, vol. 21, 1988, pp. 71–99. L. Harris, “A transactions data study of weekly and intradaily patterns in stock returns,” *Journal of Financial Economics*, vol. 16, 1988, pp. 99–117. C. Lee, “Inferring trade direction from intraday data,” *Journal of Finance*, vol. 46, 1992, pp. 733–746.

⁷ *Bricklayers & Trowel Trades Int'l Pension Fund v. Credit Suisse First Boston*, 853 F.Supp.2d 181, 192-93 (D.Mass. 2012).

About the Financial Markets Practice

CRA's Financial Markets Practice provides advanced consulting services to corporate clients and attorneys. We specialize in applying the tools, principles, and findings of finance, economics, and accounting to complex litigation and business problems. Companies, law firms, and government agencies rely on CRA for high-quality research and analysis, expert testimony, and comprehensive support in litigation and regulatory proceedings. Our reputation is built on exceptional client service and our ability to present innovative and pragmatic solutions to complicated challenges. For additional information about how CRA's financial experts can help you with your litigation and regulatory needs, please visit www.crai.com/financialmarkets.



The publications included herein were identified based upon a search of publicly available material related to intellectual property. Inclusion or exclusion of any publication should not be viewed as an endorsement or rejection of its content, authors, or affiliated institutions. The views expressed herein are the views and opinions of the authors and do not reflect or represent the views of Charles River Associates or any of the organizations with which the authors are affiliated. Any opinion expressed herein shall not amount to any form of guarantee that the authors or Charles River Associates has determined or predicted future events or circumstances, and no such reliance may be inferred or implied. The authors and Charles River Associates accept no duty of care or liability of any kind whatsoever to any party, and no responsibility for damages, if any, suffered by any party as a result of decisions made, or not made, or actions taken, or not taken, based on this paper. If you have questions or require further information regarding this issue of *CRA Insights: Financial Markets*, please contact the contributor or editor at Charles River Associates. This material may be considered advertising. Detailed information about Charles River Associates, a registered trade name of CRA International, Inc., is available at www.crai.com.

Copyright 2014 Charles River Associates