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THE NASDAQ-AMEX MERGER, NASDAQ REFORMS, AND THE LIQUIDITY OF SMALL FIRMS

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Abstract

After the Nasdaq and American Stock Exchange (AMEX) merged in 1998, officials of the new entity argued that some "smaller, harder to trade" companies on Nasdaq should switch to AMEX to improve liquidity. This recommendation is based on the traditional view among academics and practitioners alike that a substantial trading cost reduction should be realized when a company switches from the multidealer Nasdaq system to the AMEX specialist system. However, in light of the 1997 Nasdaq reforms, we reexamine the validity of these arguments using data from 1996–98 on firms that switch from the Nasdaq to the AMEX or the New York Stock Exchange. Evidence from transaction costs, volatility, and stock returns shows declining benefits to switching during the sample period. Our findings indicate that the liquidity improvement from exchange listing is limited in the wake of the Nasdaq reforms of 1997.

JEL Classifications: G10, G14

I. Introduction

I think there is a family of companies that ... for one reason or another cannot maintain the interest of market makers on Nasdaq. ... When that happens, they should be encouraged to go to a single market-maker environment. We provide an easy way for the companies to switch.

—Frank G. Zarb, chairman of the parent Nasdaq-AMEX Market Group. Quoted from the *Wall Street Journal*, November 2, 1998, p. C1, the day the Nasdaq-AMEX merger was completed.

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The degree of liquidity and the level of trade-execution costs for stocks on the Nasdaq stock market have been topics of interest because of their policy and wealth implications. This interest was further increased following the study by Christie and Schultz (1994) that suggested that Nasdaq market makers were implicitly colluding to keep spreads artificially wide. Because of the heightened scrutiny of the Nasdaq that this research prompted, a series of reforms were implemented on the Nasdaq in 1997 at the insistence of the Securities and Exchange Commission. These reforms included requirements that public limit orders be allowed to compete with Nasdaq dealer quotes and that market makers who post quotes on proprietary trading systems make those quotes available to the public as well.

Barclay et al. (1999) examine the effect of the order-handling reforms and find that Nasdaq spreads have fallen dramatically. Weston (2000) examines the effect of recent market reforms on the competitive structure of the Nasdaq and finds that the reforms have reduced the Nasdaq dealers' rents. In addition, he finds that the difference between New York Stock Exchange (NYSE) and Nasdaq spreads has been greatly diminished with the new rules. Bessembinder (1999) examines a size-matched sample of Nasdaq and NYSE firms for the latter half of 1997 and finds that the new Nasdaq order-handling rules have reduced Nasdaq trading costs significantly, though trading costs on Nasdaq are still higher than on the NYSE. These studies focus on transaction costs of relatively large firms.

Another recent event affecting the Nasdaq market is the merger between the Nasdaq and the American Stock Exchange (AMEX), which was completed November 2, 1998. According to a *Wall Street Journal* article appearing the following day, officials of the new entity expect "some smaller, harder to trade Nasdaq companies to consider switching to the new sister AMEX."[1] In fact, Frank Zarb, the chairman of the new Nasdaq parent company, states that they will provide an "easy" way for firms to switch to AMEX if they choose to do so. The claim that smaller, less liquid stocks could benefit from switching to the AMEX is consistent with past academic research.[2] In light of the recent reforms instituted by the Nasdaq, we examine whether we can still expect an improvement in liquidity for small firms switching from the Nasdaq to AMEX. We use several common measures of liquidity and find that the benefits to switching from the Nasdaq to the AMEX have declined substantially in the wake of the Nasdaq reforms.

A sizable literature examines the liquidity of the Nasdaq stock market and compares trading costs on the Nasdaq to exchanges such as the NYSE or AMEX.

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[1] See A. Lucchetti, "NASD, AMEX Complete Marriage," *Wall Street Journal*, November 3, 1998, p. C1.

[2] This recent statement by the Nasdaq leadership represents an abrupt change of strategy from what the Nasdaq has claimed for years; the Nasdaq has long positioned itself as the ideal home for smaller stocks.

Huang and Stoll (1996) use a size-matched sample of firms to compare trading costs on the Nasdaq and NYSE in 1991 and find that typical measures of trading cost are twice as large for Nasdaq as for NYSE stocks. The average firm size for their sample is $0.64 billion. Using data for 1994, Bessembinder and Kaufman (1997) also examine a size-matched sample of firms trading on the Nasdaq or the NYSE. They find that trade-execution costs are larger for Nasdaq firms than for comparable NYSE firms. Furthermore, the cost differential is largest for the small- to medium-sized firms. The average firm size for their sample is $1.1 billion. A casual inspection of the size of firms switching from the Nasdaq to NYSE during 1996–98 indicates that the mean size of these firms is greater by one order of magnitude than the mean size of firms switching from the Nasdaq to AMEX. Thus, these two studies are reporting results on relatively large firms.

Trying to match a sample of firms on the Nasdaq with a comparable sample of firms on the NYSE or AMEX has the inherent difficulty that size is not the only factor that affects a firm's execution costs. Thus, the match between samples will be imperfect because firms being matched are not identical. Another approach is to look at firms on the Nasdaq that decide to list on either the AMEX or the NYSE. This avoids the problem of trying to control for firm-unique factors that make a perfect match between samples impossible. However, examining exchange listings involves the use of a sample that is affected by the endogenous nature of the listing decision. Given the nature of the issues we are investigating, the latter approach is preferred.

