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THE TRADING COSTS OF EARLY EARNINGS RELEASE: THE CASE OF HEWLETT-PACKARD COMPANY

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ABSTRACT

Hewlett-Packard Company scheduled to announce its 2014 second quarter earnings after the market closed on May 22, 2014. However, its second quarter earnings report was accidently released earlier than scheduled. The lower-than-expected revenue news dropped Hewlett-Packard's stock price by 5% within 6 minutes. The rare occurrence of an early earnings announcement during trading hours provides an opportunity to investigate the influence of early earnings release on trading costs of market participants. The results show that Hewlett-Packard's stock trading costs, measured by bid-ask spreads increased and its information asymmetry decreased after the early earnings release.

JEL: G14

KEYWORDS: Early Earnings Release, Trading Costs, Bid-Ask Spreads, Information Asymmetry

INTRODUCTION

Hewlett-Packard Company (symbol: HPQ) was expected to announce its earnings report for fiscal 2014 second quarter (Q2, ended on April 30, 2014) after the market closed on May 22, 2014. However, on May 22, 2014, HPQ's Q2 earnings results were accidently released about half an hour prior to 4:00 PM EDT. HPQ's Q2 revenue was $27.3 billion, 1% decline from the prior-year period and lower than Wall Street analysts' expectation of $27.41 billion (Chan, 5/22/2014, *Reuters*). Based on the minute-to-minute plots of HPQ's price per share on Figure 1 (shown in empirical results section), HPQ's price per share was still around $33 at 3:30 PM EDT on May 22, 2014. After the early release of less-than-expected revenue, HPQ's share price quickly dropped to $31.35, almost the lowest price of the day, at 3:36 PM EDT. That means the stock price of HPQ decreased by $1.65 (5%) within only 6 minutes. After 3:36 PM EDT, HPQ's price per share moved up a little and then fluctuated until 4:00 PM EDT, closing at $31.78.

Although its Q2 revenue missed the market's expectation, HPQ reported Q2 non-GAAP diluted net earnings per share (EPS) of $0.88, 1% up from the previous year period and same as analysts' consensus. In addition, HPQ announced plans to cut additional 11,000 to 16,000 jobs (Chan, 5/22/2014, *Reuters*; McGrath, 5/22/2014, *Forbes*). After the negative and positive news fully digested by investors overnight, HPQ's price per share opened at $32.31 on the next trading day, May 23, 2014, and then swiftly went up to $33.04 at 9:38 AM EDT, the similar price before earnings results were inadvertently released. It reached the highest point of $34.07 at 10:31 AM EDT and then moved between $33.5 and $34.05 throughout the rest of day; eventually it closed at $33.72 on May 23, 2014.

Since it is rare to see a large publicly traded company inadvertently releases its quarterly earnings report earlier than the schedule, the early earnings release during the trading hours provides us an opportunity to investigate its effect on the market microstructure. This research uses HPQ as a case study to examine changes of intraday transaction costs and information asymmetry before and after early earnings release during the trading hours of the announcement date. The remaining sections of this study are organized as follows. The literature review is presented on the next section. Following that, data and methodology are described and then the empirical results are shown. The conclusion is made lastly.

LITERATURE REVIEW

Previous studies about the components of the bid-ask spread, the determinants of the bid-ask spread, the intraday pattern of the bid-ask spread, and the effect of earnings announcement on information asymmetry and the bid-ask spread were documented in the literature. Copeland and Galai (1983) indicate two types of traders in the market, liquidity traders and informed traders. Liquidity traders trade to get immediacy and informed traders trade based on their special information. The market maker is expected to gain from liquidity traders but lose to informed traders. If the market maker sets a wider bid-ask spread, he or she will reduce the potential loss to informed traders, but will also reduce the expected gain from liquidity traders. Similarly, a narrower spread increases the expected gain from liquidity traders, but it also increases the potential loss to informed traders. The market maker sets the optimal bid-ask spread to maximize profits by weighing the trade-off relationship. They also show that price level and return variances positively affect the spreads but trading volume negatively affects the spreads.

McInish and Wood (1992) examine the intraday pattern of percentage bid-ask spreads and test the hypotheses for the determinants of spreads. They point out a reverse J-shape pattern for the intraday behavior of spreads. The spreads are highest at the beginning of a trading day and then gradually decline but go up before the end of a trading day. Spreads are directly related to the risk level but inversely related to the trading activity.

