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Viet Anh Dang, David Michayluk, Thu Phuong Pham

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The curious case of changes in trading dynamics

when firms switch from NYSE to Nasdaq*[*]*

Viet Anh Dang[†]

David Michayluk[‡]

Thu Phuong Pham[§]

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Abstract

Voluntarily switching trading location from the New York Stock Exchange to Nasdaq is a relatively new phenomenon, with 53 companies making the switch since 2000. This paper examines the stated reasons for the move and investigates their consistency with the subsequent market dynamics, including effects on liquidity, trading activity, and visibility. We find that while the move to Nasdaq increases trading costs, it improves visibility and attracts more liquidity providers in the long term, explaining the subsequent increase in trading volume and supporting many of the management statements justifying the move. Our findings suggest multi-dimensional aspects may be important considerations in moves between exchanges.

JEL Classification: G10, G15, G18

Keywords: Trading costs, Volume, Exchange listing, NYSE, Nasdaq.

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[†] Alliance Manchester Business School, University of Manchester, Booth Street East, M15 6PB, UK. Email: vietanh.dang@manchester.ac.uk; Tel: +44.161.275.0438.

[‡] Discipline of Finance, UTS Business, University of Technology Sydney, PO Box 123, Broadway, NSW Australia. David.Michayluk@uts.edu.au ; Tel: +61.2. 9514.7761

[§] Corresponding author. Adelaide Business School, University of Adelaide, Adelaide, SA 5005, Australia & IPAG Business School, France. Email: thuphuong.pham@adelaide.edu.au; Tel: +61 (0)8 8313 4510

1. Introduction

The first voluntary shift from the New York Stock Exchange (NYSE) to Nasdaq occurred with Aeroflex Corporation in 2000; previously, the only moves between exchanges had been from Nasdaq to NYSE. Before 2000, firms moved to NYSE ostensibly because NYSE had more stringent listing requirements, and because a move to NYSE may be perceived as a signal of increasing firm quality. On the other hand, the reasons for a move in the other direction to Nasdaq have not been as well understood. There is no clear empirical evidence on how liquidity was affected when the first company moved from NYSE to Nasdaq. Kalay and Portniaguina (2001) find an abnormal positive return when Aeroflex moved, combined with subsequent lower bid-ask spreads and an increase in volume. In contrast, Pruitt, Van Ness, and Van Ness (2002) report increases in the bid-ask spread and a reduction in the number of trades. The inconclusive findings of these studies on liquidity, measured by spreads, may be attributed to the different lengths of the time windows examined, as well as different liquidity metrics. However, regardless of the metrics deployed in these first studies, the sample size of one firm limits the relevance and applicability of their findings.

Moving exchanges is costly and many managers may publicly disclose their rationale for incurring these costs. Examining press releases, we find that two-thirds of the companies moving from NYSE to Nasdaq state that they are moving to reduce trading costs and improve liquidity. Other reasons mentioned include an expected increase in trading volume and an improvement in corporate visibility. There are a few possible explanations underpinning the publicly stated reasons to switch stock listing venues. The first is to take advantage of the relatively large size of the moving firms by switching the firm to Nasdaq, which is dominated by small companies. This improvement in visibility may help eliminate any difference in liquidity across the two stock exchanges and increase trading volume. In addition, Nasdaq is perceived to be more technology-focused, and therefore being listed on Nasdaq may change perceptions of the company by association. However, it is possible that managers' stated reasons for the move are driven by their overconfidence and hubris (e.g., Malmendier and Tate (2005)), which may result in the actual effects of the move being inconsistent with the publicly disclosed motivations[1]. Thus, a question remains as to whether these reasons are empirically supported, especially since the trading environment has changed significantly since 2000, with high frequency traders accounting for up to 50% of trading as of June 2014[2].

In this paper we delve deeper to understand why firms move from NYSE to Nasdaq. Using a 15-year time period (2000–2015) we identify 53 firms that have voluntarily moved from NYSE to Nasdaq. We examine trading dynamics and obtain empirical evidence about liquidity, trading activity, and visibility differences, allowing us to investigate whether the evidence is consistent with firms' stated reasons for their move to Nasdaq. Closest to our work is that of Tse and Devos (2004) and Clyde, Schultz, and Zaman (1997), who examine companies that moved from the American Stock Exchange (Amex) to Nasdaq in the earlier 1992–1995 and 1998–2000 periods. Our work differs from theirs in that we focus on NYSE, not Amex firms, and we consider a more recent set of companies that made the switch in a time window that includes the periods before, during and after the 2008 Global Financial Crisis (GFC). In addition, we use the national best bid and ask quotes prevailing in the second prior to the trade to estimate intraday market quality measurements, which offers more accurate liquidity estimates than using quotes originating from the NYSE only. Furthermore, we examine a much longer time period than in earlier studies to capture long-term effects, while also using an event study methodology around the move to measure the short-term effects.

[1] These reasons are described in more detail in Section 2.

[2] Source: http://www.bloomberg.com/news/2014-06-17/high-speed-trading-fees-under-scrutiny-by-u-s-senators.html

We also improve on the methodology employed in earlier research. Tse and Devos (2004) and Kalay and Portniaguina (2001) used a simple comparison of the average market quality measures before and after stocks moved between exchanges. We estimate the pairwise difference in market quality proxies between the firms that moved exchanges and individually-matched stocks that did not move. This approach captures any commonality effects that are likely to be significant during the high volatility GFC period, which is contained in our study's sample period. Another enhancement in our methodology is the use of fixed effect difference-in-differences regressions to control for time variation in the matching variables and any effect due to volatility or share price.

We find that firms incur higher transaction costs after moving from NYSE to Nasdaq. This liquidity decline suggests that the move may reduce price competition between liquidity providers. Trade volume is not affected in the short-term, but increases significantly in the long-term. The lack of a short-term impact on trading volume and a decrease in liquidity is consistent with Deuskar and Johnson (2011), who find that volume may have a transient, but no permanent association with liquidity. The long-term increase in trading volume along with the long-term deterioration in liquidity[3] for stocks moving to Nasdaq is also supported by Charles et al. (1993), Easley and O'Hara (1992), and Johnson (2008). These studies find higher volume is associated with wider bid-ask spreads if increased volume is induced by a change in the competition among liquidity traders. We also document significantly higher

[3] It seems intuitive that more active stocks are usually more liquid. However, empirical and theoretical evidence is not necessarily consistent with this intuition. For example, Feldhütter, Hotchkiss, and Karakaş (2016) find that bond volume increases for distressed securities while all four liquidity measures are higher. Evans and Lyons (2002) report no link between liquidity and trading volume on the foreign exchange market. A number of other studies also show both theoretically and empirically that trading volume is not always positively related to liquidity (e.g., see Barinov (2014), Johnson (2008), Charles, Mucklow, and Ready (1993), Foster and Viswanathan (1993), and Easley and O'Hara (1992)).

realized spreads after stocks switch their listing exchange to Nasdaq, indicating less competition among liquidity providers for those firms in Nasdaq.

Collectively, the higher long-term volume documented is possibly because liquidity providers of the stocks moving to Nasdaq may enter the market and publicize these stocks. An alternative explanation is that the exposure of the stocks listed on Nasdaq is more appealing to investors, and therefore trading volume increases as more investors participate. This explanation is consistent with one of the stated motivations of the move: to bring higher visibility to the company. Our findings on the impact of the move from NYSE to Nasdaq on the firms' media coverage also provide empirical support for this explanation. The moving firms enjoy a significant improvement in media tone as well as attract a higher amount of press attention after the stock exchange switch. We note, however, that our evidence of a decline in liquidity is inconsistent with firms' publicly disclosed motives for the move. However, it is in line with our prediction that managers may be over-optimistic about reducing or eliminating liquidity differentials between NYSE and Nasdaq.

To further test the robustness of our findings, we perform similar analyses for 196 firms that voluntarily moved from Nasdaq to NYSE during the same time period of 2000–2015, and their non-moving matches. Overall, the findings for firms switching from Nasdaq to NYSE are consistent with those for firms moving in the other direction to Nasdaq. The results show that liquidity is lower for firms listed in Nasdaq in both the short-term and the long-term. Trading volume is not affected immediately after the move in either direction but significantly increases in the long-term when moving to Nasdaq. Our results resolve conflicting findings in earlier research regarding the change in transaction costs, as we show a consistent deterioration in liquidity when firms move to Nasdaq. Our finding holds even when we use a variety of liquidity measures with time windows of different lengths and control for a range of determinants of liquidity, including the characteristics of the moving and matching firms. Overall, our findings suggest that multi-dimensional aspects of liquidity and trading activity may be important considerations when firms move to Nasdaq.

Our paper contributes to the literature in a number of ways. First, to the best of our knowledge, we are the first to provide systematic, large-sample evidence on the impact of the stock exchange movement from NYSE to Nasdaq on the most important market quality indicators, namely liquidity, trading activity, and visibility. As mentioned above, our analysis improves on prior studies by employing an innovative matched pair difference-in-differences method to examine a variety of liquidity measures over different time windows. This approach allows us to obtain robust results and helps reconcile the conflicting findings on liquidity in earlier research. Thus, our study adds to an understanding of the market structure's effect on trading dynamics as well as contributes to the literature on listing location. Furthermore, our study is related to recent research on the role of the business press in financial markets. We show that an important motive of firms' exchange listing switch is to improve their visibility as reflected by greater media coverage and more positive media sentiment. Finally, our research not only adds to the academic literature but also provides relevant implications for practitioners, that is, assisting them in their decision-making process on stock listing location.

The paper proceeds as follows. Section 2 examines the rationales for the firms' decision to switch to Nasdaq. Section 3 describes the data and the construction of liquidity and trading activity proxies with descriptive statistics. Section 4 presents the methodology while Section 5 reports results on the impact of the stock exchange movement on liquidity, trading activity, and the dynamic trading process. Section 6 analyzes the effect of the switch from Nasdaq to NYSE on corporate visibility and the impact of the move in the other direction from NYSE to Nasdaq on liquidity and trading activities. Section 7 concludes.

2. Why Did Firms Switch to Nasdaq?

Nasdaq is often perceived as a technology-centric stock exchange, and that may be one reason why technology firms, and those firms wanting to be perceived as technology firms, may be attracted to the exchange. However, while the first move to Nasdaq by Aeroflex occurred at the height of the internet bubble, subsequent switching did not necessarily correspond with enthusiasm about technology. Indeed, all of the 53 companies that voluntarily moved from the NYSE to Nasdaq from January 2000 to December 2015 are included in our sample but only 10 (18.8%) are classified as technology firms by Nasdaq[4,5]. This suggests that other important reasons for the change in stock exchange listing location may be at work.

To identify those potential reasons, we located news articles about each move between exchanges, and Table 1 presents the reported reasons for the change of exchange listing. For two-thirds (35) of the sample of 53 companies, managers indicated that an improvement in cost efficiencies and liquidity was the reason for their listing move to Nasdaq. The advantage of the Nasdaq trading platform was the second most popular reason for making the switch. The remaining reasons disclosed by firms included Nasdaq being the leading exchange for technology companies, as well as there being higher visibility, and increased trading volume on Nasdaq. In our analysis, we focus on examining the first two reasons, including liquidity and trading activity. In addition, we also analyze whether firm visibility improves following the move to Nasdaq. In the remainder of this section, we first discuss whether the stated motives of the exchange listing switch are supported by the existing literature. We next analyze the moving firms, especially their size relative to those

[4] Source: http://www.nasdaq.com/screening/companies-by-industry.aspx?industry=Technology

[5] Although 59 firms moved voluntarily from NYSE to Nasdaq during this period, six of them are not included in the sample due to data unavailability in the NYSE Trades and Quotes (TAQ) database.

listed on NYSE and Nasdaq before then examining possible factors that may justify their reasons for the move.