Christie and Huang (1994) examine exchange listings by Nasdaq firms in 1990 and report significant reductions in trading costs for firms that list on either the AMEX or the NYSE. Barclay (1997) examines exchange listings on the NYSE and AMEX by Nasdaq firms from 1983 to 1992 and finds significant decreases in trade-execution costs after exchange listing. Bessembinder (1998) examines firms that moved from Nasdaq to NYSE in 1996 and 1997 and finds a substantial decline in spreads and return volatility due to exchange listing. However, by examining only firms that list on the NYSE, Bessembinder is focusing on larger firms. Also, by looking only at 1996 and 1997, he is examining a pre-reform year and then a "transition" year.

We posit that at least one full post-reform year of data is necessary to gain a clear indication of any effect the 1997 reforms may have had on execution cost differentials between the Nasdaq and exchanges such as the AMEX or NYSE. We also examine small firms, most of which list on the AMEX as opposed to the NYSE. Our study analyzes the validity of the argument that small, less liquid firms should switch to the AMEX to improve liquidity.

We use a sample of 278 Nasdaq firms that switched to either the AMEX or the NYSE in 1996, 1997, or 1998, to examine whether significant trading cost reductions are realized when a firm lists on a stock exchange. We chose this

three-year period to allow measurement of trading costs before, during, and after the Nasdaq reforms that were implemented in 1997. Although our principal focus is on smaller firms, which tend to switch to the AMEX, we also report results for firms switching to the NYSE for comparison. Except for average firm size, there should be little difference between the AMEX and NYSE because both are specialist markets.

Our results show a pattern of declining benefits to exchange listing as measured by quoted spreads and effective spreads. We find that the trading cost reduction resulting from exchange listing is largest in 1996 and smallest in 1998. In terms of the quoted spread, we find that the benefit to exchange listing is erased in 1998. The median quoted half-spread actually increases after an exchange listing by 2.54¢ for all firms in 1998, and by 5.30¢ for small firms that listed on the AMEX. Following a switch, the median decline in effective half-spread is 10.11¢ in 1996 and 9.58¢ in 1997, but only 4.44¢ in 1998. If we look at only small firms (market capitalization less than $200 million) that listed on the AMEX, the median decline in effective half-spread is 8.95¢ in 1996 and 12.75¢ in 1997, but only 1.90¢ in 1998. We attribute this decline in trading cost improvement after exchange listing to the effect of the Nasdaq reforms in lowering trading costs on the Nasdaq market. Our cross-sectional regressions confirm that after controlling for a number of other factors such as firm size, exchange, trading volume, and price level, transaction cost reductions due to switching were smaller or nonexistent in 1998. Furthermore, we find that although return volatility declines for Nasdaq firms after switching to either the AMEX or NYSE in 1996 and 1997, this post-switching decline in volatility virtually disappears in 1998.

Finally, we examine stock returns at the time of both the announcement of an intent to list on the AMEX and the actual listing. The analysis of the price reaction to listing announcements during this three-year sample period gives us some insight as to whether the market perception of the value to listing was changing over this period. Results from this event study show a significant positive announcement effect in 1996, but not in 1997 or 1998. Returns surrounding the actual listing date show a similar pattern of significant positive excess returns in 1996, marginally significant positive returns in 1997, and nonsignificant returns in 1998.

Our results provide a response to the suggestion that smaller, less liquid Nasdaq firms should switch to the AMEX (or NYSE) stock exchange to improve liquidity. We find that the liquidity improvement from exchange listing is limited in the wake of the Nasdaq reforms of 1997. Although there may be other stated reasons for exchange listing, such as improved visibility, ultimately a reduction in the cost of capital due to improved liquidity should be the motivation of the firm. Using common measures of liquidity, we find little evidence of improved liquidity for a Nasdaq firm listing on an exchange, especially the AMEX, in the post-reform environment.

II. Data and Method

Sample Selection

Our sample of firms that switched from the Nasdaq market to the AMEX or NYSE during the calendar years 1996, 1997, and 1998 was identified from the Center for Research in Security Prices (CRSP) daily returns file. This yielded a total of 319 firms. From this sample we excluded any firm for which intradaily data were unavailable for the thirty trading days before or after the date of exchange listing. We also excluded any firm that had a stock split or that paid a dividend during the sixty-trading-day window, because we wish to isolate changes in trading costs that are only due to exchange listing. Our final sample comprises 278 firms, of which 70 firms switched from Nasdaq to the AMEX and 208 firms switched to the NYSE. The market capitalization at the listing date was obtained from CRSP. Return volatility was computed over the ninety trading days before switching and over the ninety trading days after switching from CRSP daily returns.

Our study also relies on transaction and quotation data obtained from the Trade and Quote (TAQ) database. A small number of trades and quotes are excluded because they reflect errors, such as negative prices, the bid exceeding the ask, or the value of the correction code is greater than or equal to 1. Trades are categorized as either buy or sell by comparing trades with quotes in effect at least twenty seconds before the recorded trade time.

Measures of Trade-Execution Costs

Researchers have long recognized that the quoted bid or ask price of a security includes a liquidity premium, or cost for immediate execution. Amihud and Mendelson (1986) show that a higher expected return is required for firms with a higher spread. The direct implication for asset pricing is that the cost of capital for the firm will increase with increases in the cost of transacting as represented by the spread. Hence, it is in the firm's interest to promote increased liquidity for its securities through reduced transaction costs, as this will also reduce the cost of capital to the firm.

