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Adverse selection costs for NASDAQ and NYSE after decimalization

Christine X. Jiang [a,1], Jang-Chul Kim [b,*], Robert A. Wood [a,2]

[a] Fogelman College of Business & Economics, University of Memphis, Memphis, TN 38152-3120, United States
[b] Haile/US Bank College of Business, Northern Kentucky University, Highland Heights, KY 41099, United States

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ABSTRACT

NYSE and NASDAQ completed their decimalization on January 29, 2001 and on April 9, 2001 respectively. In this paper, we compare adverse selection component of the bid–ask spread for NASDAQ and NYSE stocks after decimalization using the data from May 2001 and July 2001. We find that the adverse selection component of the bid–ask spread is significantly lower on NASDAQ than on NYSE, and these differences cannot be attributed to the differences in the characteristics of the stocks traded in the two markets. In addition, we find that the adverse selection costs increase with trade size on NYSE, however there is no monotonic pattern observed for NASDAQ stocks. Lastly, we report that although the order flows arrived in the two markets are significantly different, they can at best explain a small portion of the observed differences in adverse selection costs.

1. Introduction

The NYSE (New York Stock Exchange) completed its conversion of minimum tick size to one penny on January 29, 2001 after a five-month testing period. Following the NYSE decimalization, the NASDAQ (National Association of Securities Dealers Automated Quotations) began its first testing period with 14 stocks on March 12, 2001 and its second testing period with 197 stocks on March 26, 2001. All stocks listed on the NASDAQ were converted to the minimum price increment from sixteenth of a dollar to one penny on April 9, 2001.

Many studies have examined the difference in market microstructures between the NYSE and NASDAQ. Christie and Schultz (1994), Huang and Stoll (1996), Bessembinder and Kaufman (1997), Weston (2000), and Chung, Van Ness, and Van Ness (2003) find that the quoted spread and effective spread are higher on NASDAQ than on NYSE. Also Christie and Huang (1994), Christie and Schultz (1994), Barclay (1997), and Jain and Kim (2006) provide evidence that spreads become lower for stocks moved from NASDAQ to NYSE. These studies suggest that NASDAQ has significantly higher transaction costs than that of NYSE.

In addition to a comparison of spreads, Affleck-Graves, Shantaram, and Miller (1994), Lin, Sanger and Booth (1995), and Huang and Stoll (1996) also study components of the bid–ask spread on markets of different structures. In particular, adverse selection costs on NASDAQ and NYSE have been carefully investigated and interestingly, the results suggest that the adverse selection costs are significantly higher on NYSE than on NASDAQ. An exception is the work of Van Ness, Van Ness, and Warr (1999) which suggests that information symmetry is less severe on the NYSE.

Built on prior studies on the impact of tick reduction under different market structures, and recent works on decimalization (Bessembinder, 2003; Chakravarty, Wood, & Van Ness, 2004; Chung et al., 2003), we compare the adverse selection cost on carefully matched samples of NYSE and NASDAQ, aiming to provide additional insight on the impact of decimalization. Decimalization affects the ways traders and dealers are carrying out transactions, and more importantly how informed traders submit orders. Informed traders are known to strategically fragment their orders in order to trade without detection (Barclay & Warner, 1993). Decimalization makes easier and cheaper for informed traders to break-up their large trades and jump in front of other orders. Also, Bacidore, Battalio, and Jennings (2003) and Chakravarty, Wood, and Van Ness (2004) show that the quoted depth has decreased after the reduction in tick size. Both the lower cost of trading and a decrease in quoted depth have the potential to increase the adverse selection cost faced by market makers.

We are interested in examining how decimalization affects the adverse selection costs on NYSE and NASDAQ. Note that we do not attempt to compare the adverse selection cost for a specific stock exchange before and after the decimalization or a tick size change, an important issue studied by Bacidore (2001) and Chakravarty, Van Ness and Van Ness (2003). Furthermore, the cause of the differences in adverse selection costs is also examined to see whether they can be explained by the difference in order flows in the two markets. An NYSE

* Corresponding author. Tel.: +1 513 572 1486.
E-mail addresses: cjiang@memphis.edu (C.X. Jiang), kimj1@nku.edu (J.-C. Kim), rawood@memphis.edu (R.A. Wood).
[1] Tel.: +1 901 678 5315.
[2] Tel.: +1 901 678 2670.

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Research Report (July 26, 2001) states that a higher adverse selection cost observed for NYSE listed stocks is related to many more large trades, likely to be information based, handled by NYSE specialists.

Comparisons of adverse selection costs of the two exchanges are only meaningful if determinants of these variables are carefully controlled for. In this paper, we match each stock on NYSE with stocks listed on NASDAQ based on three matching methods. Consistent with earlier comparison studies (Bessembinder & Kaufman, 1997; Huang & Stoll, 1996; Weston, 2000), the variables considered important in constructing matching samples include price, return volatility, the number of trades, daily dollar trading volume, and market capitalization. Our three matched samples contain 809, 791, and 426 pairs of NASDAQ and NYSE stocks based on different matching criteria. Therefore our sample includes considerably larger number of paired stocks than many previous studies. Our research design also allows us to observe the sensitivity of sample composition with regard to commonly used control variables and to further examine whether the conclusions derived from comparisons of adverse selection costs across two exchanges are sample specific.

Our main findings are the following. The adverse selection component of the bid-ask spread is significantly lower on NASDAQ than on NYSE, and the differences cannot be attributed to the differences in the characteristics of the samples on two exchanges. Adverse selection costs increase with trade size for NYSE stocks, however, there is no monotonic pattern for NASDAQ stocks. Although the order flows in the two markets are found to be significantly different, they can at best explain a small portion of the observed differences in adverse selection costs.