Lin, Sanger, and Booth (1995) investigate the association between components of the bid-ask spread and trade size for a sample of companies listed on NYSE. One of their findings is that the information asymmetry component is highest at the beginning of a trading day and lowest at the end of a trading day for all but the largest trades.

Krinsky and Lee (1996) research the behavior of the components of the bid-ask spread surrounding announcements of earnings during the sample period of January 1989 to December 1990. They find that adverse selection component of the bid-ask spread increases significantly before and following earnings releases, which indicate increased information asymmetry.

Bhattacharya, Desai, and Venkataraman (2013) study the relation between earnings quality and information asymmetry for a broad sample of NYSE and NASDAQ firms from 1998 to 2007. They demonstrate an inverse association between earnings quality and information asymmetry; poorer earnings quality is related to higher information asymmetry.

Chen (2014) examines the return volatility movements in S&P 500 spot index and index futures markets. One part of the research uses SPDR (the exchange traded fund (ETF) of S&P 500 index (symbol: SPY)) as the proxy to see the effect of volatility movements on bid-ask spreads. The result shows that quoted spread and percentage quoted spread are significantly greater when the market becomes more volatile.

DATA AND METHODOLOGY

Intraday trade and quote data (with time-stamp given to milliseconds) for HPQ on May 22, 2014 are from Tick Data company. The trading costs, measured by bid-ask spreads, are calculated as follows.

$$Quoted\ Dollar\ Spread = A_t - B_t \tag{1}$$

$$Percentage\ Quoted\ Spread = \left(A_t - B_t\right)/M_t \tag{2}$$

where B_t and A_t represent the national best bid and offer (NBBO), respectively, for HPQ at time t ; $M_t = (A_t+B_t)/2$, is the quoted midpoint for HPQ at time t.

$$Effective\ Dollar\ Spread = 2\times | P_t - M_t | \quad (3)$$

$$Percentage\ Effective\ Spread = 2\times | P_t - M_t | / M_t \quad (4)$$

where P_t is the price of trade occurred for HPQ at time t; $M_t = (A_t+B_t)/2$, is the quoted midpoint for HPQ at the time t trade occurs.

The quote with zero bid price or zero ask price or bid price > ask price is not considered for the NBBO. The way used to derive the NBBO follows Tick Data Technical Paper (2009) and Hasbrouck (2010). In addition, the NBBOs with locked or crossed quotes are excluded when calculating quoted dollar spreads and percentage quoted spreads. Trades associated with locked or crossed quotes are excluded when calculating effective dollar spreads and percentage effective spreads. The regular trading hours of stocks on a business day are from 9:30 AM EDT to 4:00 PM EDT, including 6 hours 30 minutes (390 minutes). This research divides 6 hours 30 minutes for HPQ on May 22, 2014 into intervals by every 30-minute, except for the last 30 minutes before the closing bell. Since HPQ's price per share quickly slides during the time period of 3:30 PM to 3:36 PM and trading volumes of this 6-minute critical period explode, the last 30 minutes (3:30 PM to 4:00 PM) are separated into two intervals, 3:30 PM to 3:36 PM (6-minute interval) and 3:36 PM to 4:00 PM (24-minute interval). Totally, 6 hours 30 minutes are divided into 14 intervals.

The average quoted dollar spread and average percentage quoted spread calculated for each interval are time-weighted average quoted dollar spread and time-weighted average percentage quoted spread. The average effective dollar spread and average percentage effective spread calculated for each interval include both volume-weighted and volume-unweighted (equally-weighted) average effective dollar spread and average percentage effective spread. Lin, Sanger, and Booth's (LSB) (1995) model for estimating the adverse selection component of the spread is used in this study as follow.

