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1-share orders and trades

Ryan L. Davis[a], Brian S. Roseman[b], Bonnie F. Van Ness[c], Robert Van Ness[c,*]

[a] University of Alabama at Birmingham, United States
[b] California State University, Fullerton, United States
[c] University of Mississippi, United States

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ABSTRACT

1-share trades are the most common odd lot trade size, accounting for 9.62% of all odd lot transactions and 3.65% of all trades on NASDAQ in 2012. While 50.41% of 1-share trades result from broken orders, 34.89% of 1-share trades are intentional. We provide substantial evidence that traders use 1-share trades to "ping" for hidden liquidity. In particular, our results indicate that 1-share trades are disproportionately aggressive and also execute against hidden liquidity more than any other odd lot trade size. We also find a relative increase in trading immediately following a 1-share trade. Our results are in line with Clark-Joseph (2014), who suggests that traders may use small, unprofitable trades to detect information from other traders. Specifically, 1-share trades represent the minimum cash outlay necessary to trade, while simultaneously producing the smallest possible effects on a market maker's inventory, and in turn, a security's price.

1. Introduction

1-share trades are the most commonly observed odd lot trade size, accounting for 9.62% of all odd lot transactions and 3.65% of all trades on NASDAQ in 2012. Because odd lots now constitute a significant portion of trading activity (O'Hara et al., 2014),[1] the disproportionate number of 1-share trades observed does not appear to be trivial. Theory suggests that traders may use small trades to hide information and reduce the market impact of their transactions (Admati and Pfeiderer, 1988). However, the persistence of odd lot trades after December 9, 2013 (SEC, 2014), the date on which odd lot trades were first reported to the consolidated tape, suggests that some traders may use small trades for reasons that extend beyond concealing information. Clark-Joseph (2014), for example, suggests that traders may use small trades to detect information from other traders, and provides a model in which high frequency traders place small exploratory orders and observe the resulting changes in market depth. While exploratory orders are unprofitable, the information gathered from such a strategy allows market participants to know when to trade ahead of other orders. 1-share trades are likely to be unprofitable, and are, perhaps, exploratory in nature. Specifically, 1-share trades represent the minimum cash outlay necessary to trade, while simultaneously producing the smallest possible effects on a market maker's inventory, and in turn, a security's price.[2]

Our purpose is to explain the disproportionate number of 1-share transactions. While it may not be surprising to see trades of only 1 share as an investments primer or simply a way to own a small portion of a company, the prevalence of 1-share transactions is unexpected. In this paper, we explore and empirically test three main hypotheses that may explain the large proportions of 1-share trades observed in the data. Specifically, we determine if 1-share trades are (i) intentionally placed or the result of broken orders, (ii) likely to be exploratory trades, or (iii) used by stealth traders to avoid the reporting requirements to the consolidated tape.

Because trade sizes may not reflect the size of incoming market orders or resting limit orders, 1-share trades may simply be the result of broken orders. Based on resting liquidity and the size of incoming market orders, 1-share trades may be a mechanical

* Corresponding author.
E-mail addresses: davisrl@uab.edu (R.L. Davis), broseman@fullerton.edu (B.S. Roseman), bvanness@bus.olemiss.edu (B.F. Van Ness), rvanness@bus.olemiss.edu (R. Van Ness).

[1] There is a growing literature of odd lot studies. Early researchers use odd lot trading as a proxy for individual trading (see, for instance, Wu, 1972; Ritter, 1988; Dyl and Maberly, 1992; and Lakonishok and Maberly, 1990). More recently, O'Hara, Yao, and Ye (2014) show that odd lot trading is increasing over time. In their sample of 120 stocks with transactions on NASDAQ, O'Hara, Yao, and Ye show that odd lot transactions increase from 14% of trades in January 2008 to 22% in December 2009, while Johnson (2014), with a larger cross section of stocks, shows that odd lot transactions increase from 2005 (16% of trades) to 2012 (approximately 30% of trades).

[2] Easley and O'Hara (1987) investigate the effects of trade sizes on prices and conclude that larger trades are made at less favorable prices due to inventory imbalance.

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consequence of the limit order book queue. For example, if a market order for 99 shares executes against a resting limit order for 100 shares, then 1 share will remain available. A subsequent order for 100 shares will produce a 1-share trade and leave 99 shares available for the next order in the queue. The 1-share trade in this example is not the result of an order for 1 share, but instead the result of a broken order.

Anecdotally, O' Hara, Yao, and Ye report that 60% of 1-share trades are initiated by high-frequency traders. This result is in line with recent literature suggesting that high frequency traders routinely use small trades to hide their information (Hendershott et al., 2011; Hendershott and Riordan, 2013; O'Hara et al., 2014). Additionally, Clark-Joseph (2014) suggests that high frequency traders may place small exploratory trades to detect information. 1-share trades may, thus, be a result of a trader "pinging" a market center, perhaps as part of a liquidity detection strategy. A trader might submit either an aggressive 1-share limit order inside the best displayed bid and ask quote, or a 1-share market order, in order to detect hidden liquidity. A 1-share order that executes would alert a trader that newly discovered liquidity is available at a specific price. Regardless of technique, 1-share trades are likely not used to fill a large position, but rather to learn about market conditions.