<INSERT TABLE 1 HERE>

The expectation of improving liquidity for firms moving to Nasdaq is surprising, as a number of studies using pre-2000 data empirically show that trading costs are lower on NYSE compared to Nasdaq (see Bessembinder and Kaufman (1997), Bessembinder (1999), and Huang and Stoll (1996)). A widely used explanation for this phenomenon is the presence of "preferencing" agreements[6], which hinders competition between Nasdaq market makers and thus increases transaction costs on this market (e.g., Barclay (1997), Bloomfield and O'Hara (1998), Dutta and Madhavan (1997), and Huang and Stoll (1996)). However, the earlier literature also shows that the differentials in average transaction costs between NYSE and Nasdaq are larger for smaller market capitalization firms compared to large firms (Bessembinder and Kaufman (1997)). Importantly, Weston (2000) finds that the difference in NYSE and Nasdaq average spreads diminished after Nasdaq underwent market reforms[7] in 1997. Since then, the trading environment has altered significantly with the advent of high-frequency trading (HFT), which may further eradicate the pre-2000 differentials in average spreads across these two stock markets. Thus, it is possible that for our sample period post-

[6] A preferencing agreement refers to the situation where order flow is routed to market makers based on a pre-negotiated arrangement rather than market makers displaying the best quotes. This may result in a lack of competition on the Nasdaq market.

[7] In 1997, Nasdaq introduced the new Order-Handling Rules, the Sixteenths Minimum Increment Rule, and the Actual Size Rule. These reforms aimed at reducing transaction costs and promoting competition without having adverse effects on market quality. See United States Securities and Exchange Commission (1996) for more details.

2000, any disadvantages of an increase in trading costs on Nasdaq may not be significant, especially if the moving firms are relatively large.

To evaluate the above conjecture, we analyze the relative size of the moving stocks on NYSE and Nasdaq. Figure 1 illustrates the mean and median size of the 53 firms moving to Nasdaq in comparison with all NYSE-listed and all Nasdaq-listed companies over the 15-year period[8]. For each stock, we calculate the time-series average market capitalization over the 15-year period before estimating cross-sectional means and medians for each of three samples: a sample of 53 firms, a sample of all NYSE-listed stocks, and a sample of all Nasdaq-listed stocks. Interestingly, the 53 firms switching from NYSE to Nasdaq have an average market capitalization of $8.27 billion, which is higher than the average of all NYSE-listed stocks ($5.49 billion) and approximately eight times larger than that of all Nasdaq-listed issues ($1.28 billion). The comparison of median market capitalization across these three samples presents the same story. The median value of the moving firms is $3.24 billion, larger than the median values of NYSE-listed and Nasdaq-listed firms. These values indicate that the moving firms are not small firms compared to others in NYSE and are also relatively large after moving to Nasdaq. Taken together, our analysis suggests that the moving firms are likely to become significant members on Nasdaq in terms of market capitalization. Hence, consistent with our conjecture, the potential higher transaction costs on this market might be minimized or even disappear given that the moves occurred from 2000 onward, after the 1997 Nasdaq reforms. However, this evidence does not necessarily imply that firms would experience lower trading costs and higher liquidity after their switch to Nasdaq.

[8] Note that the mean market capitalization in Figure 1 is slightly higher than that reported in Tables 2 and 3 since this figure presents the market value statistics over the 15-year period while the reported values in Tables 2 and 3 are estimated based on 120 days surrounding the movement dates.

<INSERT FIGURE 1 HERE >

In light of prior research and our preliminary analysis above, we contend that there are at least two possible factors that may justify the publicly declared reasons for the move to Nasdaq. First, the expectation of firm managers' regarding improved liquidity after moving to Nasdaq may reflect managerial overconfidence. Managers may interpret their company's relatively large size as being even more prominent after a move to a smaller exchange such as Nasdaq. Managers may believe that they can capitalize on the relative position and improve the company's position even further. A managerial decision to move the firm so that it is more important and relatively larger may provide benefits to the managers, but this may not necessarily translate to tangible financial benefits despite how the move is justified publicly. This type of behavior can loosely be regarded as exhibiting overconfidence, and the literature has identified that managerial overconfidence (aka hubris) plays an important role in explaining corporate decisions such as investment, mergers and acquisitions and financing (see Malmendier and Tate (2005), Malmendier and Tate (2008), and Malmendier, Tate, and Yan (2011)). Thus, management behavior may be an important underlying factor explaining the change in the stock listing venue, and therefore stated public claims for the exchange move should be carefully investigated.

The second factor relates to other important benefits in moving firms from NYSE to Nasdaq, including more active trading activity and improved corporate visibility, as the firms are relatively larger firms on Nasdaq compared to their peers remaining on NYSE. Specifically, larger stocks tend to be more actively traded than smaller stocks (e.g., see James and Edmister (1983) and Lo and Wang (2000)). There are two reasons why visibility may improve for firms moving to Nasdaq. First, technology firms are more concentrated on Nasdaq, and being associated with 'tech' firms attracts investor interest. For example, Cooper, Dimitrov, and Rau (2001) identify the ‘dotcom’ effect, where firms with name changes to internet-related dotcoms produce abnormal returns simply due to the perception that the companies are more technology-focused. With the bulk of technology firms trading on Nasdaq, moving to Nasdaq may improve the visibility and perception of the company. Second, smaller-sized companies are more typical on Nasdaq, and therefore companies that move there face less competition for investor attention, and hence have more visibility.

3. Data and Variable Construction

In this section we describe the data, the sample selection procedure to identify the companies that move exchanges, and the process for matching firms and constructing stock liquidity and trading activity measures. Section 3.1 describes the data source and sample selection. T-test and Wilcoxon median test results are presented in this section to verify the quality of our matching procedure. Section 3.2 constructs various measures of liquidity and trading activity and describes descriptive statistics for the moving and matching samples.

3.1 Data sample

All intraday trades and quotes between 9:30am and 4:00pm are obtained from the NYSE Trades and Quotes (TAQ) database. The data filter process follows Bessembinder (1999). The national best bid and ask quotes prevailing the second prior to the trade are used to estimate intraday market quality measurements. A panel data analysis method with an event study approach is used for the long-term analysis with 120-day windows surrounding the moving dates, while a similar approach using different time windows is used for the short-term analysis.

A matched control sample of stocks is selected where the matched stock remained listed on NYSE. Davies and Kim (2009) show that the best matching practice for NYSE stocks to test for the difference in transaction costs is to match firms one-to-one without replacement based on market capitalization and stock prices[9]. In order to select the match, a distance metric DD is estimated as follows:

$$DD_{Ai} = \frac{\left|MarketCap_{Ai} - MarketCap_{Aj}\right|}{\left|MarketCap_{Ai} + MarketCap_{Aj}\right|} + \frac{\left|P_{Ai} - P_{Aj}\right|}{\left|P_{Ai} + P_{Aj}\right|},$$

where $MarketCap_{Ai}$ is the market capitalization of stock i listed in the exchange A; P_{Ai} is the closing trade price of stock i listed in the exchange *A*; and *A* is the original stock exchange of stock i, which is NYSE in this study.

Each sample stock i is matched with a non-movement stock j that is listed on the same exchange *A*, and has the smallest distance DD_{Ai} measure. The distance measure is calculated based on market value and stock price at the beginning of the sample period as at December 2007, following Davies and Kim (2009) and Beber and Pagano (2013). For each moving and matched stock, we obtain all trade and quote information from the NYSE TAQ dataset. The market quality estimation dataset is matched with market capitalization data obtained from the Centre for Research in Security Prices (CRSP) daily dataset.

Table 2 reports the success of the matching procedure by reporting the mean and median of market capitalization and share price for the firms that switched listing exchange and their matched stocks that remained on the NYSE. There is no statistical difference

[9] There is a conventional belief that matched firms should be in the same industry as the moving firms. However, Davies and Kim (2009) find that pre-sorting by industry may reduce test power for differences in transaction costs, and that at best, it has little effect. In this study, we implement the analysis using the one-to-one nearest-neighbor matching, both with and without industry matching in addition to the market value and stock price for each stock. We report analysis without restricting firms to the same industry. Nevertheless, the results using industry matching are qualitatively similar and available upon request.

between the two samples when examining market capitalization, stock price, and the number of shares outstanding.

<INSERT TABLE 2 HERE >

3.2 Measures of liquidity and trading activity

We use a variety of measures to characterize trading. Effective spreads are used to measure transaction costs. These are an illiquidity proxy, where a larger effective spread indicates higher execution costs and therefore lower liquidity. Using intraday data we calculate round-trip dollar and percentage effective spreads as follows:

$$EffectiveSpread_{it} = 2\left|P_{it} - M_{it}\right|,$$

$$RelativeEffectiveSpread_{it} = EffectiveSpread_{it} / M_{it},$$

where for stock i at time t, $EffectiveSpread_{it}$ is the dollar effective spread, $RelativeEffectiveSpread_{it}$ is the relative effective spread, P_{it} is the trade price of stock *i* at time *t*, and M_{it} is the quote midpoint prevailing at the time of the trade.

We also decompose effective spreads into two components: realized spreads and the permanent price impact of trades. The first component measures revenue earned by the liquidity providers for facilitating a trade and is estimated as follows:

$$RealizedSpread_{it} = 2\left|P_{it} - M_{it+5\min}\right|,$$

$$RelativeRealizedSpread_{it} = RealizedSpread_{it} / M_{it},$$

where for each stock i at time t, $RealizedSpread_{it}$ is the five-minute realized dollar spread, $RelativeRealizedSpread_{it}$ is the relative five-minute realized spread, and $M_{it+5\min}$ is the midquote price prevailing five minutes following the trade.

The second component of effective spreads, the price impact of trades, measures the subsequent price change following a transaction:

$$PriceImpact_{it} = EffectiveSpread_{it} - RealizedSpread_{it},$$

$$RelativePriceImpact_{it} = PriceImpact_{it} / M_{it},$$

where for stock i at time t, $PriceImpact_{it}$ is the dollar five-minute price impact of trade, and $RelativePriceImpact_{it}$ is the relative five-minute price impact.

We calculate a single observation for each metric for each trading day. For effective spreads, realized spreads, and price impact measures, we calculate the trade value-weighted average effective spreads, realized spreads, and the price impact of trades on all trades[10], respectively. Trading activity is measured by daily trading volume for each stock-day ($DDVol$), which is the total number of shares traded in the day for each stock (e.g., see Chordia, Roll, and Subrahmanyam (2001)). Intraday volatility ($Volatility$) is calculated following Boehmer, Jones, and Zhang (2013), using the proportional intraday range as follows:

$$Volatility_{it} = \left(P_{it}^{\max} - P_{it}^{\min}\right) / VWAP_{it},$$

[10] In a robustness check, we also estimate volume-weighted effective spreads, realized spreads, and price impact of trades. The results are similar to those presented in this paper and are available upon request.

where $P_{it}^{\max}$, $P_{it}^{\min}$, and $VWAP_{it}$ are the highest trade price, lowest trade price, and the volume-weighted average trade price of stock i in day t, respectively.

Table 3 reports summary statistics of sample and matching firms. For each sample stock and its matched stock, a daily time-series average of trading activity and market quality is calculated over the period of January 2000 – December 2015, then cross-sectional means are derived for each proxy for each stock, giving one observation for each firm before and one observation after the specific date of the exchange listing move. This procedure ensures that no artificial statistical significance is created with a larger number of observations.

<INSERT TABLE 3 HERE >

Table 3 shows that the firms that moved to Nasdaq have a higher number of trades, higher trading volume, higher trading value, and lower standard deviations than their matched firms that remained on the NYSE. The minimum and maximum trading volume of the moving firms is about 11,000 and 27 million shares, respectively, while the range for these variables for the matching stocks is from about 11,000 to 28 million shares. The market quality proxies report the opposite comparable level of liquidity, with effective spreads, realized spreads, and trade price impacts of much higher magnitudes and larger standard deviations for the firms that moved to Nasdaq compared to their matching stocks. These broad differences indicate that the liquidity and firm characteristics do vary between the two samples of stocks. In order to ensure that endogenous stock characteristics are not driving these results we refine the testing further.