$$\Delta Q_{t+1} = \lambda z_t + e_{t+1} \quad (5)$$

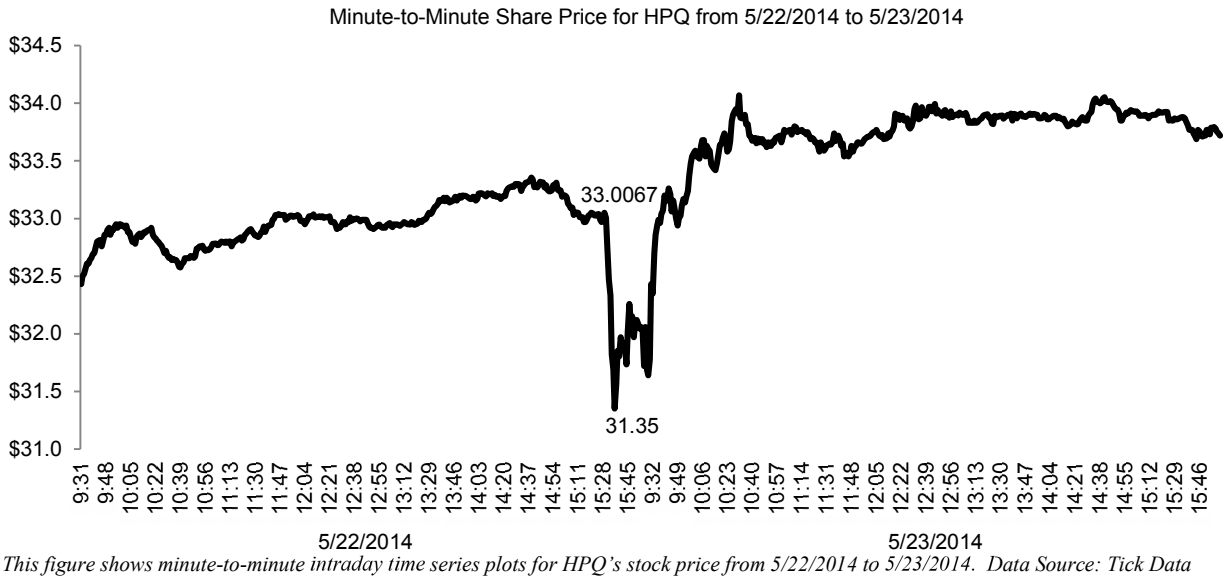
where $\Delta Q_{t+1} = Q_{t+1} - Q_t$; Q_t is the logarithm of quote midpoint at time t. ΔQ_{t+1} is the quote revision (change of quote midpoint). $z_t = P_t - Q_t$; P_t is the logarithm of trade price at time t. λ is the adverse selection component of the effective spread, reflecting the quote revision as a fraction of the effective spread. λ is estimated for HPQ in each time interval. Trades associated with locked or crossed quotes are excluded when estimating λ.

EMPIRICAL RESULTS

Figure 2 and Figure 3 show HPQ's time-weighted average quoted dollar spread and percentage quoted spread, respectively, for each interval on May 22, 2014. The spread is the highest at the beginning 30-minute interval of the day. This is consistent with the literature since the market reflects all information accumulated overnight and is more volatile at the beginning of the trading day. After that, the average quoted dollar spread (percentage quoted spread) goes down and stays around 1 cent (0.030% to 0.031%) until 3:30 PM. When earnings report is released about half a hour before the closing bell, HPQ's share price quickly slides from about $33 at 3:30 PM to $31.35 at 3:36 PM (shown on Figure 1), and the average quoted dollar spread (percentage quoted spread) goes up to 1.0537 cent (0.0327%) during the 6-minute (3:30 PM – 3:36 PM) pricing diving interval. As earnings results are released ahead of schedule, more traders know less-than-expected revenue news through HPQ's website and become informed traders. To

reduce the potenital loss to informed traders, the market maker is expected to increase the bid-ask spread. Consistent with the expectation, the average quoted dollar spread increases by 5.37% (from 1 cent to 1.0537 cent) during the short 6-minute (3:30 PM – 3:36 PM) interval.

