

Full Length Article

Limit order placement by high-frequency traders[☆]

Avanidhar Subrahmanyam^{a,*}, Hui Zheng^b

^a The Anderson School, University of California, Los Angeles – Finance Area, United States

^b The University of Sydney – Business School, Capital Markets Cooperative Research Center, Australia

Received 15 September 2016; accepted 24 September 2016

Available online 10 October 2016

Abstract

The effectiveness of liquidity provision by HFT firms is an unexplored but central policy issue. Using unique data consisting of limit order placement, execution, and cancellations, we find that HFT firms do not cancel orders more frequently than non-HFT firms. HFT firms more effectively use order cancellation to strategically manage their limit orders in anticipation of short-term price movements than non-HFT firms. HFT firms increase their liquidity provision during high volatility periods; their liquidity provision is less affected by order imbalance shocks than that of non-HFT firms. Overall, our results indicate that HFT limit orders exert a stabilizing influence. Copyright © 2016, Borsa İstanbul Anonim Şirketi. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

JEL classification: G14; G20

The significant growth in high-frequency trading (HFT) in recent years has led to considerable debate about its impact on market quality and wealth distribution among investors.¹ A key

question is whether HFT improves market liquidity (Jones, 2013). Researchers generally report that HFT improves market quality by narrowing bid-ask spreads (Jovanovic & Menkveld, 2011; Malinova, Park, & Riordan, 2013) and supplying liquidity in transactions when spreads are wide (Carrion, 2013). Others argue that the liquidity provided by HFT is illusory and difficult to access because it is usually cancelled within an exceptionally short period of time (i.e., in milliseconds), and has been dubbed as “phantom liquidity.”² A few researchers have focused on the liquidity-taking behaviour of HFT firms, with analyses on their liquidity provision during *transactions* (Brogaard, Hendershott, & Riordan, 2014). However, while the preceding studies are important, an understanding about the liquidity provided by HFT firms (hereafter, HFT liquidity) via their *posted* orders on the limit order book can potentially contribute much to the ongoing debate about the role played by HFT firms in modern securities markets.³ For example, issues

^{*} We thank Frank Hatheway, Claude Courbois, Jeffery Smith, Esen Onur and seminar participants at NASDAQ, Commodity Futures Trading Commission, and Financial Conduct Authority for helpful comments. We thank NASDAQ, Inc. for providing the data for this study. The views expressed herein are not intended to represent the views of NASDAQ, its employees, or directors. Nothing contained herein should be construed as investment advice, either on behalf of a particular security or an overall investment strategy.

^{*} Corresponding author. Fax: +1 310 825 5355.

E-mail address: subra@anderson.ucla.edu (A. Subrahmanyam).

Peer review under responsibility of Borsa İstanbul Anonim Şirketi.

¹ In the United States, the Securities and Exchange Commission (SEC) recognizes that “by any measure, HFT is a dominant component of the current market structure and likely to affect nearly all aspects of its performance” (Securities and Exchange Commission, 2010; Release No. 34–61358; File No. S7-02-10). In 2012 the SEC expressed serious concerns about the potential impact of HFT on market quality (see, “SEC May Ticket Speeding Traders,” *The Wall Street Journal*, February 23, 2012). In Europe, the latest MiFID II “will introduce specific provisions designed to ensure that high frequency trading (HFT) does not have an adverse effect on market quality or integrity.” Under MiFID II, HFT firms engaging in proprietary trading need to be authorized by exchanges. See “MiFID II – What is changing,” Financial Conduct Authority, September 12, 2014, available at: <https://www.fca.org.uk/firms/markets/international-markets/mifid-ii/what-is-changing>, accessed on July 17, 2015.

² See, “Concept Release on Equity Market Structure,” Securities and Exchange Commission, 2010, p. 50; and “High-Frequency Trading: Background, Concerns, and Regulatory Developments,” Congressional Research Service, 2014, p. 19.

³ Recently the European Securities and Markets Authority calls for further research to “assess the actual contribution of HFT to liquidity.” See, “High-frequency trading in EU equity markets,” European Securities and Markets Authority, November 1, 2014.

such as whether fleeting orders and order cancellations are more common among HFT firms, whether HFT firms provide liquidity via larger orders than other investors, whether HFT firms increase or decrease liquidity supply during periods of high volatility, can only be addressed via an analysis of how HFT firms interact with the limit order book. In this paper, we use novel data which identifies HFT orders within a limit order book to directly address some concerns raised by the opponents of HFT.⁴

Amihud (2002) and Acharya and Pedersen (2005) demonstrate the importance of market liquidity. In today's securities markets, HFT firms have largely assumed the role of traditional human market makers (Menkveld, 2013), so that it is especially interesting to understand how they provide liquidity via limit orders. We note that limit orders are an important source of market liquidity (Biais, Foucault, & Moinas, 2015), and recent advances in trading technology have significantly reduced the costs to monitor and alter limit orders (Hasbrouck and Saar 2013; Jones, 2013), making limit order trading more attractive. Jovanovic and Menkveld (2011) and Hoffmann (2014) suggest that compared with non-HFT firms, HFT firms are more likely to supply liquidity via limit orders since their superior technology can reduce adverse selection risk in market making.⁵ Finally, the widely-adopted maker-taker pricing by exchanges around the world provide additional incentives for traders to trade via limit orders.