4. Methodology

Our main innovation compared to past research is the use of matching stocks. Earlier research compared the liquidity of the stocks that moved exchanges using two periods – before and after the move – so each stock was matched with itself. Thus, the reported changes in liquidity in the earlier literature may be a consequence of macroeconomic events that might affect all stocks, and not be related to the exchange listing move. Using a control sample of matched stocks, we control for market-wide effects over the period. A pairwise difference in each liquidity proxy is constructed by measuring the liquidity proxy of each stock that moves listing location less its matched stock on each trading day. A univariate analysis is deployed using both a parametric t-test and a non-parametric Wilcoxon signed-rank test to examine whether there are any changes in means and medians of the pairwise differences in the proxies after the exchange listing move.

Importantly, a multivariate analysis is used with a difference-in-difference approach to control for potential determinants of changes in the investigated measures. We follow Boehmer et al. (2013) to estimate the following fixed-effect model:

$$Y_{it} = \alpha_i + \beta D_{it} + \gamma X_{it} + \varepsilon_{it}, \quad (1)$$

where for a matched pair of a moving stock i in day t, Y_{it} is the liquidity measure for the moving firm's shares less the measure of the same proxy for the matched company's shares. α_t is a day-specific effect for day t. D_{it} is an indicator variable set equal to zero before the stock exchange listing move and equal to one after the move for stock i and its matched stock on day t. X_{it} is a set of pairwise differences between the moving stocks and their matched stocks for the following control variables: daily volume $DDVol$, market capitalization $MarketCap$, price volatility $Volatility$, and daily volume-weighted average share price $VWAP$. The daily volume as a control variable will be dropped in the regressions when this measure is used as the dependent variable.

The matched pair difference-in-differences estimation allows us to capture any market-wide changes potentially affecting the liquidity measures, which may be attributed to the movement between exchanges. Following Boehmer et al. (2013), we use matched pair fixed effect panel regressions to eliminate any differences between two stocks in a pair during the pre-movement period as well as to control for unobserved firm characteristics that may affect liquidity. As a robustness check, we also apply time-fixed effects models and the results are qualitatively similar, so we present the estimation results of the matched pair fixed effect models in the paper. The control variables are designed to take into account time-variation in the matching variables and any potential effects due to volatility or stock price levels documented in the literature. Using this matched-sample fixed effect methodology with control variables removes most of the correlation across observations (see Boehmer et al. (2013)). Statistical inference is conducted using the date clustered standard errors, which are robust to both heteroscedasticity and within-cluster correlation.

5. Result Analysis

This section presents the empirical results investigating the impact of stock exchange listing movement from NYSE to Nasdaq on liquidity and trading activity of the moving firms in relation to their matching firms. Section 5.1 reports the long-term effects while section 5.2 reports the short-term impacts of the move. Section 5.3 investigates dynamic liquidity and trading activity effects.

5.1 Long-term effects on liquidity and trading activity

Table 4 reports the changes in means and medians of pairwise differences in daily trading volume, effective spreads, realized spreads, and price impact in dollar and basis points scaled by daily trade value. The exchange listing move date of each sample stock is defined as day 0. The pre-period is from day −60 to day −1. The post-period is from day +1 to day +60. Difference is the change in means and medians from the pre-period to the post-period in columns 3 and 7, respectively.

<INSERT TABLE 4 HERE>

The table shows that the average matched pair difference in the relative effective spread significantly increases by 12.3 basis points (bps) in the post-period compared to the pre-period. The median test confirms a statistically significant increase of 1.32 basis points. This finding suggests that the companies that move exchange listing from NYSE to Nasdaq incur higher transaction costs after switching. The mean and median differences reflect a wide dispersion in effects, suggesting the distribution in effects may be highly skewed with some very large increases affecting the mean.

The mean relative realized spread differential also experiences a statistically significant change after the exchange listing move, increasing by 11.2 basis points. The median of the pairwise difference in relative realized spreads increases by 1.6 basis points and is statistically significant. These findings imply higher revenue for liquidity providers after the stock moves to Nasdaq. A significant increase in the pairwise difference in the mean trading volume is identified between the two periods in this long-term testing even though the median does not significantly change. One explanation is that the control variables are not included when performing this pairwise comparison, and stock characteristics may be affected by control variables subsequent to the move. We use control variables in the next multivariate analysis.

Overall, the results from our univariate analysis suggest that moving from NYSE to Nasdaq reduces the liquidity of the moving companies compared with their matching stocks listed in NYSE in the same period, which is reflected by a higher relative effective and realized spread, indicating most stocks had a reduction in liquidity[11]. Some evidence of higher trading volume as a result of the move is documented in the long-term.

Table 5 reports the results of the difference-in-differences regression of each liquidity measure. The matched pair fixed-effect dummy variables are omitted in the table to save space. Consistent with the mean results in the univariate analysis reported in Table 4, the coefficients on the exchange switch indicator *D* show that the relative effective spread and the realized spread both increase significantly after the stock exchange switch. In particular, the stock movement increases the average pairwise differences in transaction costs of the moving firms by 11.9 basis points. The liquidity providers of the moving stocks earn 9.41 basis points more in trading revenue than those of the matching firms. The average pairwise differences in dollar effective spread and dollar realized spread also see a statistically significant rise of $0.160 and $0.149, respectively, in the post-period. The price impact of trades does not show a statistically significant change before and after the listing venue movement. Nor is the change in relative measure statistically significant. Taken together, the results suggest that there are higher liquidity costs for stocks that move to Nasdaq, leading to increased trading profits for the traders that provide liquidity for these stocks, while the price impact of trades is not affected by the change.

[11] We separately examine moving stocks and matching stocks and confirm that there are significant changes in the matching stocks between the periods, requiring this pairwise approach to understand the relative change for stocks that move from NYSE to Nasdaq. Separate results for each of these groups of stocks are available upon request.

<INSERT TABLE 5 HERE>

The last row of Table 5 shows that the change in listing location increases the average daily shares traded by 75.5 shares compared to matching stocks over the same period. Overall, the results are consistent with the univariate analysis, which suggests that in the long term, companies that move to Nasdaq suffer higher trading costs due to lower competition between the liquidity providers for these stocks after the move. This expense is a trade-off to the higher reported trading volume after the move.

A word of caution is in order. The higher reported trading volume reported on Nasdaq may be related to the well-known Nasdaq volume double-counting first identified in the 1990s. Double-counting occurs when an intermediary is involved on both sides of a trade, such that a transaction between two parties may be recorded twice. On NYSE the specialist links both sides of a trade, whereas on Nasdaq two separate dealers handle each side of a transaction. This market structure makes it appear as if Nasdaq has a higher amount of trading. The proportion of trades handled by NYSE specialists has been declining recently as more automated trading on NYSE and elsewhere has become popular. Anderson and Dyl (2005) examine firms that switched from Nasdaq to NYSE between 1997 and 2002 and find that their median volume dropped by about 37%, which is less than in the earlier periods but still indicates that there is a change in the volume level, which they attribute to double-counting. Even though there may be no economic difference, the reported volume may be overstated on Nasdaq.

5.2 Short-term effects on liquidity and trading activity

We examine the short-term liquidity and trading activity impacts of the listing location changes using five-trading-day windows around the date of the exchange listing move [12]. The moving date of each stock is defined as trading day 0. The pre-period is from trading day −5 to trading day −1. Two consecutive five-trading-day windows following the moving dates are considered to observe the dynamic changes in liquidity and trading activity toward the long-term effect. Post-period 1 is from trading day +1 to trading day +5. Post-period 2 is from trading day +6 to trading day +10. Table 6 reports the change in means and medians of daily trading volume, effective spreads, realized spreads, and price impact in dollar and basis points scaled by daily trade value by comparing the moving stocks and the control stocks.

<INSERT TABLE 6 HERE>

The difference in the average pairwise differences in relative effective spreads between the pre-period and the first post period is 24.6 basis points (Panel A), reducing to a difference of 18 basis points between the pre-period and the second post-period (Panel B). The increases in the medians from the pre-period to both post periods are also statistically significant. The dollar effective spread pairwise differential also demonstrates an increase between the per-period and both of the post-periods. The pairwise difference in the relative realized spread increases statistically significantly in the first post-period but there is no statistical difference between the pre-period and the second post-period. This suggests that

[12] We use +/- 5 to +/- 10 trading day windows for the short-run analysis. The results are statistically similar, showing that our results are not driven by the time window selections.

while there may be an initial reaction, there is no statistical difference in this liquidity measure after the initial period.

Generally, the univariate analysis shows that the companies that move to Nasdaq have to pay higher transaction costs in the short term and tend to also pay more in the longer term. There is evidence of a short-term reduction in competition between liquidity suppliers for the stocks that move to Nasdaq initially, although this effect is not statistically significant in the subsequent short-term period. The change in listing location does not help these companies to increase trading volume in the short term, although no control variables are used in the univariate analysis, and regression analysis with a difference-in-differences approach may provide additional insight.

Table 7 reports short term difference-in-differences regression results using a set of control variables. Overall, the results are consistent with the univariate analysis. The coefficients on the movement dummy *D* are 197.12 and 18.34 for the dollar and relative effective spreads, respectively; both are statistically significant at the 1% level. These estimates indicate that the effective cost of trading increases when the exchange listing moves to Nasdaq. The coefficient on the movement indicator variables in the regression of relative realized spreads is 13.19 and is statistically significant, implying that for stocks that move exchange listing to Nasdaq there is an increase in the short-term trading profits of liquidity suppliers of those stocks. Similarly, there are no short-term effects on trading volume, verifying the earlier univariate results.

<INSERT TABLE 7 HERE>

5.3 Dynamic liquidity and trading activity effects

The previous sections show that, as stocks move from the NYSE to Nasdaq, there is no improvement in trading volume in the short-term but over the long-term there is an increase in the number of shares traded. Meanwhile, effective spreads and realized spreads increase over both the short-term and long-term after the stock exchange switch. Such differences in the short-term and long-term effects on liquidity and trading activity warrant a further investigation of the dynamic patterns of those effects.

To examine the dynamics of the liquidity and trading effects and also to identify any changes in the patterns of those effects over time, we follow the extant literature (e.g., Acharya, Baghai, and Subramanian (2014) and Serfling (2016)), and regress various liquidity proxies and trading activities on the control variables stated in the regression equation (1) and dummy variables indicating the trading subperiod relative to the date of the stock listing move. We split the 60-day post-move period into non-overlapping 10-day, 15-day, 20-day, and 30-day post-period windows and respectively create six, four, three, and two post-period dummy variables. Since the regression results over the different windows show a similar pattern, we only report the estimations and the graphical analysis of the 10-day post-period windows[13]. We implement a matched pair fixed-effect multivariate analysis with a difference-in-differences approach to control for the determinants of changes in the investigated measures as follows:

$$Y_{it} = \alpha_i + \sum_{j=1}^{n} \beta_j \, postperiod_{it}^{j} + \gamma X_{it} + \varepsilon_{it}, \tag{2}$$

where for a matched pair of a moving stock i in day t, Y_{it} is the liquidity or trading volume measure for the moving firm's shares less the measure of the same proxy for the matched

[13] The results for other window lengths are available upon request.

company's shares. α_i is the matched pair specific effect for day t . n is the number of distinct, non-overlapping 10-day, 15-day, 20-day, and 30-day post-period windows; by definition, n equals six, four, three, and two, respectively. For the 10-day post-period window, the first post-period variable $Postperiod_{it}^{1}$ is set to 1 for the +1 to +10 trading days after the event day when firm i moved, and equal to zero otherwise for stock i and its matched stock. X_{it} is a set of pairwise differences between the moving stocks and their matched stocks for the following control variables: daily volume ($DDVol$), market capitalization ($MarketCap$), price volatility ($Volatility$), and daily volume-weighted average share price ($VWAP$). The daily volume as a control variable will be dropped in the regressions when this measure is used as the dependent variable.