Figure 1: Minute-to-Minute Share Price for HPQ from 5/22/2014 to 5/23/2014



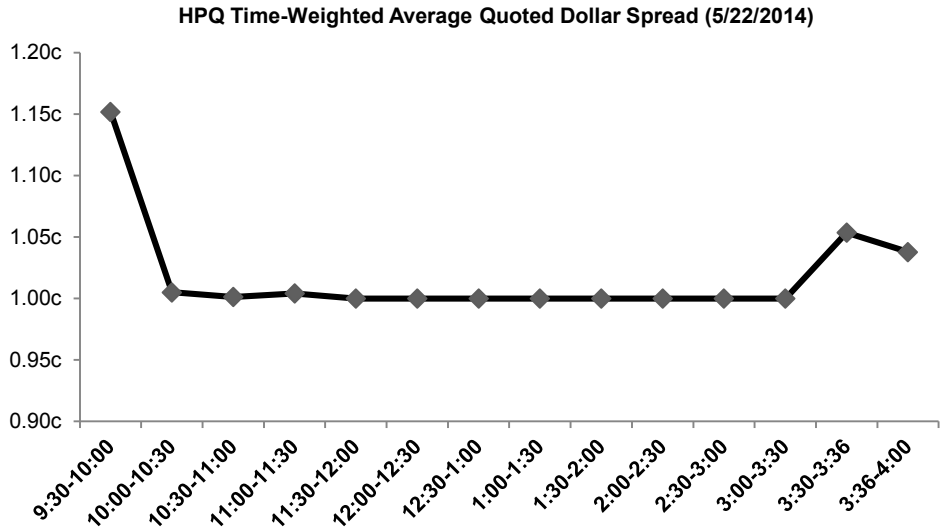
This figure shows minute-to-minute intraday time series plots for HPQ's stock price from 5/22/2014 to 5/23/2014. Data Source: Tick Data

The short 6-minute price diving period implies that investors do not have sufficient time to fully digest all of information on earnings report but intuitively sell the HPQ's shares to reflect the negative revenue news. After 6-minute interval, the market participants have a longer time to digest HPQ's Q2 earnings report and they do not fully treat it as negative news. HPQ's share price rebounds a little and then fluctuates. The average quoted dollar spread decreases a little to 1.0379 cent for the remaining 24 minutes (3:36 PM – 4:00 PM) before the market closed. The lower spread for the remaining 24-minute interval can be explained as the market maker becomes more informed since early release news is wider known so he or she reduces the spread to increase the expected gain from liquidity traders and worries less about the potential loss to informed traders.

HPQ's volume-weighted average effective dollar spread and percentage effective spread for each interval on May 22, 2014 are displayed on Figure 4 and Figure 5, respectively. The average effective dollar spread (average percentage effective spread) starts at 1.0267 cent (0.0314%) at the beginning 30-minute interval of the day and then moves down to between 0.80 cent and 0.95 cent (between 0.024% and 0.029%) until 3:00 PM.

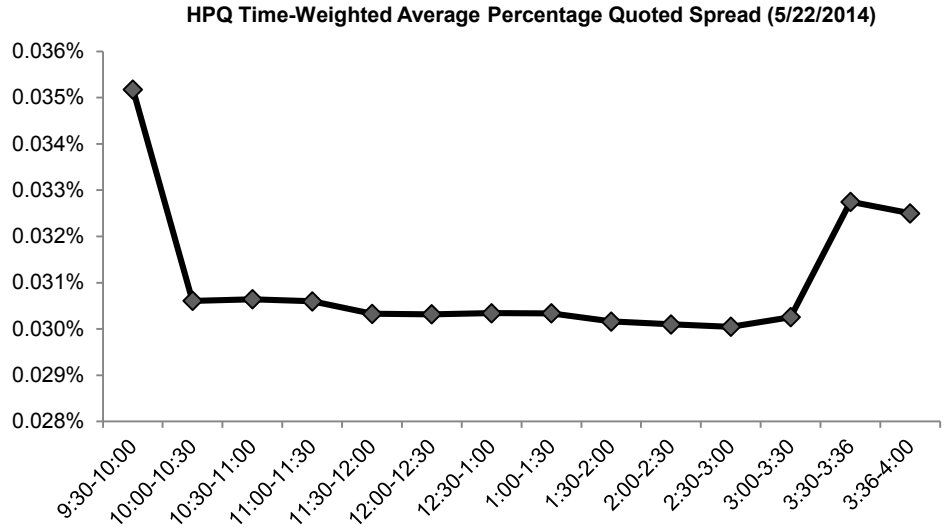
After 3:00 PM, trading volumes increase and trading costs rise. The volume-weighted average effective dollar spread (average percentage effective spread) jumps from 0.9143 cent (0.0275%) during 2:30 PM – 3:00 PM interval to 1.1764 cent (0.0356%) during 3:00 PM – 3:30 PM interval and then reaches the highest level of $1.2766 cent (0.0397%) during 6-minute (3:30 PM – 3:36 PM) price diving interval. The increase of the volume-weighted average effective dollar spread from 0.9143 cent during 2:30 PM – 3:00 PM interval to 1.1764 cent during 3:00 PM – 3:30 PM interval indicates 28.67% increase and the continued increase from 1.1764 cent during 3:00 PM – 3:30 PM interval to 1.2766 cent during 3:30 PM – 3:36 PM price diving interval indicates 8.52% increase.