In this study, we first reconstruct the LOBs for a sample of 116 stocks traded on Nasdaq during the first quarter of 2011. Then, using information on 26 trading firms which are identified by Nasdaq as mainly engaging in HFT activities, we provide a detailed analysis on their liquidity provision activities via limit order placement, including executed and cancelled orders. To the best of our knowledge, such an analysis of HFT limit orders has not been conducted before.⁶

⁴ Some researchers examine the aggregated impact of HFT liquidity on market quality using market events that affect the trading of the high frequency market making firms (Friederich & Payne, 2015; Hagströmer, Norden, & Zhang, 2014; Jovanovic & Menkveld 2011; Malinova et al., 2013). Unlike these researchers, we examine the dynamics of HFT liquidity on the LOB.

⁵ Research has shown that in a quote driven market, specialists can be informed (Ready, 1999) due to their exclusive access to the information about floor brokers (Benveniste, Marcus, & Wilhelm, 1992) and the LOB (Harris & Panchapagesan, 2005; Madhavan & Panchapagesan, 2000). Such privileges become less apparent when most equities markets today have an electronic LOB.

⁶ Brogaard et al. (2014) (BHR 2014) also conduct some analysis on the liquidity provision by HFT firms. Our study differs from BHR 2014 in a number of ways. First, since the data used in BHR 2014 are limited to transactions, their study focuses on the effects of liquidity-taking behaviour of HFT firms. Second, the findings of BHR 2014 on the liquidity provision by HFT firms are based on limit orders executed in transactions. In our study, we provide a detailed analysis of the liquidity provision by HFT and non-HFT firms for all limit orders in the top 50 price levels of the LOB. As a result, the policy implications of our study complement those of BHR 2014. More recently, in another concurrent and complementary paper, Brogaard et al. (2015) examine the impact of HFT limit orders on price discovery; in contrast, our focus is on liquidity provision and we provide a more detailed analysis on the dynamics of the LOB. While our HFT classifications originate from Nasdaq, they use algorithms to classify firms as HFT firms (for an analysis of potential issues induced by classification algorithms for HFT firms, see "Equity Market Structure Literature Review Part II: High Frequency Trading", Securities and Exchange Commission, 2014).

We find that the average size of HFT limit orders is smaller than that of the limit orders from other traders, whom we define as the non-HFT firms. However, the median sizes of limit orders are similar between groups. The limit order cancellation ratios are also very similar between HFT firms and non-HFT firms. The limit order execution ratios are smaller for HFT firms when we examine limit orders submitted to the top three price levels of the LOB. However, when we include all limit orders submitted to the top 50 price levels of the LOB, the order execution ratios become similar between the two groups. In general, our results show that the commonly perceived special features of HFT liquidity provision, such as smaller order size and being less accessible when needed by liquidity demanders, are not unique to HFT liquidity.

A large number of limit orders submitted and cancelled within a short period of time can increase the uncertainty of liquidity and affect wealth distribution among traders.⁷ The rise of such fleeting orders is widely attributed to the increase of HFT, but there is little evidence to support this perception. We analyse this issue and find that the time that a limit order rests on the LOB is significantly shorter for the limit orders of HFT firms than for those of non-HFT firms. For stocks with large, medium, and small market capitalizations (hereafter, large-, medium-, and small-cap stocks), the median time a limit order rests at the top 50 price levels of the LOB before an execution or cancellation is 1.85, 6.02, and 18.30 s for HFT firms, and 4.12, 8.98, and 22.43 s for non-HFT firms, respectively. For limit orders submitted to the top three price levels of the LOB, the median time to cancellation of HFT firm (non-HFT firm) limit orders is 0.53 (3.02), 2.15 (3.47), and 6.84 (4.48) seconds for large-, medium-, and small-cap stocks, respectively. These results confirm the common belief that HFT liquidity rests on the LOB for a shorter period of time than non-HFT liquidity.

In a closer examination of the distribution of limit orders across the LOB we find that HFT firms gradually reduce their liquidity on the LOB at price levels further away from the top of the LOB. Intraday analysis shows that HFTs place limit orders on the LOB exhibiting a pattern consistent with a strategic behaviour of a liquidity provider in the presence of market volatility. Following Næsland Skjeltorp (2006), we further calculate the slope of the LOB for the limit orders of HFT firms and non-HFT firms and find that HFT firms strategically place more liquidity further away from the top of the LOB ahead of an increase in price volatility. Our tests on the impact of order submission and order cancellation reveal that across all stock groups, HFT firms tend to cancel buy (sell) limit orders ahead of a short-term price decrease (increase), while for non-HFT firms the relation is the opposite for large-cap stocks and significantly weaker for the medium- and

⁷ Hasbrouck (2013) documents that the volatility of quote changes at 50 ms intervals are about three times of the volatility measured over 27-min intervals and the uncertainty associated with short-term liquidity provides a significant advantage to liquidity takers with faster speed. Baruch and Glosten (2013, p. 28) provide some theoretical explanations for the rationale behind the fleeting orders.

Download English Version:

<https://daneshyari.com/en/article/7341816>

Download Persian Version:

<https://daneshyari.com/article/7341816>

[Daneshyari.com](https://daneshyari.com)