The regression results using six 10-day post-period windows are reported in Panel A of Table 8[14]. T-statistics are presented in parentheses. These statistics are based on robust standard errors adjusted for heteroskedasticity and clustered by date. We also perform t-tests to examine whether the differences in the estimated coefficients on the post-period window pair for each liquidity and trading activity proxy are statistically significant. Panel B, Table 8 reports the t-test results of differences in the estimated coefficients between post-period window 1 and the subsequent post-period windows, which reflect the dynamic changes in these market quality measures.

<INSERT TABLE 8 HERE>

Panel A of Table 8 shows that there is no immediate change in trading volume when the stocks move to Nasdaq, but after the first 10-day post-period window, the change in each

[14] We do not report the coefficient estimates of the control variables to save space.

of the next five post-period windows is statistically significant. Specifically, trading volume increases quite significantly in post-period 2, as shown by the relatively large coefficient on post-period 2. The coefficients for post-periods 3, 4, 5, and 6 are also significant and higher than that for post-period 1 but are not significantly different from that for post-period 2[15]. Looking at the effective spreads and realized spreads, the change in these measures is significant and highest in magnitude in the first post-period, immediately after the stock exchange movement, and becomes smaller in the subsequent post-periods. These results show that there are no statistically significant changes in the liquidity measures from post-period 2 to the subsequent post-periods. While liquidity deteriorates immediately after the stock switch, it seems to improve after trading day +20 (i.e., post-period 2). This pattern is consistent with the dynamics of trading volume, which experiences no significant change immediately after the movement but sees an improvement afterwards, especially between +10 and +20 days.

Figures 2 and 3 present graphical analysis of the effects of the stock exchange switch on trading volume and liquidity, respectively. The y-axis plots the estimated coefficient on the indicator capturing the effect for the post-period of interest in the regression of relevant trading volume or liquidity proxies. The x-axis shows the time relative to the stock exchange movement for +10 trading day increments, i.e., the different post-period windows. The dashed lines correspond to the 90% confidence intervals of the coefficient estimates; these confidence intervals are estimated from standard errors clustered by date. Figure 2 confirms the multivariate analysis and shows that the increase in trading volume is largest between trading days +10 and +20, before levelling off between days +20 and +40 and slightly decreasing after trading day +60. Figure 3 reveals that both the relative effective spreads and

[15] The results of the t-tests examining the differences between post-period 2 and subsequent post-periods are available upon request.

relative realized spreads experience an increase in the post-move period[16]. However, the magnitude of this increase is largest between the moving day and trading day +10, becomes smaller between trading days +10 and +50, and increases strongly again after trading day +50.

6. Additional Analysis

This section analyzes the effects of stock exchange listing movement from NYSE to Nasdaq on the visibility of the moving firms in relation to their matching firms. Section 6.1 describes the media coverage sample, explains how visibility proxies are constructed, and reports the empirical results investigating visibility measures. Section 6.2 reports the dynamic liquidity and trading activity changes for firms moving in the other direction from Nasdaq to NYSE during the same period to provide a robustness check for the findings in Section 5.

6.1 Effects on stock visibility

6.1.1 Media coverage sample and variable construction

Since firm visibility was stated as a motive for a firm to move from the NYSE to Nasdaq, we next examine the amount of media coverage that the firm receives before and after the move. We obtain data on the news coverage of the moving stock and matched stocks during the period from 60 days before to 60 days after the stock switch. News data are from RavenPack News Analytics, a leading global news database used in quantitative and algorithmic trading, which has recently been used in finance research (e.g., Dai, Parwada, and Zhang (2015), Dang, Moshirian, and Zhang (2015), and Kolasinski, Reed, and Ringgenberg

[16] Since our sample includes a wide range of stocks, the relative measures of spreads are more accurate than the absolute measures due to their comparability between stocks. Thus, we present the graphs for the two relative, not absolute, spread measures.

(2013)). We match the CRSP data with RavenPack data using CUSIP, NCUSIP, and TICKER over the period January 2000 to December 2016.

We use the event sentiment score (ESS) and the number of articles estimated by RavenPack News Analytics as proxies for media tone and media intensity, respectively. The former score, ESS, indicates the firm-specific news sentiment for each firm on a daily basis as a numerical score between 0 and 100 rated by experts with extensive experience and backgrounds in finance, economics, and linguistics. An ESS score of 50 indicates neutral sentiment while a score above 50 indicates positive sentiment and an ESS score below 50 suggests negative sentiment. RavenPack also calculates a 'relevance' score with a range value between 0 and 100, which indicates how related the firm is to the underlying news story. A higher value of the relevance score indicates greater relevance. Following the literature, our sample includes only news with a relevance score of 100, which means the firm was prominent in the news story (e.g., see Dai et al. (2015) and Dang et al. (2015)). We obtain the data for both the moving and matching firms to estimate visibility proxies.

Following the literature, we construct two measures of media coverage, *media breath* and *media tone*, as follows:

$$MediaBreath_{it} = \log(1 + Narticles_{it}),$$

$$MediaTone_{it} = \frac{ESS_{it} - 50}{50},$$

where $Narticles_{it}$ is the number of articles published about firm *i* in day *t*. *MediaBreath* is an indicator of media intensity. A higher value of *MediaBreath* implies that the firm attracted more media attention. *MediaTone* is the scaled ESS value ranging between −1 and 1, with negative, positive and zero values indicating negative, positive and neutral tone (sentiment) of news, respectively. The two media proxies are estimated for each firm moving from NYSE to Nasdaq over the period between 60 days before and 60 days after the move. We also calculate these media measures for the matched firms over the same time windows.

6.1.2 Empirical tests and results

To conduct our tests about firm visibility, we run a difference-in-differences regression in which the dependent variable is the differential of each media coverage measure (i.e., *MediaTone* or *MediaBreath*) between the moving firms and the matching firms. The independent variables are dummy variables indicating the days relative to the moving date from the NYSE to Nasdaq. We create indicators for subperiods up to 60 days after the exchange switch. For example, *Post-period 1* is a dummy variable set to one for the subperiod between +1 to +10 days after the moving date. *Post-period 6* is a dummy variable equal to 1 for the subperiod between +50 to +60 days after the switching date. Since our test window consists of 60 days around the moving date, there are six dummy variables for the post-periods.

The regression model with a matched pair fixed effect approach is as follows:

$$Y_{it} = \alpha_i + \sum_{j=1}^{6} \beta_j \, postperiod_{it}^{j} + \varepsilon_{it}, \tag{3}$$

where Y_{it} is the difference between the media coverage proxy of the moving firm and that of the matching firm for each matched pair of moving stock *i* on day *t*. We also perform a series of t-tests to examine whether the differences in the estimated coefficients on the post-period dummies are statistically significant. Table 9 reports the regression estimations (Panel A) and the t-test results (Panel B) for the two media coverage proxies. The t-statistics are calculated from robust standard errors clustered by date. A positive coefficient estimate represents an improvement in media sentiment or intensity that will attract investors to those stocks and improve the visibility of the stocks to the public.

<INSERT TABLE 9 HERE>

Panel A shows that for *MediaTone*, the coefficients on most of the post-period dummies are significantly positive, indicating that, after the stock exchange switch, the media's sentiment on the moving firms improves in comparison to the matching firms. Specifically, the moving firms experience the largest improvement in media sentiment immediately after the move, as shown by the significant coefficient on *Post-period 1*. The coefficients on post-periods 3 and 6 are smaller than that on the first post-period but remain significantly positive. These results suggest that media sentiment became more positive for the moving firms after they moved to Nasdaq with the largest improvement immediately after the switch. In the regression of *MediaBreath*, the coefficient on post-period 6 is statistically significant and positive while the coefficients on previous post-periods are not significant. This pattern suggests that firms moving to Nasdaq only attract more media attention than their matched firms in NYSE in the medium to long term.

Panel B presents the t-test results regarding the differences between the coefficients on the first post-period indicator and those on the subsequent post-period indicators in the regressions of *MediaTone* and *MediaBreath*. In terms of *MediaTone*, the differences between the coefficients on the dummy variable for post-period 1 and those for the three subsequent post-periods are positive (0.0107, 0.0083 and 0.01, respectively) and statistically significant. This pattern is consistent with the results reported in Panel A, suggesting the media sentiment score of the moving firms significantly increases after the move to Nasdaq, with the highest improvement observed in post-period 1. However, in terms of media intensity, there is no statistically significant change in the coefficients on the post-period indicators across the post-period windows.

Overall, these results suggest that there is a significant improvement in the tone of the media coverage of a moving stock relative to the matching stocks once the company has moved to Nasdaq. The moving firms also seem to attract a higher amount of press attention than the matching firms, although the impact is only observed in the medium to long term after the move. Taken together, the increase in the sentiment and intensity of firm-specific news articles following the stock exchange switches demonstrate an improvement in the stocks' visibility, consistent with our prediction and managers' stated explanations for the move.

6.2 Effects of moving in the opposite direction from Nasdaq to NYSE

As a robustness check for our main findings regarding the impacts on liquidity and trading activities, we examine firms that voluntarily moved in the opposite direction from Nasdaq to NYSE in the same time period of 2000–2015. To the extent that firms moving to Nasdaq experience lower liquidity and higher trading volume, we expect firms moving in the opposite direction to experience higher liquidity and lower trading volume.

Using the CRSP daily database, we identify 196 firms[17] switching from being listed on Nasdaq to being listed on NYSE during the sample period. To examine how liquidity and trading activity of these firms change after the stock exchange switch, we apply the same data filtering process, matching procedure and methodologies as described earlier in Sections 3 and 4 for firms switching from Nasdaq to NYSE. Table A.1 in the Appendix shows the quality of the matching procedure for companies moving from Nasdaq to NYSE and their matches. In Table A.2 in the Appendix, we present the summary statistics of firms switching in this direction and the matching firms over the period of 2000–2015. Interestingly, the

[17] There were 235 firms moving from Nasdaq to NYSE during the period of 2000–2015. However, the final sample size only includes 196 firms due to data unavailability in TAQ.

average market capitalization of firms voluntarily moving from Nasdaq to NYSE is $2.6 billion, which is much smaller than the figure for firms moving in the opposite direction ($6.8 billion, as presented in Table 3). This observation is different from the perception that firms that move from Nasdaq to NYSE are normally large while those switching their listing from NYSE to Nasdaq are likely to be small in terms of market value.

We estimate the difference-in-differences model (1) using the matched pair fixed-effect approach. This method allows us to investigate whether various liquidity measures and trading volume change after the stock listing switch while controlling for other determinants of liquidity and trading volume[18]. The regression results for the long-term and short-term analysis are presented in Tables 10 and 11, respectively.

<INSERT TABLE 10 HERE>

In Table 10, the movement variable indicators are negative and statistically significant in all effective spread and realized spread regressions, indicating lower transaction costs and greater competition between liquidity providers for stocks switching their listing from Nasdaq to NYSE compared to their matches remaining listed in Nasdaq. The price impacts for the moving stocks are significantly higher on NYSE after the move, which is a trade-off against a larger reduction in realized spreads than effective spreads in the long-term. Stocks moving to NYSE experience a significant reduction in trading volume. One reason for the

[18] We also carry out univariate analyses using both parametric t-tests and non-parametric Wilcoxon signed-rank tests for all liquidity proxies and trading volume. The 120-day windows surrounding the movement date are employed to measure the long-term effect. A +/- 5 and +/- 10 trading day windows are used to examine the short-term impact. The (untabulated) results are consistent with the regression results and are available upon request.

decline in trading activity may be that the stocks moving their listing to NYSE are relatively small compared to the large stocks already listed on the exchange.