Figure 2: HPQ's Time-Weighted Average Quoted Dollar Spread for Each Interval on 5/22/2014



This figure shows HPQ's time-weighted average quoted dollar spread for each interval on 5/22/2014. The vertical axis is the time-weighted average quoted dollar spread (c represents cent) and the horizontal axis is each time interval. NBBOs with locked or crossed quotes are excluded when calculating the time-weighted average quoted dollar spread for each time interval.

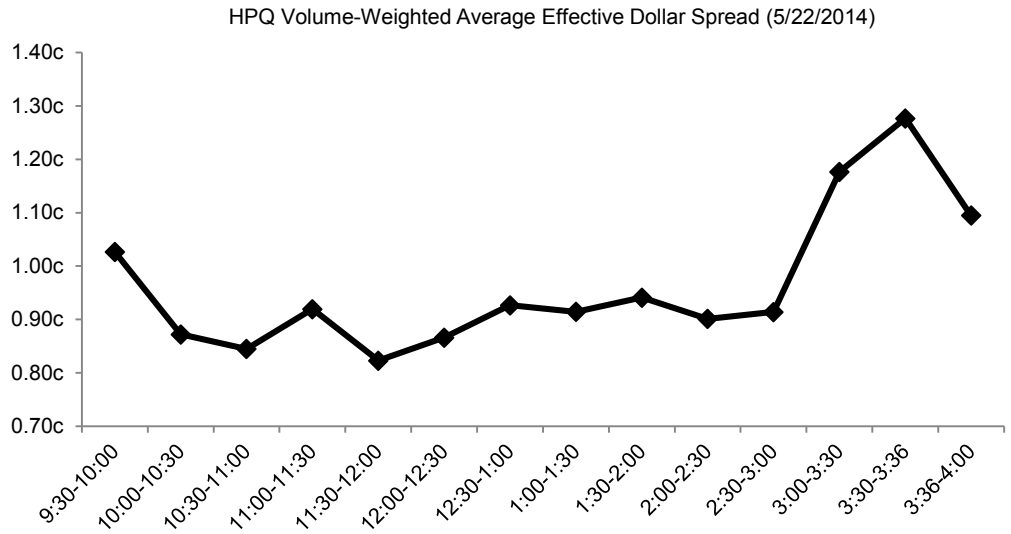
Figure 3: HPQ's Time-Weighted Average Percentage Quoted Spread for Each Interval on 5/22/2014



This figure shows HPQ's time-weighted average percentage quoted spread for each interval on 5/22/2014. The vertical axis is the time-weighted average percentage quoted spread and the horizontal axis is each time interval. NBBOs with locked or crossed quotes are excluded when calculating the time-weighted average percentage quoted spread for each time interval.

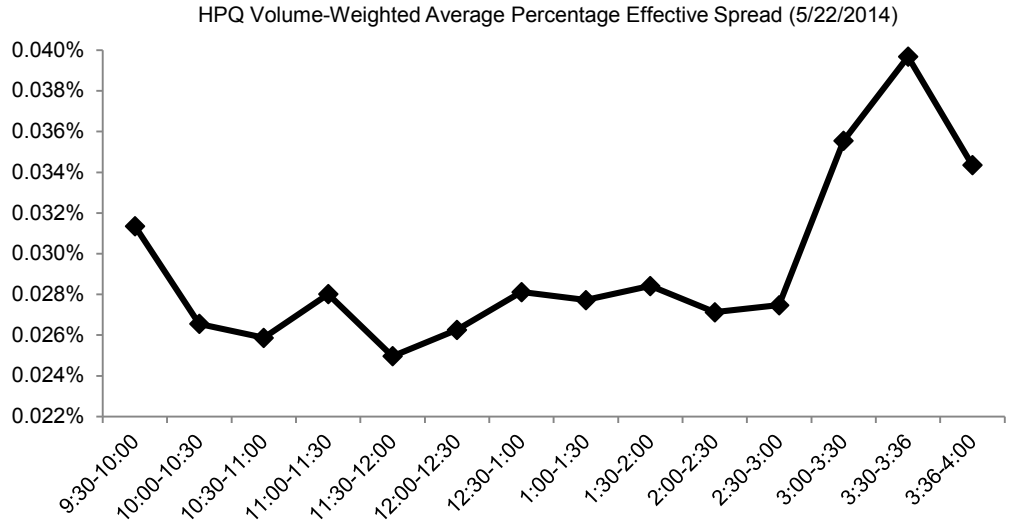
After 6-minute interval, the average effective dollar spread (average percentage effective spread) falls to 1.10 cent (0.034%) for the remaining 24-minute (3:36 PM – 4:00 PM) interval.

