

# Market structure, fragmentation, and market quality<sup>☆</sup>

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## Abstract

This paper studies the impact of order flow fragmentation on market quality. Due to differences in market structure, order flow becomes more consolidated when stocks switch listings from a dealer market (NASDAQ) to an exchange (NYSE). We find that the post-switch improvements of market quality are related to the degree of order flow fragmentation on NASDAQ as well as the change of fragmentation after trading on the NYSE. After controlling and correcting for potential selection bias arising from a nonrandom sample, we find that order flow fragmentation affects market quality as predicted by finance theories. Our paper shows that order flow consolidation is particularly valuable for less liquid securities.

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## 0. Introduction

A key issue of interest to financial economists is why the same or similar securities have different trading characteristics in differently structured markets. This issue has raised questions about optimal market design. One of the goals of market design is to facilitate liquidity provision and price efficiency. Order handling rules, decimal pricing and new trading technology have narrowed the difference between the New York Stock Exchange (NYSE) and NASDAQ in terms of trading as well as market quality.<sup>1</sup> A key difference of trading, however, still exists between these two types of market structures. On a dealer market, such as NASDAQ, order flows are usually more fragmented than on an exchange, such as the NYSE, where all buy and sell orders are consolidated and interact with each other. Indeed, a significant amount of trading of NASDAQ-listed stocks takes place on various ECNs and dealers.<sup>2</sup> Many studies compare market quality across different market structures, but there is limited evidence explaining why observed differences exist in recent periods.<sup>3</sup> This paper utilizes natural experiments of exchange switching to examine the impact of order flow fragmentation on market quality.

Due to differences in market structure, NASDAQ stocks are traded by a large number of market venues, including NASDAQ SuperMontage, various ECNs, dealers, and regional exchanges, and therefore have a higher degree of order flow fragmentation than their NYSE peers. When NASDAQ stocks switch listing to the NYSE, order flows migrate from dealers and ECNs to the exchange and become more consolidated. Such natural experiments allow us to examine the impact of order flow fragmentation on liquidity provision and price efficiency. Using switching stocks in this study enables us to control for firm characteristics and remove potential influence due to an imperfect match.

Market fragmentation has been widely studied in the literature. Theoretical work of Mendelson (1987) and Madhavan (1995) shows that fragmentation can result in reduced liquidity, higher price volatility, and violations of price efficiency. Empirical evidence on fragmentation and market quality is, however, inconclusive. Some studies find negative effects of decentralized, or “fragmented,” trading on market quality.<sup>4</sup> Others show that fragmentation with competition does not hurt market quality.<sup>5</sup> Amihud et al. (2003) provide evidence that order consolidation improves liquidity and pricing, and Barclay and Hendershott (2004) show the positive impact of trading consolidation on liquidity.

We examine the stocks of 39 companies that transferred from NASDAQ to the NYSE during 2002 and the first quarter of 2003. The stocks in our sample on average have a market capitalization of \$1.4 billion each and trade 650,000 shares daily. They are not large and actively traded stocks if compared to index stocks and actively traded ETFs.<sup>6</sup> We

<sup>1</sup>See Weston (2000), Sapp and Yan (2003), and Boehmer (2005).

<sup>2</sup>During our sample period, about 80% of 11Ac1–5 eligible orders are executed by ECNs when the stocks are listed on NASDAQ. The ratio of 11Ac1–5 executed shares to twice of consolidated tape volume is about 40% during our sample period.

<sup>3</sup>See Lee (1993), Goldstein (1994), Christie and Huang (1994), Barclay (1997), Bessembinder and Kaufman (1997), Bessembinder (1999), Heidle and Huang (1999), Huang and Stoll (1999), Venkataraman (2000), Jones and Lipson (1999), Bessembinder (2003), among others.

<sup>4</sup>See Cohen et al. (1985), Porter and Thatcher (1998), and Cohen et al. (1982) among others.

<sup>5</sup>See Neal (1987), Battalio (1997), Fong et al (2001), Conrad et al. (2005), Mayhew (2003), Wahal (1997), among others.

<sup>6</sup>The average market capitalization for an S&P 500 stock is about \$20 billion during our sample period. The average daily volume for the active ETFS (DIA, SPY, QQQQ) are between 10 and 150 million shares each.

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