During our sample period, odd lot trades are not reported to the consolidated tape. We indirectly test O'Hara et al. (2014) proposition that 1-share trades may be the result of traders breaking up orders to avoid the reporting requirements of trades of 100 shares or more. For example, a trader may break a 100-share order into two orders, one for 1 share and another for 99 shares. Unlike a 100-share trade, a 1-share trade and a 99-share trade will not be reported to the consolidated tape. Support for this hypothesis would suggest that 1-share trades are part of a stealth trading strategy designed to reduce the potential information that can be gleaned from the consolidated tape feed.

Using order-level data provided by NASDAQ, we find that half of all 1-share transactions originate from orders for more than 1 share, while approximately 35% of 1-share trades are intentional (i.e. result from a 1-share liquidity-supplying order).[3] Additionally, we find that almost 25% of 1-share market orders are intentional, that is, the liquidity demanding order is submitted as a 1-share order. We also find that 1-share trades are influenced by firm characteristics. Specifically, 1-share trades fluctuate directly with price and inversely with number of trades, volatility, and firm size. We provide substantial evidence that 1-share trades are used to "ping" hidden liquidity. In particular, our results indicate that 1-share trades are disproportionately aggressive and also execute against hidden liquidity more than any other odd lot trade size. We also find a relative increase in trading immediately after a 1-share trade. We do not find overwhelming evidence that traders split 100-share orders into two trades (one for 1 share and one for 99 shares) in order to avoid reporting the trade to the consolidated tape. In fact, we find that proportions of 1-share trades and 99-share trades increase after odd lot trades are reported to the consolidated tape. In total, our results suggest that while half of 1-share trades are a result of broken orders, many intentional 1-share trades are likely exploratory trades, consistent with theory provided by Clark-Joseph (2014).

2. Data & sample

Our primary data source in this study is the NASDAQ TotalView-ITCH. NASDAQ TotalView-ITCH provides order level data—orders added, removed, and executed on NASDAQ. We examine all firms in ITCH on all trading days during the second half of 2012 (July 2nd through December 31st). We require that each stock close above $5, trade at least five times a day, and have a minimum volume of 1000 shares every trading day in the sample.[4] We also examine 1-share trades in the month surrounding December 9th, 2013, using data from NASDAQ TotalView-ITCH.[5] We obtain shares outstanding and closing share prices for each stock from CRSP in order to calculate market capitalization. This market capitalization measure is the average of a firm's size on the first and last trading day of the sample period. Last, we use NYSE's Trade and Quote (TAQ) data to determine a firm's average daily spread as well as the average number of shares available at the top of the limit order book.

Table 1
Summary Statistics.

	Mean	Median	Std. Dev.	Min	Max
Price	35.90	26.23	41.22	5.54	861.63
Trades	1789	634	3399	3	95,992
Volume	475,430	110,067	1827,415	757	66,461,886
Volatility (%)	17.84	11.68	28.04	0.00	2626.39
#1Trades	18.65	7.71	40.31	0.08	1344.46
%1Trades	3.65%	1.11%	9.91%	0.01%	58.24%
#1Orders	65.21	15.26	208.93	0.00	5241.58
%1Orders	0.38%	0.07%	1.87%	0.00%	48.70%
MktCap (000 s)	6633,411	1529,547	22,321,059	4429	572,021,587
# of Firms	2901	2901	2901	2901	2901

Table 1 provides summary statistics for firms in our study. All variables, with the exception of firm size, are recorded by firm by day. The sample includes data for all firms in the NASDAQ TotalView-ITCH database from July 2012 to December 2012. Firms with stock prices that close below $5, trade less than five times a day, and have less than 1000 shares of daily trading volume are filtered from the sample. The summary statistics below are for trades on NASDAQ. *Price* is the daily closing price. *Trades* is the number of trades. *Volume* is the number of shares traded. *Volatility* is the standard deviation of daily trade prices. *#1Trades* is the number of 1-share trades. *%1Trades* is the number of 1-share trades divided by total number of trades for the day. *#1Orders* is the number of 1-share orders. *%1Orders* is the number of 1-share orders divided by total orders for the stock day. *MktCap* is a firm's market capitalization (in 000 s) which is a firm's price multiplied by shares outstanding.

Descriptive statistics for the sample, consisting of 2901 stocks, are shown in Table 1. The average firm in our sample has a share price of $35.90 and a market capitalization of $6.6 billion. Securities trade almost 1800 times per day. When considering averages by firm, 1-share trades comprise 3.65% of these transactions. However, 1-share trades tend to be more heavily concentrated in certain securities, as evidenced by a median daily number of 1-share trades (7.71) which is smaller than the mean number of 1-share transactions (18.65). Additionally, some firms have almost 1300 1-share trades in a single trading day.

Fig. 1 provides the relative frequencies of all odd lot transactions in the latter half of 2012. 1-share trades are the most common odd lot trade size, accounting for 9.62% of all odd lot transactions. Given the range of all possible order sizes available, along with the array of potential execution sizes, these results are surprising. O'Hara et al. (2014) find that 1-share trades are the second (third) most common odd lot trade size class in 2008–2009 (2010–2011). Similar to that documented by O' Hara, Yao, and Ye, our results show that trade sizes cluster on multiples of 10 s and 25 s. However, in sharp contrast to their results, we find that 1-share trades are at the top of the odd lot hierarchy.

[3] The remaining 15% of 1-share trades are executions against hidden-liquidity and cannot be definitively classified as intentional or broken.

[4] These filters are applied to aggregate numbers from all exchanges reported in CRSP, not trades executing only on NASDAQ. The summary statistics provided in Table 1 are for trades on NASDAQ.

[5] Prior to December 9, 2013 odd lot transactions were not reported to the consolidated tape.