Figure 4: HPQ's Volume-Weighted Average Effective Dollar Spread for Each Interval on 5/22/2014



This figure shows HPQ's volume-weighted average effective dollar spread for each interval on 5/22/2014. The vertical axis is the volume-weighted average effective dollar spread (c represents cent) and the horizontal axis is each time interval. Trades associated with locked or crossed quotes are excluded when calculating the volume-weighted average effective dollar spread for each time interval.

Figure 5: HPQ's Volume-Weighted Average Percentage Effective Spread for Each Interval on 5/22/2014



This figure shows HPQ's volume-weighted average percentage effective spread for each interval on 5/22/2014. The vertical axis is the volume-weighted average percentage effective spread and the horizontal axis is each time interval. Trades associated with locked or crossed quotes are excluded when calculating the volume-weighted average percentage effective spread for each time interval.

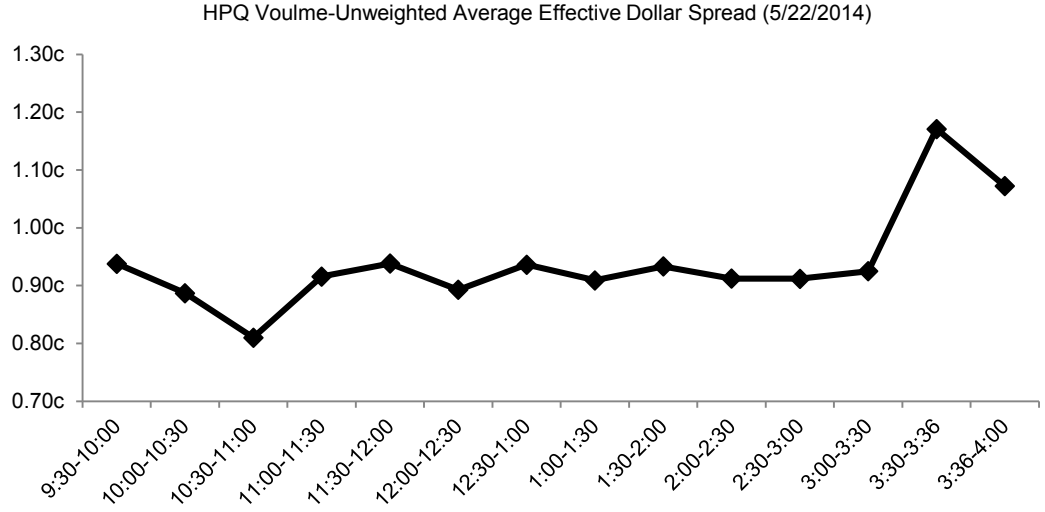
Although researchers generally calculate the volume-weighted effective spreads, HPQ's early earnings release instantly causes unusual large trading volumes, which may affect the results of calculating effective spreads. To isolate the effect of high trading volumes on the computation of effective spreads, the volume-unweighted (equally-weighted) average effective spreads are also calculated. Figure 6 and Figure 7 present HPQ's volume-unweighted average effective dollar spread and percentage effective spread for each interval on May 22, 2014, respectively.

The volume-unweighted average effective dollar spread (average percentage effective spread) begins at 0.9380 cent (0.0286%) and goes down to 0.8101 cent (0.0248%) and then goes up again, moving between 0.90 cent and 0.95 cent (between 0.027% and 0.029%). During the 6-minute (3:30 PM – 3:36 PM) price diving period, the volume-unweighted average effective dollar spread (average percentage effective spread) jumps up to 1.1709 cent (0.0364%). The increase of the volume-unweighted average effective dollar spread from 0.9250 cent during 3:00 PM – 3:30 PM interval to 1.1709 cent during 3:30 PM – 3:36 PM price diving interval indicates 26.58% increase.