<INSERT TABLE 11 HERE>

In terms of the short-term effect of moving exchanges, we find a similar impact on various measures of liquidity for stocks moving from Nasdaq to NYSE, which is shown by negative and significant coefficients on the movement dummy variables in Table 11. However, there is no evidence of a significant change in trading volume in the short-term for firms moving from Nasdaq to NYSE.

Overall, these results show that firms moving from Nasdaq to NYSE enjoy significant improvements in liquidity in both the long-term and the short-term. On the other hand, there is a reduction in trading volume in the long-term, although this change is not observable in the short-term. These results for firms moving in the opposite direction to the focus of our study are consistent with our earlier findings that liquidity deteriorates for firms moving from NYSE to Nasdaq, even though reported trading volume and company visibility increase for these firms.

7. Conclusion

We document changes in trading dynamics when firms move from NYSE to Nasdaq. There is an initial and sustained decrease in liquidity as measured by the effective and realized spreads and price impact. However, the liquidity decline is offset in the long term with an increase in reported trading volume and an improvement in media sentiment and intensity, and hence, in corporate visibility.

There are two potential explanations for the long-term increase in trading volume. First, the wider spreads are attractive to liquidity providers that would step in and facilitate increased trading. Perhaps, short-term trading costs are irrelevant for long-term investors and the move to a higher cost market may actually remove more volatile traders while encouraging liquidity providers to enter the market. A second, non-mutually exclusive, explanation centers around the increased visibility of stocks on Nasdaq. The concentration of technology stocks on Nasdaq suggesting moving a stock to Nasdaq may bring attention to the stocks by tech investors. This increase in visibility may be due to the share trading being in the same 'habitat' as related stocks. Barberis, Shleifer, and Wurgler (2005) suggest that once stocks are perceived to be in the same habitat, they are more likely to exhibit comovement. The move to Nasdaq may contribute to these stocks generating more interest from technology investors. Visibility may also increase because these stocks that move to Nasdaq are larger relative to other firms on the new exchange after the exchange switch, hence attracting more media attention in a market of mainly small firms like Nasdaq.

While the increase in trading volume and the improvement in corporate visibility in practice is consistent with the motivations of the move to Nasdaq that are declared in the public announcement of the movement, the deterioration in liquidity on Nasdaq, in reality, contradicts the firm's publicly disclosed objective. These results are robust even when we examine liquidity changes for a set of 196 stocks that moved in the opposite direction (from Nasdaq to NYSE) over the same time period. Perhaps, the market reforms on Nasdaq in 1997 and the different trading environment after 2000 may have played a role in forming the managers' expectation of an improvement in liquidity following the listing move to Nasdaq. Since the average market capitalization of companies moving to Nasdaq is larger than that of the average NYSE-listed firm and is far higher than the average of Nasdaq-listed firms, managers might be overly optimistic that they would be able to improve the company's position by being a large firm on an exchange dominated by small firms.

In summary, understanding the complex market quality measures suggests that CEOs are focused on long-term trading activity and corporate visibility when they undertake to change their company's trading venue. This long-term benefit is consistent with CEOs' explanations for the move, and helps justify the costs incurred. However, the lower liquidity documented after the move to Nasdaq seems inconsistent with firms' publicly disclosed motives, and suggests that management's expectation and behavior may also play a role in determining the stock exchange movement.

Overall, our study reconciles the earlier conflicting findings in liquidity changes with our larger sample size of stocks that moved from NYSE to Nasdaq over a recent 15-year period. We provide evidence about the impact of the decision to move trading venues by empirically documenting some key aspects of stock listings including liquidity, trading activity, and corporate visibility. This study will assist managers in understanding that an exchange move may have short-term and long-term effects on different dimensions of trading.

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Table 1. Self-reported reasons listed companies moved to Nasdaq

This table reports the reasons given for the movement of exchange listing location for 53 companies that moved from the NYSE to Nasdaq in the period 2000–2015. The source of information is press releases and news reports on announcements made by the companies around the time of the change. Note that some companies provided multiple reasons.

	Number of firms	Percentage of sample
Greater cost efficiency, liquidity	35	66.04
Advantages of NASDAQ trading platform	16	30.19
Increased visibility	11	20.75
NASDAQ being the leading exchange for technology companies	10	18.87
NASDAQ being indicative of the innovation	7	13.21
Increased trading volume	1	1.89
Others and None stated	5	9.43

Table 2. Matching statistics for the firms moving from NYSE to Nasdaq and their matches

The table presents a comparison of the 53 firms moving from NYSE to Nasdaq with 53 matched firms during the period of January 2000 – December 2015 using without-replacement matching methods. Matches must be on the same listing exchange as the moving firms before the movement. A distance metric is calculated as the sum of absolute percentage deviation between the non-moving matched candidate and the moving stock in market capitalization and price as of the beginning of the investigated period. The match is the closest non-moving match candidate to the moving stock in terms of the distance metric. We report the mean and median for the moving and matched firms, and provide p-values for the differences between moving and matched firms.

	Means			Statistics		Medians			Statistics	
	Match	Moving	Difference	t	p-value (t-test)	Match	Moving	Difference	z	p-value (Wilcoxon)
Market Capitalization ($ thousands)	6,732,772	6,658,153	-74,619	-0.03	0.97	2,384,877	2,580,167	195,290	0	1
Stock Price	16.82	16.86	0.04	0.02	0.99	12.96	12.58	-0.38	-0.02	0.98
Number of shares outstanding (thousands)	358,755	349,196	-9,559	-0.11	0.91	186,016	184,519	-1,497	0.08	0.94

Table 3. Descriptive statistics for the moving companies and their matches over the period of January 2000–December 2015

The table reports the summary statistics for the firms switching the listing exchange during the period of January 2000–December 2015 and their matched stocks. For each stock, we calculate the time-series average over the investigated period and estimate cross-sectional means for each proxy. Values are provided in US dollar amounts ($) or in basis points (bp).

	Firms NYSE to Nasdaq					Matching Firms on NYSE				
Variables	#Firms	Min	Max	Mean	Std	#Firms	Min	Max	Mean	Std
Number of trades	53	26	14,982	3,314	3,169.6	53	25	10,844	3,221	2,850.9
Daily Trading Volume (shares)	53	11,266	26,933,126	3,900,406	5,263,775	53	11,603	28,355,949	3,472,162	4,991,333
Daily Trading Value ($ million)	53	0.07	424.2	58.4	80.8	53	0.05	539.5	59.5	94.5
Effective Spread ($)	53	77.9	3,624.3	381.1	668.5	53	84.1	910.5	187.5	167.1
Relative Effective Spread (bp)	53	3.1	203.4	30	42.1	53	3	193	23.2	37.4
Realized Spread ($)	53	152	5,494.1	794.8	848	53	111.9	2034.1	632.5	429.3
Relative Realized Spread (bp)	53	13.4	207.8	54.5	41.3	53	11.2	243.9	50.2	42.3
Price Impact ($)	53	-1,841.8	-21.5	-432.4	382.1	53	-1,868.8	79.4	-450.2	434
Relative Price Impact (bp)	53	-74.2	-1.6	-26.4	16.9	53	-99.4	14.3	-27.8	20.5
Average Price	53	2.8	49.2	17.7	12.6	53	1.1	54.7	17.3	13.2
Relative Range-Based Volatility	53	0.01	0.11	0.04	0.02	53	0.01	0.12	0.03	0.02
Market Capitalization ($ billion)	53	0.05	69.7	6.8	11.5	53	0.05	55.4	6.7	10.6

Table 4. Univariate analysis of the pairwise difference in spreads components and trading volume: long-term effect

This table presents the changes in mean and median of daily trading volume, effective spreads, realized spreads and price impact in dollar and basis points scaled by daily trade value. The reported means and medians are the differences in spreads components and trading volume between moving stocks and their matching stocks. The moving date of each moving stock is defined as day 0. The pre-period is from trading day −60 to trading day −1. The post-period is from trading day +1 to +60. Difference is the change in means and medians from the pre-period to the post-period in columns 3 and 7, respectively. The t-tests and Wilcoxon signed rank tests examine whether these differences in the means and medians, respectively, are equal to zero.

	Means				Medians			
Variables	pre-period	post-period	Difference	t-Statistics	pre-period	post-period	Difference	Wilcoxon
Daily Trading Volume (shares)	1,108.7	855,543.5	854,434.8	2.31*	-17,550	23,091.5	40,641.5	104.50
Effective Spread ($1/10000)	115.2	265	149.8	2.28*	1.3	24.9	23.6	549.50***
Relative Effective Spread (bsp)	0.4	12.7	12.3	2.28*	-0.02	1.3	1.32	534.50***
Realized Spread ($1/10000)	84.7	231.6	146.9	2.28*	6.4	10.9	4.5	266.50*
Relative Realized Spread (bsp)	-1.6	9.6	11.2	2.02*	0.3	1.9	1.6	266.50*
Price Impact ($1/10000)	27.9	9.4	-18.5	-0.73	10.6	35.9	25.3	-83.50
Relative Price Impact (bsp)	1.8	1.2	-0.6	-0.34	1.7	3.1	1.4	8.50

* Significant at the 5% level.

** Significant at the 1% level.

*** Significant at the 0.1% level.

Table 5. Multivariate analysis of the pairwise difference in spreads, price impact and trading volume for the moving and matching companies: long-term effects

The table reports the results of the regression of the following fixed effect model:

$$Y_{it} = \alpha_i + \beta D_{it} + \gamma X_{it} + \varepsilon_{it}, \quad (1)$$

where Y_{it} is various market quality proxies and trading activity for the moving firm less the measured quantity of the same proxy for its matched company. α_i is a matched pair fixed effect for matched pair stock i. D_{it} is an indicator variable set equal to zero before the movement and equal to one after movement for stock i and its matched stock on day t . X_{it} is a set of pairwise differences between the moving stocks and their matched stocks for the following control variables: daily volume ($DDVol$), market capitalization ($MarketCap$), price volatility ($Volatility$), and the daily volume-weighted average share price ($VWAP$). Dependent variables include the dollar effective spread, relative effective spread, dollar realized spread, relative realized spread, price impact of trades, relative price impact of trades and daily trading volume. The date of the move from NYSE to Nasdaq is categorized as trading day 0. The pre-period is from trading day −60 to trading day −1. The post-period is from trading day +1 to trading day +60. All of these components of spreads are scaled by trade value. The absolute measure of spreads and price impact are multiplied by 10^4 for presentation purposes. The t-statistics are reported in parentheses.

Dependent Variables	D	DDVol	VWAP	Volatility	MarketCap	Adj R-Square
Dollar Effective Spread	160.10***	-0.05***	64.18***	4,468.18***	-0.29***	0.30
	(6.03)	(-5.1)	(4.44)	(5.98)	(-3.8)	
Relative Effective Spread	11.91***	-0.01***	-0.18	426.14***	-0.00	0.25
	(7.52)	(-5.5)	(-.41)	(5.50)	(-.26)	
Dollar Realized Spread	148.67***	0.01	115.66***	10,343.16***	-0.44***	0.45
	(5.50)	(0.69)	(8.11)	(10.3)	(-5.9)	
Relative Realized Spread	9.41***	-0.00	0.50	1,039.96***	-0.00	0.38
	(5.97)	(-1.0)	(1.15)	(11.7)	(-1.8)	
Price Impact	-9.61	-0.06***	-49.93***	-5,960.54***	0.14***	0.52
	(-.87)	(-4.7)	(-10)	(-9.0)	(5.50)	
Relative Price Impact	0.86	-0.00***	-0.65**	-622.64***	0.00**	0.38
	(0.99)	(-3.6)	(-2.7)	(-13)	(2.63)	
Daily Trading Volume	75.45***		-6.94***	3,405.61***	0.06	0.50
	(7.06)		(-6.6)	(9.17)	(1.80)	

* Significant at the 5% level.
** Significant at the 1% level.
*** Significant at the 0.1% level.

