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Liquidity and market efficiency: Analysis of NASDAQ firms

Dennis Y. Chung *, Karel Hrazdil

Faculty of Business Administration, Simon Fraser University, Burnaby, BC, V5A 1S6, Canada

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ABSTRACT

We analyze all NASDAQ firms with respect to their short-horizon return predictability, which Chordia et al. (2008) formulate as an inverse indicator of market efficiency. Our results confirm that increased liquidity enhances market efficiency, and show that this effect is amplified during periods with new information. After controlling for liquidity and information effects, we find that NASDAQ firms experience an improvement in market efficiency only from the sixteenth to the decimal tick size regimes. We further demonstrate that inferences of market efficiency are not uniform across the different portfolios formed on the basis of trading frequency, volume and market capitalization.

1. Introduction

Chordia, Roll, and Subrahmanyam (2008, hereafter referred to as CRS) examine market efficiency across three tick size regimes and document a substantial decline in short-horizon return predictability for a sample of New York Stock Exchange (NYSE) companies. The argument is that the short-horizon predictability of stock returns from past order flows is an inverse indicator of market efficiency and CRS provide compelling evidence that the market is becoming more efficient as the tick size decreases.[1] One important implication of the CRS study is that their approach provides a feasible basis for estimating the degree of informational efficiency in a market. Research utilizing this approach in connection with NYSE firms is also beginning to appear in the literature (e.g., Aktas, de Bodt, & Van Oppens, 2008; Visaltanachoti & Yang, 2010). However, before CRS's results can be generalized across all U.S. firms or applied in various research settings, further analysis needs to be conducted on additional, more comprehensive samples. In

* Corresponding author. Tel.: +1 778 782 4355; fax: +1 778 782 4920.
E-mail addresses: dychung@sfu.ca (D.Y. Chung), karel_hrazdil@sfu.ca (K. Hrazdil).

[1] CRS analyze a period of three tick size regimes between 1993 and 2002 in which the NYSE changed its minimum tick size from $1/8 to $1/16 on June 24, 1997, and further to $0.01 on January 29, 2001.

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fact, CRS state explicitly that "future investigation should extend the analysis to smaller firms and other years, exchanges, and countries" (pg. 252).

CRS form their sample by selecting from only the NYSE firms. They further restrict their sample to only the largest and actively traded firms to minimize the impact of non-trading in a short interval setting. Due to specific microstructure and institutional characteristics of the NYSE, it is uncertain whether different exchanges characteristics, such as trading rules, treatment of limit orders, or opening price setting mechanisms play a role in the extent to which liquidity is related to market efficiency. The main objective of this study is to apply the CRS analysis to a large sample of U.S. firms trading on the NASDAQ that have experienced exogenous changes in minimum bid-ask spreads around similar time periods as the NYSE firms. We first address the issue of whether the improvement in market efficiency across tick size regimes can be observed for all firms traded on the NASDAQ between January 1, 1993 and June 30, 2004. We thus contribute to the literature and provide empirical evidence on the issue beyond CRS's initial NYSE sample; our study covers a total of 11,073 NASDAQ firms. Given that many NASDAQ stocks are not actively traded, we also examine the cross-sectional differences in market efficiency for portfolios of our sample firms formed on the basis of trading frequency, market capitalization, and trading volume. Finally, we extend CRS analysis one step further and directly test the impact of new information on the relation between liquidity and market efficiency for these NASDAQ firms in a multiple regression setting. We identify periods of high adverse selection, relate market efficiency to a continuous measure of liquidity, and examine how this relation is affected by increased adverse selection in the market.

We adopt a two stage regression approach based on Chung and Hrazdil (2010), who provide a comprehensive analysis of all NYSE firms. First, we rely on the CRS methodology (i.e. regressing five-minute returns on lagged order imbalances, and lagged order imbalances interacted with a dummy variable for illiquidity) to estimate the degree of market efficiency. In the second stage, we deviate from the portfolio approach and analyze the return predictability on a firm level basis. We relate market efficiency to a continuous measure of liquidity, measured by the effective bid-ask spread, to provide further evidence on how liquidity affects return predictability. We then identify periods of high adverse selection in the market and examine how the liquidity and market efficiency dynamic changes during these informational periods.

Our first set of results confirms that for a market portfolio of all NASDAQ firms, market efficiency has improved across the three tick size regimes; the explanatory power from regressions of returns on lagged order imbalances, and lagged order imbalances interacted with a dummy variable for illiquidity show a similar decrease in R-square across the tick size regimes. However, unlike Chung and Hrazdil (2010), we do not see a consistent decrease in return predictability for portfolios of NASDAQ firms formed on the basis of trading frequency, market capitalization, and trading volume. In fact, only the most frequently traded firms show results consistent with CRS. These results call for a careful selection of control samples when using CRS's market efficiency estimations for NASDAQ firms in cross-sectional research designs.

In a multiple regression setting, we relate market efficiency to a continuous measure of liquidity and validate CRS's findings for the NASDAQ firms that increased liquidity enhances market efficiency. We further confirm that the results of Chung and Hrazdil (2010) also apply to the NASDAQ firms and that, in the presence of new information, increased liquidity has a stronger and more positive effect on market efficiency. This association is robust to controlling for the effects of market capitalization, trading volume, and trading frequency.

The rest of this paper is organized as follows. We summarize CRS's study along with the literature in Section 2. We describe the data and methods of analysis in Section 3. We discuss the main empirical results in Section 4. Section 5 summarizes and concludes the paper.

2. Literature and predictions

2.1. Overview of Chordia et al. (2008)

CRS formulate two major hypotheses to explain how liquidity and market efficiency are related. First, if market makers cannot absorb the impact of price pressure and imbalances in buy and sell orders, then temporary price deviations arise inducing return predictability and creating arbitrage profit potential. Higher liquidity enhances arbitrage trading which leads to lower return predictability and higher market