We employ two measures of trade-execution costs that are standard in the market microstructure literature: quoted spreads and effective spreads.[3] The quoted spread is simply the difference between the quoted ask price and the quoted bid price. Quoted spreads are examined on an absolute basis and as a percentage of the

[3] In addition to quoted and effective spreads, we also examine realized spreads. The realized spread results are similar to those of effective spreads; therefore, for the sake of brevity, they are not reported. These results are available from the authors on request.

bid-ask midpoint. The quoted half-spread is given by

$$Quoted\ Half\text{-}Spread = \frac{1}{2}\left[ask - bid\right]. \tag{1}$$

Another measure of trading costs that reflects savings due to trades that occur inside the quotes is the effective spread, defined as the difference between the transaction price and the midpoint of the most recent bid and ask quotes. The effective half-spread is given by

$$Effective\ Half\text{-}Spread = \left|trade\ price - \frac{(bid + ask)}{2}\right|. \tag{2}$$

Summary Statistics

The total sample consists of 278 Nasdaq firms that switched to either the AMEX or the NYSE in 1996, 1997, or 1998. Of these 278 firms, summary statistics for the 70 firms that listed on the AMEX are presented in the first three columns of Table 1, and summary statistics for the 208 firms switching to the NYSE are presented in the following three columns. We note that the average market capitalization of the AMEX firms is $79 million, whereas that of the NYSE firms is one order of magnitude larger at $838 million.

Descriptive data on pre- and post-switching volume is also provided in the table. However, it is important to keep in mind that a buy order and a sell order involve separate transactions on the Nasdaq, whereas specialist markets may allow the orders to cross in a single trade.[4] Because of these differences, a direct comparison of trading volume is not meaningful.

Each stock's annualized return volatility is computed from daily returns data for the ninety trading days before and ninety trading days after a switch. Because we are examining the same firm before and after listing on an exchange, we expect any difference in volatility surrounding a switch to be directly related to differences in market structure and trading costs. Because of changing market volatility over the sample period 1996–98, we normalize the pre- and post-switching volatility by dividing by the volatility of the CRSP value-weighted index over matching periods.[5] For 1996 and 1997, consistent with Bessembinder (1998), we see a decrease in return volatility following exchange listing on the NYSE as well as on the AMEX. This is true whether or not we adjust for changing market volatility. In 1998, the reduction in volatility is much smaller compared with 1996 and 1997. The finding of little

[4] See Atkins and Dyl (1997) for a detailed discussion.

[5] Adjusting volatility using the CRSP equally weighted index yields qualitatively similar results.

TABLE 1. Descriptive Statistics on 278 Sample Firms that Moved from Nasdaq to the AMEX or the NYSE During 1996, 1997, and 1998.

		Firms Switching to AMEX			Firms Switching to NYSE		
		Mean	Median	Standard Deviation	Mean	Median	Standard Deviation
Market capitalization ($ million)	All	78.51	52.21	121.49	838.39	505.69	1167.41
	1996	94.12	54.64	196.98	851.48	414.96	1420.88
	1997	95.35	55.72	98.54	851.06	560.72	1103.03
	1998	45.13	38.18	29.93	802.71	534.52	819.17
Share price ($)	All	10.37	6.44	9.42	27.57	24.47	13.57
	1996	8.32	5.92	8.04	25.84	24.09	12.21
	1997	14.55	11.73	11.07	31.13	27.62	16.46
	1998	6.98	4.45	6.10	24.83	23.05	9.14
Daily trading volume before switch (1,000s of shares)	All	441.14	123.59	704.93	2783.94	1033.33	6100.71
	1996	482.73	125.83	605.87	3479.13	823.60	8448.92
	1997	432.19	87.88	628.36	3134.47	874.11	4478.94
	1998	418.19	126.94	878.33	2729.77	1484.40	3553.65
Daily trading volume after switch (1,000s of shares)	All	292.12	105.41	420.75	1823.00	562.55	5553.82
	1996	344.52	125.10	463.00	2701.41	428.83	8640.79
	1997	288.44	48.26	455.61	1164.41	518.29	2405.96
	1998	253.30	133.47	348.01	1516.06	742.13	1789.49
Return volatility before switch (%)	All	72.61	67.48	29.15	47.00	43.29	18.11
	1996	73.50	66.33	31.28	43.88	39.68	16.87
	1997	66.85	61.90	31.73	44.73	43.00	12.30
	1998	78.89	70.35	23.34	54.65	48.58	24.21
Return volatility after switch (%)	All	54.33	47.36	31.47	40.00	35.77	19.19
	1996	59.58	60.05	32.74	35.73	30.46	17.23
	1997	45.49	36.58	26.56	37.51	36.50	13.91
	1998	63.02	47.37	34.36	55.85	42.53	23.46
Normalized volatility before switch	All	5.49	4.81	2.70	3.57	3.22	1.47
	1996	7.17	6.71	3.37	4.23	4.00	1.65
	1997	5.25	4.49	2.60	3.35	3.19	1.27
	1998	4.38	4.38	1.25	3.02	2.84	1.12
Normalized volatility after switch	All	4.06	3.73	2.55	2.85	2.61	1.39
	1996	5.44	5.09	2.86	3.38	2.97	1.63
	1997	2.88	2.67	1.76	2.44	2.31	1.00
	1998	4.37	3.93	2.52	2.74	2.69	1.31

Notes: The sample firms were identified from CRSP. Firms with stock splits or stock dividends within the sixty-trading-day period surrounding the listing date are excluded. Seventy firms switched to AMEX and the other 208 firms switched to the NYSE. Of the 70 firms switching to AMEX, 19 firms listed in 1996, 28 firms listed in 1997, and 23 firms listed in 1998. Of the 208 firms switching to the NYSE, 77 firms listed in 1996, 78 firms listed in 1997, and 53 firms listed in 1998. Market capitalization is calculated at the listing date. Share price is the average price over the sixty-trading-day period surrounding the listing date. The (annualized) return volatility is calculated from CRSP daily return data. Normalized volatility is computed by dividing each firm's volatility by the volatility of the CRSP value-weighted index over the same period.

reduction in volatility surrounding a switch in 1998 is consistent with the finding of little or no reduction in spreads surrounding a switch, as discussed next.