Table 6. Univariate analysis of the pairwise difference in spreads components and trading volume: short-term effects

This table presents the changes in means and medians of daily trading volume, effective spreads, realized spreads and price impact in dollar and basis points scaled by daily trade value. The reported means and medians are the differences in spreads components and trading volume between moving stocks and their matching stocks. The moving date of each moving stock is defined as trading day 0. The pre-period is from trading day −5 to −1. Post-period 1 is from trading day +1 to + 5. Post-period 2 is from trading day + 6 to + 10. Difference is the change in means and medians from the pre-period to Post-period 1 and Post-period 2, and is reported in Panel A and B, respectively. The t-tests and Wilcoxon signed rank tests examine whether these differences in the means and medians, respectively, are equal to zero.

	Means				Medians			
Variables	pre-period	post-period	Difference	t-Statistics	pre-period	post-period	Difference	Wilcoxon
Panel A: pre-period vs post-period 1								
Daily Trading Volume (shares)	208,624	411,212.4	202,588.4	0.66	-17,800	-16,014	1,786	27.50
Effective Spread ($1/10000)	136.7	380.4	243.7	3.10**	-3	24.5	27.5	517.50***
Relative Effective Spread (bsp)	-1.4	23.2	24.6	2.94**	-0.28	2.1	2.38	542.50***
Realized Spread ($1/10000)	192.1	333.9	141.8	1.55	-17.2	49.6	66.8	214.50
Relative Realized Spread (bsp)	-1.3	23.1	24.4	2.23*	-2.2	5.4	7.6	292.50**
Price Impact ($1/10000)	-53.7	24.3	78.1	0.82	17.6	9.3	-8.4	53.50
Relative Price Impact (bsp)	-0.04	-1.3	-1.26	-0.30	2.1	-0.372	-2.505	13.50

(continued on the next page)

	Means				Medians			
Variables	pre-period	post-period	Difference	t-Statistics	pre-period	post-period	Difference	Wilcoxon
Panel B: pre-period vs post-period 2								
Daily Trading Volume (shares)	20,8624	488,626.8	280,002.8	0.72	-17,800	-33,416	-15,616	-18.50
Effective Spread ($1/10000)	136.7	388.3	251.6	2.68**	-3	26.1	29.1	472.50***
Relative Effective Spread (bsp)	-1.4	16.6	18	2.76**	-0.28	1.6	1.88	390.50***
Realized Spread ($1/10000)	192.1	374.1	182	2.51*	-17.2	3	20.2	65.50
Relative Realized Spread (bsp)	-1.3	11.3	12.6	1.67	-2.2	1.3	3.5	104.50
Price Impact ($1/10000)	-53.7	-19.9	33.8	0.72	17.6	22.9	5.3	85.50
Relative Price Impact (bsp)	-0.04	4.1	4.161	0.75	2.1	2.5	0.4	82.50

[*] Significant at the 5% level.
[**] Significant at the 1% level.
[***] Significant at the 0.1% level.

Table 7. Multivariate analysis of the pairwise difference in spreads, price impact and trading volume for the moving and matched companies: short-term effects

The table reports the results of the regression of the following fixed-effect model:

$$Y_{it} = \alpha_i + \beta D_{it} + \gamma X_{it} + \varepsilon_{it}, \quad (1)$$

where Y_{it} is various market quality proxies and trading activity for the moving firm less the measured quantity of the same proxy for its matched company. α_i is a matched pair fixed effect for matched pair stock i. D_{it} is an indicator variable set equal to zero before the movement and equal to one after movement for stock i and its matched stock on day t. X_{it} is a set of pairwise differences between the moving stocks and their matched stocks for the following control variables: daily volume ($DDVol$), market capitalization ($MarketCap$), price volatility ($Volatility$), and the daily volume-weighted average share price ($VWAP$). Dependent variables include the dollar effective spread, relative effective spread, dollar realized spread, relative realized spread, price impact of trades, relative price impact of trades and daily trading volume. The date of the move from NYSE to Nasdaq is categorized as trading day 0. The sample period is from trading day −5 to +10. All of these components of spreads are scaled by trade value. The absolute measure of spreads and price impact are multiplied by 10^4 for presentation purposes. The t - statistics are reported in parentheses.

Dependent Variables	D	DDVol	VWAP	Volatility	MarketCap	Adj R-Square
Dollar Effective Spread	197.12***	-0.11*	-69.41	4855.35**	0.22	0.55
	(5.31)	(-2.3)	(-.81)	(2.59)	(1.00)	
Relative Effective Spread	18.34***	-0.01**	-3.03	502.64***	0.00	0.45
	(5.99)	(-2.8)	(-1.2)	(3.53)	(0.62)	
Dollar Realized Spread	96.47	-0.04	-38.35	13,915.38***	0.13	0.71
	(1.92)	(-.70)	(-.43)	(4.25)	(0.55)	
Relative Realized Spread	13.19***	-0.01	-2.59	1,307.30***	0.00	0.59
	(3.93)	(-1.8)	(-.83)	(7.68)	(0.03)	
Price Impact	83.62*	-0.05	-7.06	-9,230.57**	0.02	0.58
	(2.25)	(-.77)	(-.11)	(-3.1)	(0.15)	
Relative Price Impact	3.97	-0.00	-0.27	-821.93***	0.00	0.53
	(1.66)	(-.28)	(-.11)	(-5.8)	(0.52)	
Daily Trading Volume	9.78		-15.64*	1,559.92***	0.08	0.72
	(0.38)		(-2.5)	(4.00)	(1.37)	

[*] Significant at the 5% level.

[**] Significant at the 1% level.

[***] Significant at the 0.1% level.

Table 8. The dynamics of the liquidity and trading activity effects for stocks moving from NYSE to Nasdaq

The table reports how the stock exchange movement affects the dynamics of liquidity and trading activity. Panel A presents the regression results of the following matched pair fixed-effect model:

$$Y_{it} = \alpha_i + \sum_{j=1}^{6} \beta_j \, postperiod_{it}^{j} + \gamma X_{it} + \varepsilon_{it}, \tag{2}$$

where for a matched pair of a moving stock i in day t, Y_{it} is the liquidity or trading volume measure for the moving firm's shares less the measure of the same proxy for the matched company's shares. α_i is a matched pair-specific effect for stock pair *i*. We split the 60-day post-period into distinct, non-overlapping, 10-day, 15-day, 20-day and 30-day post-period windows, and respectively create six, four, three and two post-period dummy variables. For example, for the first 10-day post-period window, the first post-period variable $Postperiod_{it}^{1}$ is set to 1 for +1 to +10 trading days after the firm i moves, and equal to zero otherwise for stock i and its matched stock. Dependent variables include the dollar effective spread, relative effective spread, dollar realized spread, relative realized spread, price impact of trades, relative price impact of trades and daily trading volume. X_{it} is a set of pairwise differences between the moving stocks and their matched stocks for the control variables, which are defined in Table 7. Panel B includes the t-test results regarding the differences between the estimated coefficients for Post-period 1 and those for subsequent post-periods. The absolute measure of spreads and price impact are multiplied by 10^4 for presentation purposes. The t - statistics are reported in parentheses.

Panel A: Coefficient estimations for regression equation (2)

Dependent Variable	Post period 1	Post period 2	Post period 3	Post period 4	Post period 5	Post period 6	Control Variables	Adj R-Square
Dollar Effective Spread	265.08***	126.93***	126.00***	135.54***	82.37***	222.03	Yes	0.30
	(5.17)	(7.21)	(5.58)	(5.46)	(4.35)	(1.87)	Yes	
Relative Effective Spread	17.57***	10.43***	13.22***	11.49***	6.12**	12.46***	Yes	0.25
	(6.03)	(4.67)	(5.12)	(3.96)	(2.84)	(3.42)	Yes	
Dollar Realized Spread	244.90***	132.75***	82.28**	123.98***	80.16**	225.78*	Yes	0.46
	(4.57)	(5.51)	(3.12)	(4.44)	(2.90)	(1.96)	Yes	
Relative Realized Spread	13.74***	7.46***	9.77***	7.52***	5.58**	12.25***	Yes	0.38
	(4.22)	(3.45)	(3.68)	(3.44)	(2.74)	(3.45)	Yes	
Price Impact	-4.76	-20.81	20.16	-14.80	-18.16	-19.74	Yes	0.52
	(-.18)	(-1.2)	(1.01)	(-.70)	(-.84)	(-1.0)	Yes	
Relative Price Impact	2.79	1.92	1.14	0.50	-0.79	-0.47	Yes	0.38
	(1.49)	(1.28)	(0.63)	(0.31)	(-.61)	(-.29)	Yes	
Daily Trading Volume	25.35	95.33***	93.79***	98.75***	69.06***	70.63***	Yes	0.50
	(1.44)	(4.74)	(3.32)	(5.03)	(3.37)	(4.15)	Yes	

(continued on the next page)

Panel B: Pairwise comparison of post-period dummy coefficients for liquidity and trading activities					
Dependent Variable	Post-period 1 – Post-period 2	Post-period 1 – Post-period 3	Post-period 1 – Post-period 4	Post-period 1 – Post-period 5	Post-period 1 – Post-period 6
Dollar Effective Spread	138.16**	139.09**	129.54*	182.72***	43.05
	(2.69)	(2.60)	(2.38)	(3.42)	(0.34)
Relative Effective Spread	7.14*	4.35	6.08	11.45***	5.11
	(2.23)	(1.25)	(1.62)	(3.59)	(1.20)
Dollar Realized Spread	112.15*	162.62**	120.92*	164.74**	19.12
	(2.01)	(2.85)	(2.09)	(2.79)	(0.15)
Relative Realized Spread	6.28	3.97	6.22	8.16*	1.48
	(1.82)	(1.04)	(1.77)	(2.36)	(0.33)
Price Impact	16.06	-24.92	10.04	13.40	14.98
	(0.52)	(-.79)	(0.31)	(0.40)	(0.47)
Relative Price Impact	0.88	1.66	2.29	3.58	3.26
	(0.39)	(0.66)	(0.98)	(1.68)	(1.40)
Daily Trading Volume	-69.98**	-68.44*	-73.40**	-43.71	-45.28*
	(-2.9)	(-2.1)	(-3.0)	(-1.8)	(-2.1)

[*] Significant at the 5% level.
[**] Significant at the 1% level.
[***] Significant at the 0.1% level.

Table 9. Analysis of the change in media coverage and sentiment following the move to Nasdaq using the pairwise differences of the moving firms and their matches

The table shows whether and how the moving stocks improve visibility following the switch. Panel A presents the regression results of the following matched pair fixed-effect difference-in-difference model:

$$Y_{it} = \alpha_i + \sum_{j=1}^{6} \beta_j \, postperiod_{it}^{j} + \varepsilon_{it}, \tag{3}$$

where Y_{it} is the difference between the media coverage proxy of the moving firm and that of the matching firm for each matched pair of moving stock *i* on day *t*. α_i is a matched pair-specific effect for stock pair *i*. We created six indicators for post-period windows up to 60 days after the exchange switch. For example: the first 10-day post-period window, $Postperiod_{it}^{1}$ is set to 1 for the +1 to +10 trading days after the firm i moves and equal to zero otherwise for stock i and its matched stock. Dependent variables include *MediaTone* and *MediaBreath*. Panel B includes the t-test results for the differences in the estimated coefficients between the post-period 1 and those of subsequent post-periods. The t - statistics are reported in parentheses.

Panel A: Coefficient estimations for regression equation (3)

Dependent Variable	Post period 1	Post period 2	Post period 3	Post period 4	Post period 5	Post period 6	Adj R-Square
Media Tone	0.0095***	-0.0012	0.0060*	0.0012	-0.0005	0.0054**	0.0600
	(4.80)	(-.50)	(2.55)	(0.56)	(-.21)	(2.60)	
Media Breath	0.0778	-0.0671	-0.0214	0.0214	0.0662	0.1758*	0.0800
	(1.01)	(-.96)	(-.26)	(0.26)	(0.83)	(2.34)	

Panel B: Pairwise comparison of post-period dummy coefficients for visibility proxies

Dependent Variable	Post-period 1 - Post-period 2	Post-period 1 - Post-period 3	Post-period 1 - Post-period 4	Post-period 1 - Post-period 5	Post-period 1 - Post-period 6
Media Tone	0.0107***	0.0035	0.0083**	0.0100***	0.0041
	(3.81)	(1.21)	(3.00)	(3.64)	(1.53)
Media Breath	0.1449	0.0992	0.0564	0.0116	-0.0980
	(1.50)	(0.95)	(0.54)	(0.11)	(-.99)

* Significant at the 5% level.
** Significant at the 1% level.
*** Significant at the 0.1% level.