After 6-minute interval, the volume-unweighted average effective dollar spread (average percentage effective spread) eventually drops to 1.0723 cent (0.0336%) for the remaining 24-minute (3:36 PM – 4:00 PM) interval.

The results of Figure 2, 4, and 6 reveal that during the 6-minute price diving interval (3:30 PM – 3:36 PM), HPQ's trading costs, measured by the time-weighted average quoted dollar spread, volume-weighted, and volume-unweighted average effective dollar spreads, increase by 5.37%, 8.52%, and 26.58%, respectively, from the prior 30-minute interval (3:00 PM – 3:30 PM).

Figure 6: HPQ's Volume-Unweighted Average Effective Dollar Spread for Each Interval on 5/22/2014

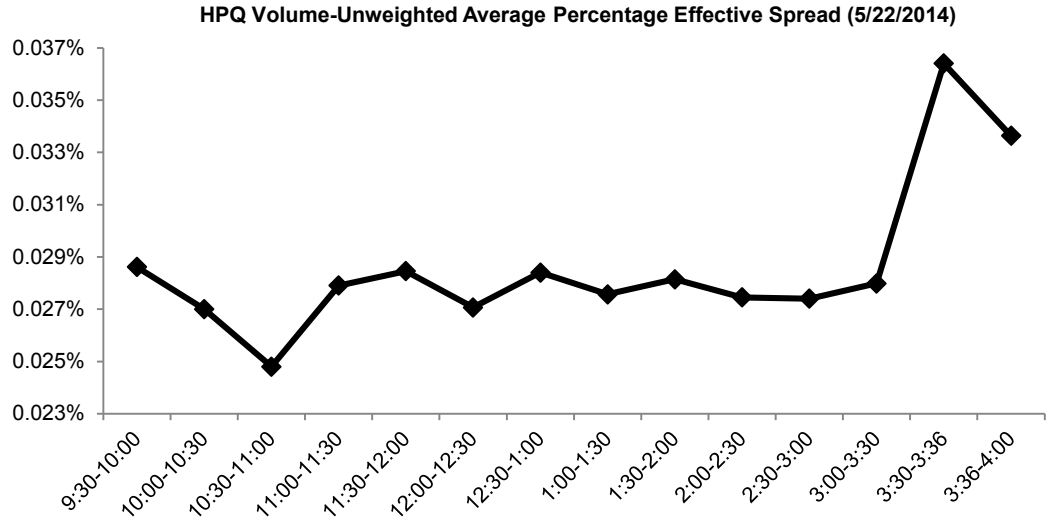


This figure shows HPQ's volume-unweighted average effective dollar spread for each interval on 5/22/2014. The vertical axis is the volume-unweighted average effective dollar spread (c represents cent) and the horizontal axis is each time interval. Trades associated with locked or crossed quotes are excluded when calculating the volume-unweighted average effective dollar spread for each time interval.

Figure 8 shows HPQ's adverse selection component of spread for each interval on May 22, 2014. The adverse selection component of spread is used to measure the information asymmetry. Based on Figure 8, the trend of adverse selection component is downward, which indicates that the information asymmetry is the highest at the beginning 30-minute interval of the day and then gradually moves down. It drops to the lowest level during the 6-minute price diving period and eventually moves up a little for the remaining 24-minute period. The result is consistent with the conjecture that the information asymmetry gradually goes down when the time approaches to HPQ's Q2 earnings release time and the information asymmetry reaches to the lowest level (0.0168) when earnings report is accidently released earlier and share price rapidly dives beginning 3:30 PM. After 3:36 PM, the market participants have a longer time to digest HPQ's Q2 earnings report; different opinions may arise and mix with the negative news. So, the information asymmetry increases (to 0.0339) for the remaining 24-minute interval. If the 6-minute price diving period and the last