III. Results

Trade-Execution Costs

To measure the change in trade-execution costs that arises from a switch in trading location, we report results for the quoted and effective half-spreads. Results are stated in terms of both percentage spreads and absolute cent spreads for the thirty trading days before an exchange listing and for the thirty trading days after an exchange listing. Because the mean is more sensitive to the presence of (positive) outliers, we focus on the median in reporting transaction costs. Table 2 lists the results for the quoted half-spreads. The first two columns give the quoted half-spreads from before and after exchange listing, respectively, and the third column displays the difference between quoted spreads before and after listing. For all firms in 1996 the median percentage (absolute) quoted half-spread is 1.1 (21.67¢) before a switch and 0.7 (14.73¢) after a switch. For all firms in 1997 the median percentage (absolute) quoted half-spread is 1.01 (20.18¢) before a switch and 0.66 (16.53¢) after a switch. For all firms in 1998 the median percentage (absolute) quoted half-spread is 0.83 (13.44¢) before a switch and 0.78 (15.72¢) after a switch. The median absolute quoted spread before a switch is about the same for 1996 and 1997, but it is substantially lower for 1998. This decline in spreads is likely due to the Nasdaq reforms. However, the median absolute quoted spread following a switch is roughly constant across the three-year sample period.

From the last column of Table 2, we see that the difference in quoted spreads surrounding a switch is declining in both mean and median from 1996 to 1998. A simple hypothesis test reveals that the mean change in spread following listing in both 1996 and 1997 is statistically different from that in 1998 at the 5% level for either absolute or percentage quoted spreads. The median decline in quoted half-spread is 9.20¢ in 1996 and 4.67¢ in 1997. However, in 1998 the difference in quoted spread surrounding an exchange listing becomes positive (i.e., there is an increase in the quoted spread after listing), with the median increase being a significant 2.54¢. This result is even more pronounced for small firms switching to AMEX, where the median increase in quoted half-spread is 5.30¢ following exchange listing. Of these twenty-three small firms switching to AMEX in 1998, eighteen (or 78% of the subsample) experience an increase in quoted spread. Sorting the sample on market capitalization only, the large firms as a group appear to have the smallest decline in trading costs following an exchange listing.

The first two columns of Table 3 give the effective half-spreads from before and after exchange listing, respectively, and the third column displays the difference between spreads before and after listing. For all firms in 1996 the

TABLE 2. Quoted Spreads.

		Before Exchange Listing		After Exchange Listing		Change in Spread		
	No. of Obs.	Mean	Median	Mean	Median	Mean [p-value]	Median [p-value]	No. of Negative
Panel A. Percentage Quoted Spreads								
All	278	1.41	0.98	1.12	0.70	−0.29 [0.000]	−0.19 [0.001]	166
AMEX	70	2.96	2.70	2.40	1.71	−0.56 [0.054]	−0.48 [0.023]	45
NYSE	208	0.89	0.81	0.69	0.61	−0.20 [0.000]	−0.13 [0.022]	121
1996	96	1.48	1.10	0.90	0.70	−0.58 [0.000]**	−0.36 [0.000]	70
1997	106	1.39	1.01	0.92	0.66	−0.47 [0.000]**	−0.26 [0.002]	69
1998	76	1.37	0.83	1.68	0.78	0.32 [0.054]	0.12 [0.015]	27
Small	105	2.46	2.03	1.95	1.28	−0.51 [0.011]	−0.40 [0.003]	68
Medium	113	0.94	0.88	0.66	0.60	−0.28 [0.000]	−0.27 [0.000]	77
Large	60	0.48	0.41	0.55	0.48	0.06 [0.071]	0.09 [0.027]	21
Small and AMEX and 1996	18	3.31	3.01	1.71	1.47	−1.60 [0.001]	−1.69 [0.001]	16
Small and AMEX and 1997	26	2.96	2.93	1.77	1.19	−1.19 [0.014]	−1.12 [0.029]	19
Small and AMEX and 1998	23	2.96	2.41	3.90	3.47	0.94 [0.080]	0.93 [0.093]	7
Panel B. Dollar Quoted Spreads (¢)								
All	278	24.42	17.79	16.39	15.66	−8.03 [0.000]	−1.81 [0.005]	163
AMEX	70	28.70	16.53	15.37	14.10	−6.25 [0.000]	−0.93 [0.120]	42
NYSE	208	22.98	18.10	16.73	15.88	−13.33 [0.000]	−2.95 [0.022]	121
1996	96	23.99	21.67	14.60	14.73	−9.40 [0.000]**	−9.20 [0.000]	68
1997	106	30.02	20.18	17.80	16.53	−12.21 [0.000]**	−4.67 [0.005]	68
1998	76	17.16	13.44	16.68	15.72	−0.47 [0.752]	2.54 [0.015]	27
Small	105	26.51	18.66	15.49	14.63	−11.03 [0.000]	−2.87 [0.006]	67
Medium	113	27.68	24.19	17.86	16.62	−9.81 [0.000]	−7.35 [0.000]	78
Large	60	14.62	11.99	15.19	15.30	0.57 [0.584]	2.54 [0.003]	18
Small and AMEX and 1996	18	21.60	21.11	10.02	9.92	−11.58 [0.001]	−8.62 [0.001]	16
Small and AMEX and 1997	26	41.70	31.20	16.02	14.45	−25.67 [0.001]	−16.91 [0.076]	18
Small and AMEX and 1998	23	21.03	10.67	19.37	18.68	−1.66 [0.721]	5.30 [0.011]	5