Table 10. Multivariate analysis of the pairwise difference in spreads, price impact and trading volume for the moving firms and their matches: long-term effects (Nasdaq to NYSE movement)

The table reports the results of the regression of the following fixed effect model:

$$Y_{it} = \alpha_i + \beta D_{it} + \gamma X_{it} + \varepsilon_{it}, \quad (1)$$

where Y_{it} is various market quality proxies and trading activity for the moving firm less the measured quantity of the same proxy for its matched company. α_i is a matched pair fixed effect for matched pair stock i. D_{it} is an indicator variable set equal to zero before the movement and equal to one after movement for stock i and its matched stock on day t. X_{it} is a set of pairwise differences between the moving stocks and their matched stocks for the following control variables: daily volume (*DDVol*), market capitalization (*MarketCap*), price volatility (*Volatility*), and the daily volume-weighted average share price (*VWAP*). Dependent variables include the dollar effective spread, relative effective spread, dollar realized spread, relative realized spread, price impact of trades, relative price impact of trades and daily trading volume. The date of the move from Nasdaq to NYSE is categorized as trading day 0. The pre-period is from trading day −60 to trading day −1. The post-period is from trading day +1 to trading day +60. All of these components of spreads are scaled by trade value. The absolute measure of spreads and price impact are multiplied by 10^4 for presentation purposes. The t-statistics are reported in parentheses.

Dependent Variables	D	DDVol	VWAP	Volatility	MarketCap	Adj R-Square
Dollar Effective Spread	-200.92***	-0.03	20.72***	7,365.83***	0.05	0.21
	(-11)	(-.94)	(4.60)	(11.6)	(0.87)	
Relative Effective Spread	-10.93***	-0.00	-0.51***	486.96***	0.00	0.20
	(-12)	(-.57)	(-7.1)	(7.07)	(0.09)	
Dollar Realized Spread	-229.84***	0.02	49.12***	18,565.26***	0.15*	0.38
	(-11)	(0.35)	(10.1)	(17.9)	(2.52)	
Relative Realized Spread	-14.04***	0.00	-0.54***	1,097.99***	0.00	0.30
	(-13)	(0.35)	(-6.8)	(7.76)	(1.22)	
Price Impact	83.15***	-0.06*	-26.86***	-10,035.53***	-0.12**	0.33
	(5.71)	(-2.1)	(-11)	(-11)	(-3.2)	
Relative Price Impact	5.10***	-0.00	0.07	-619.81***	-0.00	0.23
	(7.53)	(-1.3)	(1.59)	(-7.2)	(-1.8)	
Daily Trading Volume	-31.41***		1.39*	1,364.68***	-0.57**	0.44
	(-7.3)		(2.06)	(6.59)	(-3.0)	

* Significant at the 5% level.

** Significant at the 1% level.

*** Significant at the 0.1% level.

Table 11. Multivariate analysis of the pairwise difference in spreads, price impact and trading volume for the moving and matched companies: short-term effects (Nasdaq to NYSE movement)

The table reports the results of the regression of the following fixed-effect model:

$$Y_{it} = \alpha_i + \beta D_{it} + \gamma X_{it} + \varepsilon_{it}, \tag{1}$$

where Y_{it} is various market quality proxies and trading activity for the moving firm less the measured quantity of the same proxy for its matched company. α_i is a matched pair fixed effect for matched pair stock i. D_{it} is an indicator variable set equal to zero before the movement and equal to one after movement for stock i and its matched stock on day t. X_{it} is a set of pairwise differences between the moving stocks and their matched stocks for the following control variables: daily volume (*DDVol*), market capitalization (*MarketCap*), price volatility (*Volatility*), and the daily volume-weighted average share price (*VWAP*). Dependent variables include the dollar effective spread, relative effective spread, dollar realized spread, relative realized spread, price impact of trades, relative price impact of trades and daily trading volume. The date of the move from Nasdaq to NYSE is categorized as trading day 0. The sample period is from trading day −5 to +10. All of these components of spreads are scaled by trade value. The absolute measure of spreads and price impact are multiplied by 10^4 for presentation purposes. The t - statistics are reported in parentheses.

Dependent Variables	D	DDVol	VWAP	Volatility	MarketCap	Adj R-Square
Dollar Effective Spread	-438.83***	-0.06	44.52	11,105.99***	-0.07	0.27
	(-5.8)	(-1.6)	(1.62)	(3.68)	(-.84)	
Relative Effective Spread	-15.27***	-0.00	-0.35	611.98***	-0.00	0.26
	(-5.9)	(-1.7)	(-.48)	(3.83)	(-.73)	
Dollar Realized Spread	-519.82***	0.03	87.77**	21,298.74***	0.05	0.37
	(-6.7)	(0.84)	(3.10)	(7.63)	(0.53)	
Relative Realized Spread	-17.72***	-0.00	0.06	1,103.86***	0.00	0.41
	(-7.5)	(-.81)	(0.09)	(7.25)	(0.10)	
Price Impact	96.44**	-0.08**	-40.33***	-10,573.39***	-0.12*	0.46
	(2.76)	(-3.1)	(-4.1)	(-13)	(-2.0)	
Relative Price Impact	2.93*	-0.00*	-0.30	-508.89***	-0.00	0.37
	(1.97)	(-2.3)	(-1.1)	(-14)	(-1.9)	
Daily Trading Volume	2.67		-5.30	1,456.74***	-1.69*	0.47
	(0.27)		(-1.2)	(6.01)	(-2.2)	

* Significant at the 5% level.
** Significant at the 1% level.
*** Significant at the 0.1% level.

Figure 1: Size of firms moving to Nasdaq versus NYSE-listed and Nasdaq-listed stocks

This figure illustrates the mean and median market capitalization of 53 firms moving to Nasdaq in comparison with all NYSE-listed and all Nasdaq-listed companies over the 2000–2015 period. For each stock, we calculate the time-series average market capitalization over the 15-year period and then estimate cross-sectional means and medians for each of three samples: a sample of 53 firms, a sample of all NYSE-listed stocks and a sample of all Nasdaq-listed stocks. All values are provided in US dollar currency.

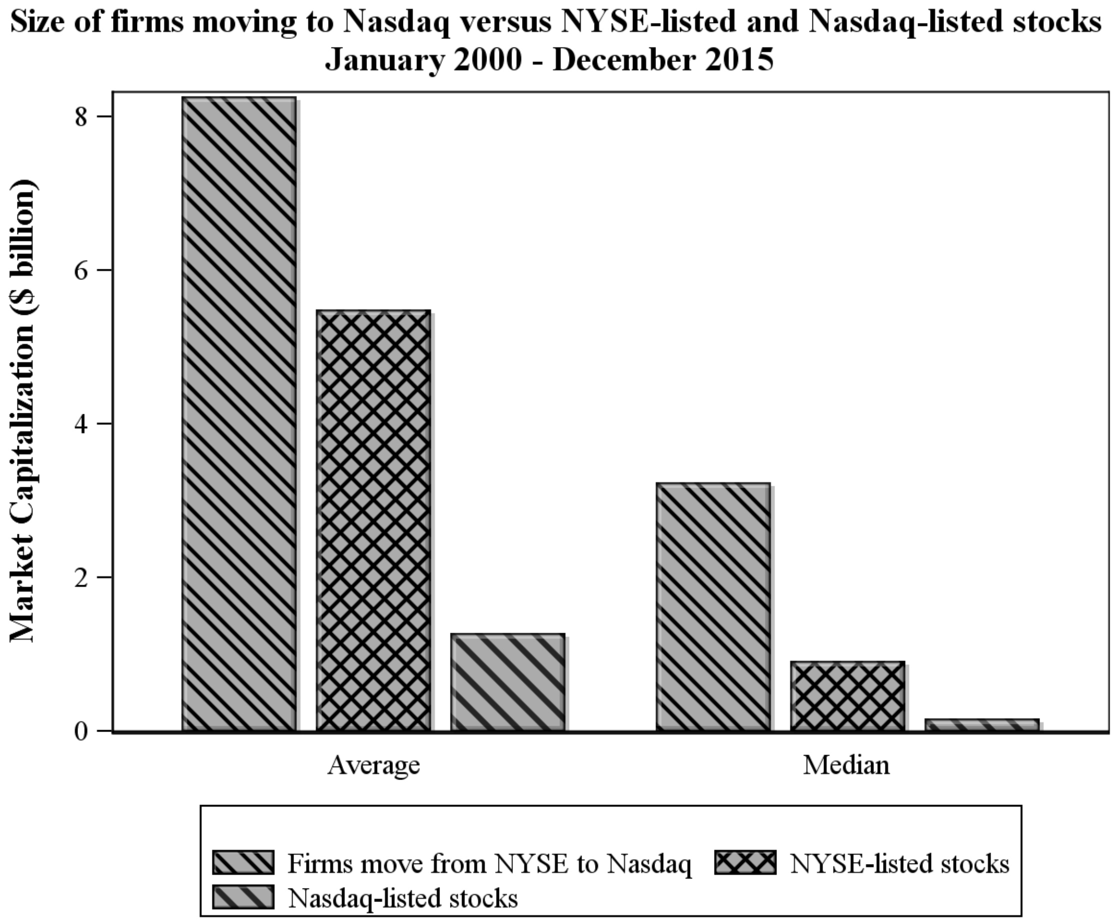


__Figure 2. Effect of the stock exchange switch on trading volume__

This figure shows the effect of the stock exchange switch on trading activity. On the y-axis, the graph plots the coefficient estimates from regressing trading volume on matched pair fixed effects and dummy variables indicating the day relative to the switch. We create six 10-day dummies indicating up to 60 days after the movement. The last variable is set to one for the +1 to +10 trading days after the firm moves, and equal to zero otherwise for the stock and its matched stock. The x-axis shows the time relative to the switch. The dashed lines correspond to the 90% confidence intervals of the coefficient estimates. Confidence intervals are calculated from standard errors clustered by date.