In Sections 2 and 3 of this paper, methods for constructing matching samples and data are discussed. In Section 4, the empirical results on adverse selection costs are reported and discussions are provided as well. Section 5 concludes the paper.

2. Constructing matched samples of NASDAQ and NYSE stocks

In this paper, we use price, return volatility, number of trades, daily dollar trading volume, and market capitalization to match the NYSE and NASDAQ stocks. Following Huang and Stoll (1996), for each NYSE stock we use the following equation to identify the comparable NASDAQ stock which has the lowest composite score:

$$\sum_{i=1}^{j}\left(\frac{X_i^{\mathrm{NASDAQ}}-X_i^{\mathrm{NYSE}}}{\left(\frac{X_i^{\mathrm{NASDAQ}}+X_i^{\mathrm{NYSE}}}{2}\right)}\right)^2 \quad (1)$$

where X_i^{NASDAQ} (X_i^{NYSE}) denotes the value of the ith matching variable for the NASDAQ (NYSE) stock, and j is the number of characteristic variables included in the matching. To minimize the variability between matched NASDAQ and NYSE stocks, we further constrain the sample selection process by imposing the following condition:

$$\left|\frac{X_i^{\mathrm{NASDAQ}}-X_i^{\mathrm{NYSE}}}{\left(\frac{X_i^{\mathrm{NASDAQ}}+X_i^{\mathrm{NYSE}}}{2}\right)}\right|<0.5 \quad (2)$$

Among the NYSE stocks that satisfy the above constraint, a composite score is calculated and the NYSE stock with the lowest composite score is selected as the match for the NASDAQ stock. To minimize variability between NYSE and NASDAQ stocks, we further eliminate those matched stocks with matching scores greater than 0.5.[3] None of the NYSE stocks was considered a match for more than one NASDAQ stock.

[3] Our matching procedures are similar with Chung, Van Ness, and Van Ness (2003) and Jiang and Kim (2005). Chung, Van Ness, and Van Ness (2003) include pairs of stocks with a composite score of less than 1.0. Jiang and Kim (2005) eliminate matched stocks with a matching score of greater than 1.5.

Panels A, B, and C of Table 1 shows the summary statistics for three matched samples of NYSE and NASDAQ stocks. For the matched sample based on market capitalization (809 pairs altogether), the mean values of market capitalization are very close, at $3,066 million for NASDAQ and $3,220 million for NYSE. Means at various percentiles further demonstrate the close match of the stocks in the sample in terms of market capitalization.

Panel B of Table 1 reports statistics on the matching variables (price, daily dollar trading volume, and market capitalization) as well as return volatility and number of trades for the 791 pairs of NASDAQ and NYSE stocks. The mean values and the distribution of all three matching variables are very close. While difference in return volatility becomes much smaller compared with those in sample 1, the difference in number of trades remains large.

Lastly, we use five characteristic variables to form a matched sample across two exchanges. The additional constraints leave us with a much smaller sample size (426 pairs in sample 3), yet the matching is quite successful judging from the statistics reported in Panel C. One noticeable feature of our sample 3 is that it includes more stocks of lower market capitalization and also of relatively lower prices. In addition, the average daily number of trades for both markets shows an average ranging from 238 (NASDAQ) to 157 (NYSE), suggesting that many stocks included in sample 3 are not the most actively traded issues.[4] Overall, all three matched samples are similar in their mean values and the distribution of the variables used in forming the matched samples.

3. Data

We obtain transaction data from the Trade and Quote database (TAQ) provided by the NYSE for the period from May 2001 to July 2001. From the initial sample, we delete non-U.S. stocks, other class stocks, and stocks that had a split over our sample period.[5] We then apply the following data filters to trades and quotes, which are standard in the microstructure literature (see, e.g., Huang & Stoll, 1996), to clean the data of errors and outliers: (1) delete quotes if either the bid or ask price is negative; (2) delete quotes if either the bid or ask size is negative; (3) delete quotes if the bid-ask spread is greater than $4 or negative; (4) delete trades and quotes if they are out of time sequence or involve an error; (5) delete before-the-open and after-the-close trades and quotes; (6) delete trades if the price or volume is negative; and (7) delete trades and quotes if they changed by more than 10% compared to the last transaction price and quote. We delete unlisted stocks, stocks with average annual share prices less than $2, and stocks not included in the NYSE's TAQ, the Center for Research in Security Prices (CRSP), and Standard & Poor's COMPUSTAT.

The control variables are calculated as the following. Price is the average of daily mid-quote prices for our sample period from May 2001 to July 2001. Return volatility is the standard deviation of returns computed using midquote-to-midquote prices. Daily dollar trading

[4] The variables used in forming our matching sample is quite similar to those in Chung, Van Ness, and Van Ness (2003) with the exception of that trading volume is used in their paper while we use trade size instead. Nevertheless, judging from the sample statistics, our sample 3 is quite different from the sample of Chung et al. The difference in composition is likely due to the fact that, in addition to minimizing the composite score, we further constrain the difference of each characteristic variable between the chosen NYSE and NASDAQ pair to be less than the average of the two values. Thus, our matching criteria place extra emphasis on the proximity in values for each individual characteristic variable.

[5] Prior studies have shown that spreads and adverse selection costs for non-U.S. stocks are generally higher than those of matched sample of domestic stocks (Bacidore & Sofianos, 2002; Jiang & Kim, 2005). Similarly, many studies have presented evidence that liquidity significantly improves and transaction costs increase after a stock split (Muscarella & Vetsuypens, 1996; Schultz, 2000).