Notes: Quoted spreads are half of the valid bid-ask spread in effect when each trade is executed. Change in quoted spread is measured by subtracting each firm's average pre-listing spread from the average post-listing spread. AMEX indicates firms that switched from Nasdaq to the AMEX, and NYSE indicates firms that switched from Nasdaq to the NYSE. Small firms are those with market capitalization at the listing date less than $200 million. Medium firms are those with market capitalization between $200 million and $800 million. Firms with a market capitalization above $800 million are classified as large firms.

**The mean change in spread following listing is statistically different from that in 1998 at the 5% level.

TABLE 3. Effective Spreads.

		Before Exchange Listing		After Exchange Listing		Change in Spread		
	No. of Obs.	Mean	Median	Mean	Median	Mean [*p*-value]	Median [*p*-value]	No. of Negative
Panel A. Percentage Effective Spreads								
All	278	1.12	0.79	0.53	0.34	−0.59 [0.000]	−0.37 [0.000]	254
AMEX	70	2.34	2.11	1.14	1.03	−1.19 [0.000]	−0.88 [0.000]	59
NYSE	208	0.70	0.63	0.32	0.28	−0.39 [0.000]	−0.30 [0.000]	195
1996	96	1.17	0.84	0.51	0.39	−0.66 [0.000]**	−0.44 [0.000]	91
1997	106	1.08	0.80	0.44	0.29	−0.64 [0.000]**	−0.45 [0.000]	101
1998	76	1.11	0.69	0.67	0.38	−0.43 [0.000]	−0.21 [0.000]	62
Small	105	1.93	1.57	0.92	0.70	−1.01 [0.000]	−0.67 [0.000]	92
Medium	113	0.74	0.72	0.31	0.28	−0.43 [0.000]	−0.39 [0.000]	110
Large	60	0.40	0.35	0.24	0.22	−0.16 [0.000]	−0.14 [0.000]	52
Small and AMEX and 1996	18	2.64	2.31	1.20	1.13	−1.44 [0.000]	−1.34 [0.001]	16
Small and AMEX and 1997	26	2.28	2.09	0.91	0.76	−1.36 [0.000]	−1.12 [0.000]	24
Small and AMEX and 1998	23	2.38	2.09	1.46	1.49	−0.92 [0.010]	−0.60 [0.093]	16
Panel B. Dollar Effective Spreads (¢)								
All	278	19.11	14.52	7.84	7.14	−11.27 [0.000]	−7.30 [0.000]	265
AMEX	70	22.04	12.95	8.14	7.60	−13.90 [0.000]	−6.55 [0.000]	61
NYSE	208	18.12	14.71	7.75	7.01	−10.38 [0.000]	−7.40 [0.000]	204
1996	96	18.80	17.83	7.68	7.36	−11.12 [0.000]*	−10.11 [0.000]	95
1997	106	23.10	16.58	8.34	7.21	−14.76 [0.000]*	−9.58 [0.000]	103
1998	76	13.94	11.56	7.36	6.80	−6.59 [0.000]	−4.44 [0.000]	67
Small	105	20.43	14.17	7.86	7.24	−12.57 [0.000]	−6.88 [0.000]	95
Medium	113	21.46	19.28	8.33	7.39	−13.13 [0.000]	−11.46 [0.000]	113
Large	60	12.39	11.08	6.90	6.48	−5.49 [0.000]	−3.96 [0.000]	57
Small and AMEX and 1996	18	16.95	17.40	7.29	7.17	−9.66 [0.000]	−8.95 [0.000]	17
Small and AMEX and 1997	26	31.49	24.65	9.43	8.26	−22.06 [0.000]	−12.75 [0.000]	24
Small and AMEX and 1998	23	16.54	9.19	7.61	6.83	−8.93 [0.028]	−1.90 [0.035]	17

Notes: Effective spreads are the difference between the transaction price and the midpoint of the prevailing bid-ask spread. Change in effective spread is measured by subtracting each firm's average pre-listing spread from the average post-listing spread. AMEX indicates firms that switched from Nasdaq to the AMEX, and NYSE indicates firms that switched from Nasdaq to the NYSE. Small firms are those with market capitalization at the listing date less than $200 million. Medium firms are those with market capitalization between $200 million and $800 million. The rest of the firms are classified as large firms.

**The mean change in spread following listing is statistically different from that in 1998 at the 5% level.

*The mean change in spread following listing is statistically different from that in 1998 at the 10% level.

median percentage (absolute) effective half-spread is 0.84 (17.83¢) before a switch and 0.39 (7.36¢) after a switch. For all firms in 1997 the median percentage (absolute) effective half-spread is 0.80 (16.58¢) before a switch and 0.29 (7.21¢) after a switch. For all firms in 1998 the median percentage (absolute) effective half-spread is 0.69 (11.56¢) before a switch and 0.38 (6.80¢) after a switch. Both the median percentage and absolute effective spread before a switch are lower in 1998 than in 1996 and 1997. Following a switch, the median percentage and absolute effective spreads are relatively constant across the three-year sample period.