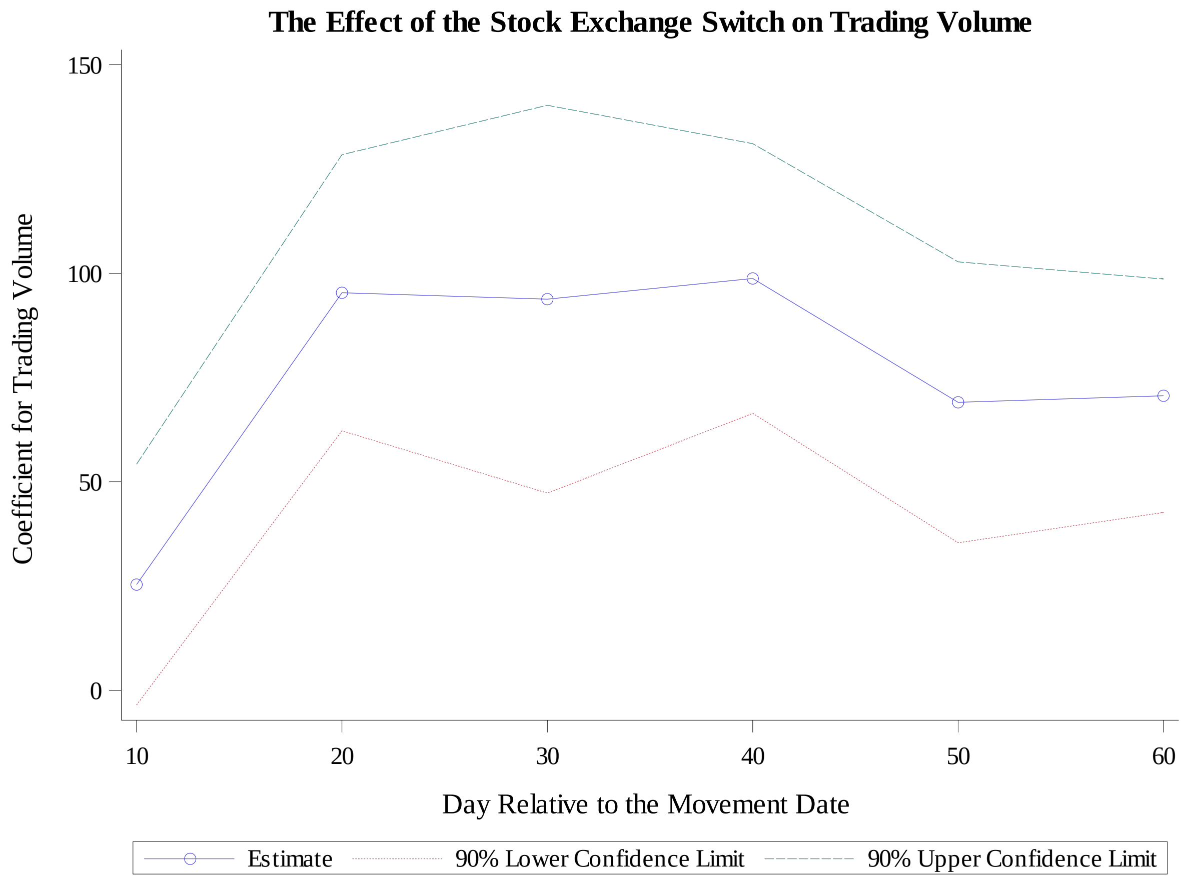
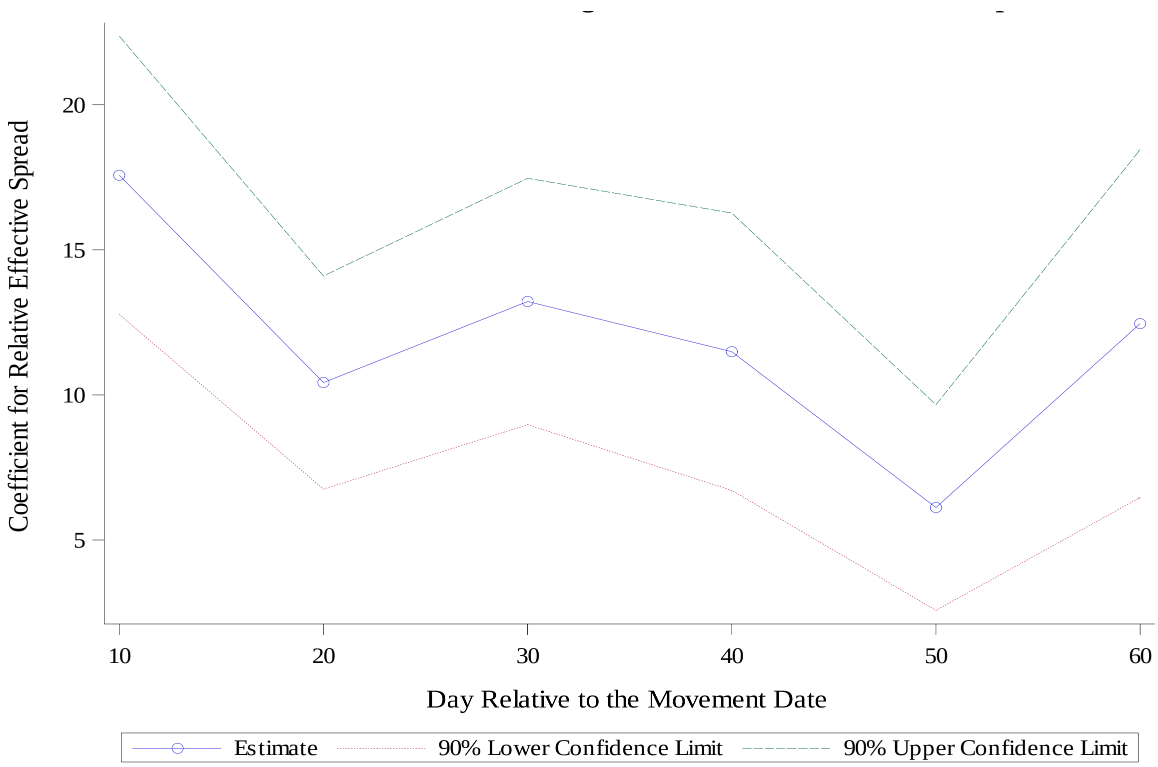


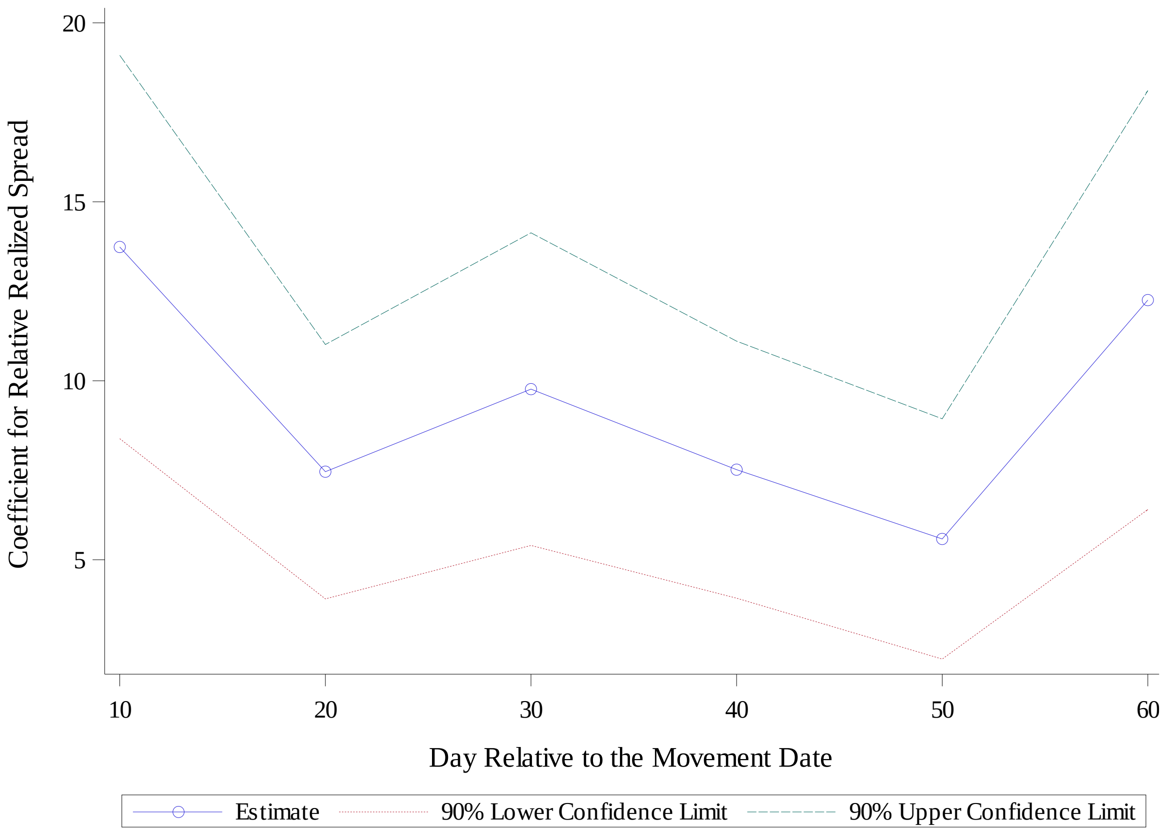
Figure 3. Effect of the stock exchange switch on liquidity

This figure shows the effect of the stock exchange switch on relative effective spreads (Graph A) and relative realized spread (Graph B). On the y-axis, the graph plots the coefficient estimates from regressing the liquidity proxies on matched pair fixed effects and dummy variables indicating the day relative to the switch. We create six 10-day dummies indicating up to 60 days after the movement. The last variable is set to one for the +1 to +10 trading days after the firm moves, and equal to zero otherwise for the stock and its matched stock. The x-axis shows the time relative to the switch. The dashed lines correspond to the 90% confidence intervals of the coefficient estimates. Confidence intervals are calculated from standard errors clustered by date.

Graph A. The effect of the stock exchange switch on relative effective spread



Graph B. The effect of the stock exchange switch on relative realized spread



Appendix

Table A.1. Matching statistics for the firms moving from Nasdaq to NYSE and their matches

The table presents a comparison of the 196 firms moving from Nasdaq to NYSE with 196 matched firms during the period of January 2000 – December 2015 using without-replacement matching methods. A distance metric is calculated as the sum of absolute percentage deviation between the non-moving matched candidate and the moving stock in market capitalization and price as of the beginning of the investigated period. The match is the closest non-moving match candidate to the moving stock in terms of the distance metric. We report the mean and median for the moving and matched firms, and provide p-values for the differences between moving and matched firms.

	Means			Statistics		Medians			Statistics	
	Match	Moving	Difference	t	p-value (t-test)	Match	Moving	Difference	z	p-value (Wilcoxon)
Market Capitalization ($ thousands)	2,977,970	2,517,840	-460,130	-0.31	0.76	769,856	765,196	-4,660	0.03	0.98
Stock Price	26.02	26.03	0.015	0.01	0.99	23.18	23.14	-0.04	-0.08	0.94
Number of shares outstanding (thousands)	118,473	102,089	-16,384	-0.32	0.75	33,704	34,219	515	0	1

Table A.2. Descriptive statistics for companies moving from Nasdaq to NYSE and their matches over the period of January 2000–December 2015

The table reports the summary statistics for the firms switching the listing exchange during the period of January 2000–December 2015 and its matched stocks. For each stock, we calculate the time-series average over the investigated period and then estimate cross-sectional means for each proxy. Values are provided in US dollar amounts ($) or in basis points (bp).

	Firms NASDAQ to NYSE					Matching Firms NASDAQ to NYSE				
Variables	#Firms	Min	Max	Mean	Std	#Firms	Min	Max	Mean	Std
Number of trades	196	3	8,912	933	1,348	196	32	12,647	1,275	1,808
Daily Trading Volume (shares)	196	1,347	23,127,664	813,651	2,343,263	196	8,709	51,369,184	1,277,691	4,424,166
Daily Trading Value ($ million)	196	0.04	752.1	20.3	62.9	196	0.17	1,698.7	31.9	130.6
Effective Spread ($)	196	107.8	5205.9	755	652.9	196	84.1	6890.8	908.4	857.9
Relative Effective Spread (bp)	196	3.6	324.9	35	32.7	196	3.6	278.4	44.2	40.4
Realized Spread ($)	196	199.9	5346.4	1301	820.2	196	151.1	11320.8	1575.5	1259.8
Relative Realized Spread (bp)	196	15.9	451.9	55.7	36.5	196	13.9	285.1	70.8	43.9
Price Impact ($)	196	-3405.7	467.6	-563.2	508.9	196	-5745.6	30.2	-706	686.7
Relative Price Impact (bp)	196	-136.9	19.7	-22.6	14.9	196	-74.1	11	-29.5	16.1
Average Price	196	4.5	120.8	26.1	16.4	196	1.7	132.7	25.6	17.2
Relative Range-Based Volatility	196	0.01	0.09	0.04	0.01	196	0.01	0.12	0.05	0.02
Market Capitalization ($ billion)	196	0.09	152.5	2.6	11.3	196	0.01	277.7	3.2	20.1