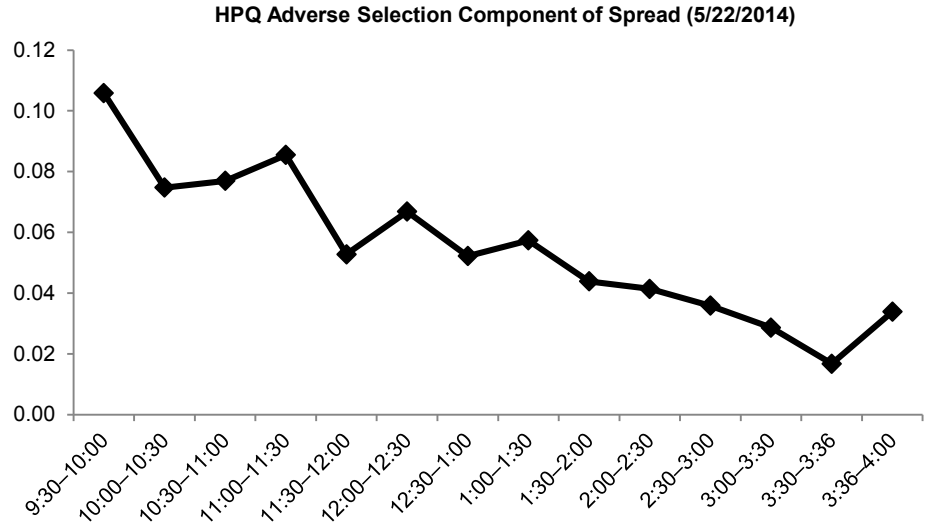
24-minute period are combined to one 30-minute interval, the adverse selection component for the last 30-minute interval (3:30 PM – 4:00 PM) is 0.0248, lower than 0.0287 of the previous 30-minute (3:00 PM – 3:30 PM) interval.

Figure 7: HPQ's Volume-Unweighted Average Percentage Effective Spread for Each Interval on 5/22/2014



This figure shows HPQ's volume-unweighted average percentage effective spread for each interval on 5/22/2014. The vertical axis is the volume-unweighted average percentage effective spread and the horizontal axis is each time interval. Trades associated with locked or crossed quotes are excluded when calculating the volume-unweighted average percentage effective spread for each time interval.

Figure 8: HPQ's Adverse Selection Component of Spread for Each Interval on 5/22/2014



This figure shows HPQ's adverse selection component of effective spread for each interval on 5/22/2014. The vertical axis is the adverse selection component of effective spread and the horizontal axis is each time interval. Lin , Sanger, and Booth's (1995) model for estimating the adverse selection component of effective spread is used and it is shown on equation (5) in data and methodology section. Trades associated with locked or crossed quotes are excluded when estimating the adverse selection component for each time interval.

The results of the important last-30-minute trading time on the announcement date can be summarized as follows. When HPQ's 2014 Q2 earnings report is inadvertently released prior to the closing bell on May

22, 2014, HPQ's stock price instantly slides 5% within 6 minutes to reflect the less-than-expected revenue news. During the 6-minute price diving interval (3:30 PM – 3:36 PM), HPQ's bid-ask spreads, measuring its trading costs increase, compared to the prior 30-minute interval (3:00 PM – 3:30 PM) and the adverse selection component of spread, measuring the information asymmetry declines to the lowest level of the day. After the 6-minute interval, HPQ's share price rebounds a little and then fluctuates since investors have a longer time to digest HPQ's Q2 earnings results and do not entirely treat them as negative results. For the remaining 24-minute interval (3:36 PM – 4:00 PM), HPQ's trading costs declines and information asymmetry rises relatively to the previous 6-minute price diving interval (3:30 PM – 3:36 PM).

CONCLUSION

Large publicly traded corporations mostly announce their quarterly earnings after the closing bell on the scheduled dates. The scarce occurrence of early 2014 Q2 earnings release on the announcement date for HPQ provides a chance of a case study to investigate the effect of early earnings release on intraday trading costs and information asymmetry for the market participants. Using the intraday trade and quote data for HPQ on the earnings release date, this study calculates HPQ's bid-ask spreads, measuring the trading costs and estimates the adverse selection component of spread, measuring information asymmetry for divided time intervals. The results show that HPQ's trading costs increase and its information asymmetry declines following early earnings release on the announcement day. The limitation of this research is that the results are only for the case of HPQ's 2014 Q2 early earnings release. This paper's results do not represent for the results of any other firms that also happen the situations of early quarterly earnings release. The future research may be pursued by including a larger sample of firms with similar events to examine how the events affect firms' trading costs on different (stock, bond, options) markets.

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