From the last column of Table 3, we again see a pattern of declining differences in spread over time where, following a switch, the median reduction in effective half-spread is 10.11¢ and 9.58¢ in 1996 and 1997, respectively, but only 4.44¢ in 1998. For small firms switching to the AMEX, the median decline in effective half-spread is 8.95¢ and 12.75¢ in 1996 and 1997, respectively, but only 1.90¢ in 1998.

The spread results show a pattern of declining benefits to listing on the AMEX for small Nasdaq firms across the three-year sample period. However, to control for any secular change in spreads during our sample period, we form and examine a control sample of Nasdaq firms that were eligible to list on the AMEX but remained on Nasdaq. Qualified firms are determined by checking the AMEX minimum listing requirements during this period against all Nasdaq firms in the Compustat database. We then use price and firm size to match one firm for each of the seventy firms in our sample that switched from Nasdaq to AMEX. Transactions costs for each matching firm are measured over the same sixty trading days as the corresponding listing firm. Results are presented in Table 4, alongside the transaction costs for the seventy sample firms that listed on AMEX.

Over this three-year period Nasdaq percentage quoted spreads were declining for the control sample, just as in the actual sample. Also, note that spreads in the actual sample are noticeably higher than in the control sample. For instance, the average pre-switching quoted spread for the actual sample is 2.96%, but only 1.93% for the control sample. The finding of higher spreads for these switching firms compared with a control sample lends some insight as to why these firms might have chosen to leave the Nasdaq.

By examining the change in spread surrounding the listing date we see that transactions costs for the control firms are relatively stable over the matching sixty-day windows. There is a slight decline on average in percentage quoted spreads for the control firms in 1996, but the magnitude is not economically meaningful compared with the actual sample. Specifically, the quoted spreads of control firms declined by 0.18% in 1996 compared with a decline of 1.52% for firms actually switching to AMEX. There is no significant change in quoted spreads for the control firms in 1997 or 1998. Results for effective spreads are also presented in Table 4, and they are similar to those for quoted spreads. Overall, we conclude that evidence from a control sample of matching firms is consistent with our finding of declining benefits to switching from Nasdaq to AMEX from 1996 to 1998.

TABLE 4. Comparison of Spreads Between Control Sample and Firms Switching to AMEX.

		Before Exchange Listing		After Exchange Listing		Change in Spread	
	No. of Obs.	Control	Actual	Control	Actual	Control	Actual
Percentage quoted spreads (%)							
All	70	1.93	2.96	1.84	2.40	−0.09 [0.059]	−0.56 [0.055]
1996	19	2.44	3.16	2.26	1.64	−0.18 [0.033]	−1.52 [0.001]
1997	28	1.97	2.82	1.86	1.69	−0.11 [0.183]	−1.13 [0.012]
1998	23	1.45	2.96	1.46	3.90	0.01 [0.901]	0.94 [0.080]
Absolute quoted spreads (¢)							
All	70	18.72	28.70	18.45	15.37	−0.27 [0.625]	−13.33 [0.001]
1996	19	17.81	21.58	16.78	10.13	−1.03 [0.063]	−11.45 [0.000]
1997	28	22.68	39.83	22.97	15.65	0.29 [0.819]	−24.18 [0.001]
1998	23	14.66	21.03	14.33	19.37	−0.34 [0.534]	−1.66 [0.721]
Percentage effective spreads (%)							
All	70	1.57	2.34	1.51	1.14	−0.06 [0.092]	−1.19 [0.000]
1996	19	1.96	2.53	1.82	1.15	−0.14 [0.033]	−1.38 [0.000]
1997	28	1.61	2.17	1.51	0.87	−0.09 [0.122]	−1.29 [0.000]
1998	23	1.21	2.38	1.24	1.46	0.03 [0.631]	−0.92 [0.010]
Absolute effective spreads (¢)							
All	70	15.29	22.04	15.17	8.14	−0.12 [0.766]	−13.90 [0.000]
1996	19	14.44	16.91	13.73	7.32	−0.71 [0.138]	−9.59 [0.000]
1997	28	18.47	30.05	18.78	9.13	0.31 [0.715]	−20.92 [0.000]
1998	23	12.12	16.54	11.97	7.61	−0.15 [0.797]	−8.93 [0.028]

Notes: Spreads are listed for seventy control Nasdaq firms that were identified from Compustat as eligible to list on the AMEX but that remained on Nasdaq. These firms were matched to the seventy sample firms that listed on the AMEX according to time, price, and size. Spreads from the firms that listed on the AMEX are provided for comparison. The *p*-values are in brackets.

TABLE 5. Cross-Sectional Regression of Changes in Percentage Quoted and Effective Spreads Around Exchange Listing.

	QSDIFF	ESDIFF
Constant	0.55	−0.57
	(0.85)	(−1.68)
Log market capitalization	0.14	0.19
	(1.37)	(3.87)**
AMEX	−0.22	−0.31
	(−.85)	(−1.99)**
Price level	−0.024	−0.013
	(−3.71)**	(−4.16)**
Trading volume	0.057	0.038
	(2.46)**	(2.64)**
Volatility	−0.87	−0.99
	(−1.72)	(−2.90)**
Y96	−1.02	−0.39
	(−4.84)**	(−3.17)**
Y97	−0.75	−0.29
	(−3.42)**	(−2.43)**
R^2	0.17	0.33

Notes: Changes in spreads are measured by subtracting the firm's average pre-listing spread from the average post-listing spread. QSDIFF is the change in average percentage quoted spread after exchange listing. ESDIFF is the change in average percentage effective spread after exchange listing. Market capitalization is in millions of dollars. AMEX is a dummy variable that equals 1 if the stock listed on the AMEX and 0 if the stock listed on the NYSE. Price, trading volume, and volatility are pre-listing values. Trading volume is in hundred of thousands of shares. Y96 and Y97 are dummy variables for years 1996 and 1997, respectively. The *t*-statistics are in parentheses. All regressions have 271 observations. White (1980) heteroskedasticity-consistent standard errors are used.

**Significant at the 5% level.

Cross-Sectional Regressions

In presenting the results for various measures of trade-execution costs, we sort the data along several useful dimensions such as year, firm size, and listing exchange to glean some insight concerning the various subsamples of the data. An alternative approach that allows us to measure the marginal contribution of a given characteristic of the data in explaining changes in trade-execution cost is to adopt a regression framework. Regression results for the difference in percentage trading costs around exchange listing are presented in Table 5. Because each dependent variable is defined as post-listing cost minus pre-listing cost, regressors that contribute positively to the dependent variable are interpreted as decreasing the amount of cost reduction due to listing. Explanatory variables with negative coefficients are contributing to cost reduction (if any) due to exchange listing. We see that firm size is negatively correlated with trading cost reductions and is significant for effective

spread. Therefore, *ceteris paribus,* small firms are more likely to have a trading cost reduction. Listing on the AMEX as opposed to the NYSE contributes to a reduction in trading costs as measured by the effective spread, but matters little in terms of the quoted spread. Thus, taking into account these first two regressors, we observe that in general small firms switching to AMEX constitute a category of firms that should be in a more favorable circumstance to experience a reduction in trade-execution costs, yet still we find that the benefit to switching for these firms is negligible by 1998. We also see that a high pre-list price level tends to contribute to a trading cost reduction.

The indicator variables for 1996 and 1997 show that exchange listing in 1996 contributes significantly more to reductions in trading costs than in 1998, as measured by quoted and effective spreads. In 1997 the marginal contribution to trading cost reductions beyond that of the 1998 base-year firms is still significant according to both measures of trading costs, but the magnitude of the coefficients is much smaller than in 1996. This result agrees with our earlier finding for pre- and post-listing spreads sorted by year, even though we are now controlling for numerous other factors. In conjunction with results presented earlier we interpret 1997, the year of the Nasdaq reforms, as a transition year when the benefits to exchange listing are shrinking, and this trend continues into 1998. Taking effective spread as an example, firms switching in 1996 have on average a 0.39% greater reduction surrounding a switch than firms switching in 1998, and firms switching in 1997 have a 0.29% greater reduction than firms in 1998.

As noted earlier, we find substantial reductions in return volatility surrounding a switch in 1996 and 1997, but no change following a switch in 1998. To explore this issue further, we regress changes in volatility surrounding a switch on several explanatory variables including firm size, change in transaction costs, and year of listing. In results not reported here, we find that firm size and changes in transaction costs are both positively related to changes in volatility. In other words, large firms experience less of a volatility reduction from switching, and reductions in transaction costs are correlated with reductions in volatility.

Stock Returns

We show that in terms of trade-execution costs, the value of exchange listing appears to have declined substantially over the three-year sample period. But we might also ask whether the stock market views a decision by these firms to exchange list as value enhancing and whether the market perception of the value to listing was also changing over this period. To examine this issue, we look at excess stock returns surrounding the announcement of an intent to list as well as the actual listing date for the seventy Nasdaq firms that listed on the AMEX from 1996 to 1998. For this purpose, we searched for the earliest public announcement of a firm's intent to list on the AMEX using Dow Jones News Service and

TABLE 6. Announcement and Listing Effects for Firms Switching to the AMEX.

	All Years	1996	1997	1998
Sample size	70	19	28	23
One year pre-list [−366,−1]	−8.60	−16.16	−4.74	−7.17
	(−1.03)	(−1.05)	(−0.46)	(−0.38)
Announcement date [−5,+5]	3.34	6.84	3.46	0.30
	(1.85)*	(1.75)*	(1.06)	(0.15)
List date [−5,+5]	4.57	9.48	5.44	−0.55
	(2.51)**	(2.33)**	(1.72)*	(−0.30)
Announce to list	0.52	1.29	0.34	0.10
(average daily return)	(2.59)**	(2.55)**	(1.28)	(0.37)
Post-list [+5,+30]	−0.86	−1.42	−1.62	0.54
	(−0.39)	(−0.36)	(−0.58)	(0.11)

Notes: Results show the average market-adjusted holding period return for Nasdaq firms that switch to the AMEX in 1996, 1997, and 1998. The row labeled "One year pre-list" gives the average excess return over the year before exchange listing. The row labeled "Announcement date" gives the average excess return from five days before an announcement of intent to list on the AMEX to five days after the announcement. The row labeled "List date" gives the average excess return from five days before the actual listing date to five days after listing. The row labeled "Announcement to list" gives the average excess return from two days before announcing an intent to list to the actual date of listing. The row labeled "Post-list" gives the average excess return from five days after listing to thirty days after listing. There are seventy observations. Returns for announcement to list are presented as daily returns because the event-window size varies by firm. All other excess returns are raw returns over the entire event window. Returns are in percentages with *t*-statistics in parentheses.

**Significant at the 5% level.
*Significant at the 10% level.

the *AMEX Weekly Bulletin*. We found that, almost exclusively, the *AMEX Weekly Bulletin* first publicly announces that a firm has gained approval to list on the AMEX, generally one to three weeks before the actual listing occurs. Excess returns for the event study are computed by subtracting the return of the CRSP value-weighted index from the firm's return over the corresponding event window.[6]

The results, presented in Table 6, show there is a positive announcement effect that is declining over the three-year period. The effect is largest in 1996, showing a 6.84% excess return over the ten-day event window, and it is significant at the 10% level. The announcement effect is positive, but smaller and nonsignificant thereafter. If we look at the run-up of returns from the announcement date to the listing date, we see that the average daily excess return is positive and significant in 1996 at 1.29% per day, but smaller and nonsignificant in 1997 and 1998. Finally, if we look at returns surrounding the actual listing date, we see that a highly significant average excess return of 9.48% was realized in 1996. In 1997, an average excess

[6]Measuring excess returns using the CRSP equally weighted index yields qualitatively similar results.

return of 5.44% was realized at the time of listing, but it is only significant at the 10% level. In 1998, the average excess return is negative and nonsignificant. Note that the average excess return for firms over the year leading up to listing is negative, but nonsignificant, and the average excess return for firms during the month following exchange listing is generally negative, but nonsignificant.

Thus, the market reaction to exchange listing shows that listing was viewed as a value-enhancing decision in 1996. The market reaction is weaker in 1997 and flat in 1998. Overall, the evidence from stock returns shows a declining perceived benefit by the market to exchange listing over this three-year period and is consistent with our findings for trade-execution costs.

IV. Motivations for Exchange Listing

Improved liquidity through lower trade-execution costs is a central motive for firms to change trading venue, and the level of transactions costs has accordingly served as the primary measure of the benefit to exchange listing employed in the literature. However, other common motives for listing that have been publicly stated by managers of listing firms and found in surveys include improved visibility and enhanced prestige (e.g., see Baker and Johnson 1990). However, the long-run effect of these factors on the value of the firm is difficult to gauge.

Another factor in the listing choice that may affect firm value is the annual listing fee charged by the exchange. Listing fees charged by the Nasdaq, AMEX, and NYSE are based on the number of shares outstanding and are comparable among the three exchanges. For example, based on 1997 published fee schedules, a firm with 10 million shares outstanding would pay $9,750 on Nasdaq, $10,000 on the AMEX, or $16,170 on the NYSE each year.[7] Bessembinder (2000) examines the effect of listing fees on the benefits to exchange listing and concludes that differences in annual listing fees are relatively small and inconsequential compared with the magnitude of transactions costs.

An important aspect of the Nasdaq reforms was the requirement that superior quotes from electronic communication networks (ECNs), such as Instinet, be included in the Nasdaq system. Although the emergence of ECNs has led to downward pressure on trading costs, most ECNs provide reasonable liquidity only for the larger firms, whereas smaller firms have difficulty attracting sufficient volume. In fact, Barclay et al (1999) find that the bulk of the reduction in spreads on Nasdaq surrounding the 1997 reforms came from limit orders rather than from the consolidation of ECN quotes. Aggarwal and Angel (1998) argue that the emergence

[7]The 2002 figures would be $21,225, $17,500, or $35,000, on the Nasdaq, AMEX, or NYSE, respectively.

of ECNs, with the resultant favorable effect on transactions costs, may in fact serve as a motivation for larger firms to stay on Nasdaq. Furthermore, the marketing of a firm's stock by Nasdaq broker/dealers may enable lesser known firms to expand their investor base, eventually reducing the cost of capital for the firm. Hence, Nasdaq firms that list on an exchange would lose this potential benefit, and clearly, these firms would expect to achieve an off-setting reduction in transaction costs.

It may be argued that our results are biased to the extent that managers of switching firms choose to list on the NYSE and AMEX in the belief that trading cost reductions would materialize. However, the presence of such a bias where only firms that expect to realize a trading cost reduction actually switch from the Nasdaq implies that our sample is composed of the very firms that expected to see the greatest benefit from changing trading venue. Yet, our results show that for these firms such reductions in trading cost are dwindling over the 1996–98 sample period. Thus, to the extent that such a bias exists, our results are strengthened. Furthermore, if we are to assume that these firms are acting rationally, future research may seek to better quantify other sources of an expected benefit to listing.

V. Conclusion

Past research supports the claim that substantial trading cost reductions should be realized when a firm switches its trading location from Nasdaq to the AMEX or NYSE. Officials of the recently merged Nasdaq-AMEX entity have publicly echoed such sentiments and have encouraged small, less-liquid Nasdaq firms to switch to the AMEX for improved liquidity. However, in light of the recent rule changes on the Nasdaq, the presumption of trade-execution cost reductions resulting from exchange listing is ripe for reexamination. Several recent studies compare transaction cost levels between exchanges but focus on the experience of large firms. Our results provide a response to the suggestion that smaller, less-liquid Nasdaq firms should switch to the AMEX (or NYSE) to improve liquidity.

Using trade and quote data from 1996–98 on firms that switch from the Nasdaq to the AMEX or NYSE, we show that the liquidity benefit as measured by spreads is declining substantially over our sample period. We find substantial reductions in volatility following a switch in 1996 and 1997, but virtually no change in volatility following a switch in 1998.

Finally, an examination of stock price reactions to exchange listings and listing announcements shows a decline in the market's perceived benefit to exchange listing over this three-year period. Whether investors are basing their reactions directly on transaction costs or on other subjective factors, the pattern of stock price reactions to exchange listings is consistent with the transaction cost evidence presented for this three-year period. It appears that investors no longer view a switch from Nasdaq to the AMEX as value enhancing. Overall, our findings indicate that

the liquidity improvement from exchange listing is limited in the wake of the Nasdaq reform of 1997.

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