

Competition Versus Consolidation of Order Flow: Common Stock Listing on Dual Domestic Exchanges

Walayet A. Khan
University of Evansville

H. Kent Baker
The American University

Richard B. Edelman
The American University

We examine the market behavior of AMEX- and NYSE-listed common stocks that dually listed on the Pacific Stock Exchange from 1984 to 1990. Dual listing changes the market structure in which stocks trade by adding competition for the AMEX or NYSE specialist, which in turn may improve liquidity services. Dual listing also fragments the order flow, which may reduce trading volume and lower efficiency. Event study methodology results show significantly negative abnormal returns on the dual listing day. The pattern of abnormal returns differs significantly around dual listing for stock with low versus high pre-dual listing liquidity. There is also evidence of a post-dual listing anomaly for low liquidity stocks. Finally, dual listing does not result in significantly improved liquidity. We conclude that dual listing does not result in improved stock returns or liquidity, especially for low liquidity stocks, for the sample studied.

INTRODUCTION

Firms often list their common stock on a regional exchange before moving to a national exchange because the listing requirements are less stringent. Some firms with stock listed on the American Stock Exchange (AMEX) or the New York Stock Exchange (NYSE) later have listed dually on one or more regional stock exchanges. Although many researchers have examined the effects of listing on a national exchange, dual domestic listing is largely unexplored.¹

An exception is a study by Khan, Baker, Kennedy, and Perry (1993). They examine the value impact of dually listed firms on the Pacific and Midwest Stock Exchanges from 1984 to 1988. Although the Khan, Baker, Kennedy, and Perry study finds no significant market reaction on the dual listing day, it reports significantly negative abnormal returns after dual listing. The study examines only 30 trading days in the postlisting period. The study concludes that dual listing has negative valuation implications and that management should question dual listing.

Given its exploratory nature, the Khan, Baker, Kennedy, and Perry study does not consider whether market participants react differently to dual listing based on certain prelisting characteristics such as liquidity. Thus, the negative postlisting market response

¹ See Baker and Meeks (1991) for a summary and interpretation of selected research on exchange listings.

to dual listing may apply only to a subsample of stocks, not to all dually listed stocks. Their study also does not examine the issue of whether liquidity changes as a result of dual listing by altering the trading structure from a monopoly specialist system of the AMEX and NYSE to a multispecialist system created by dual listing.

The current study extends the recent research on the microstructure of equity markets by analyzing the effects of dual listing on stock returns and liquidity. It also examines whether a postlisting anomaly exists after dual listing. This study is important because little empirical evidence exists about the effects of changing market structure through dual domestic listing. As Hasbrouck (1991, p. 14) notes, "microstructure analysis had not yet arrived at the point where we can assert *a priori* that a particular market structure will afford the most liquidity for a given security."

Besides being of academic interest, the current study has implications for market regulators. In 1975 the Securities and Exchange Commission and Congress created the National Market System (NMS) in which dually listed stocks trade. NMS was created to increase interdealer and intermarket competition and to enhance transactional efficiency of equity markets. This study provides evidence about whether increasing competition among specialists through dual listing enhances liquidity. Gerety, McMillan, and Mulherin (1991) note that market microstructure has become an important tool in gauging the effect of existing securities regulation.

The findings also should interest corporate managers and investors. Corporate managers, who are considering dually listing their firm's stock, may want to know if this decision affects the financial well-being of their common shareholders. Investors may want to know if dual listing provides an opportunity for achieving abnormal returns.

MARKET MICROSTRUCTURE ISSUES

According to Amihud and Mendelson (1988) and Hasbrouck (1991), many persons believed until recently that market arrangements had little relevance for securities returns. Now the various characteristics and differences among alternative market structures have attracted increasing interest among the academic community. Microstructure studies suggest that managers intent on increasing shareholder wealth should pay attention to the market arrangements by which their stock is traded.

The specialist structure is desirable for less liquid securities because the consolidation of the smaller order flow with one specialist reduces the fixed costs of market-making. Furthermore, the specialist reduces risk exposure by having greater flexibility in adjusting inventory due to absence of competing dealers. Ho (1984) argues that competition between market makers is desirable for thick issues, but not for thin issues. Consolidation of order flow on a single exchange, NYSE or AMEX, reduces competition for the specialist. Yet reduced competition for a specialist may be better for thin issues than for active issues already trading at minimum spreads.

Cohen, Maier, Schwartz, and Whitcomb (1978) present a model of the effect of thinness on the variance of security returns in a specialist noncompetitive market. The model shows that thin issues are less volatile due the specialists' market power. They argue that the specialist can reduce variance for thin issues so much that the variance-thinness relationship becomes positive. The empirical findings of Cohen, Ness, Okuda, Schwartz, and Whitcomb (1976) and Cohen, Maier, Ness, Okuda, Schwartz, and Whitcomb (1977) show

that variance on thinly traded stocks is greater when these stocks are traded in a non-specialist environment. The variance is low, however, when these stocks are traded in a specialist noncompetitive system. This is because the specialist can have the greatest proportional impact in the market for thinly traded securities.

Grammatikos and Papaioannou (1986) report that less liquid stocks react positively to news about NYSE listing. Edelman and Baker (1990) report a similar result for firms listing on the AMEX. These studies show that only low liquidity stocks benefit by trading under the specialist system of an exchange. Klemkosky and Conroy (1985) and Grossman and Miller (1988) note that the participation of specialists is significantly greater for less actively traded issues. The specialist plays a more prominent role because such issues generate less interest than high liquidity stocks.

Dually listed stocks trade in a different environment than stocks solely listed on the AMEX or the NYSE. The national exchanges have a monopoly specialist system because they assign each stock to a single specialist who, as a dealer, provides marketability services.² Dual listing creates a competitive specialist structure in which the specialist on a national exchange competes against the specialist on a regional exchange for an order flow.

Debate continues about the relative merits of different market structures. At the heart of this debate is the consolidation versus fragmentation controversy. In a consolidated market (single listing) the order flow occurs in one market, but in a fragmented market (dual listing) it does not. Consolidating all orders for a stock in one market maximizes the competitive interaction of traders but sacrifices competition between dealers in providing marketability services. Alternatively, fragmenting the order flow between specialists on a national and a regional exchange provides interdealer competition but weakens the competitive interaction of traders. Empirical results from studies by Demsetz (1968), Branch and Freed (1977), Hamilton (1979, 1987), Cohen, Conroy, and Maier (1985), and Neal (1987) are mixed on the merits of alternative market structures. These studies, however, do not consider the fact that a tradeoff between consolidation and fragmentation may work differently for stocks with high versus low liquidity.

Grossman and Miller (1988) develop an optimal trading structure model that predicts a single specialist in equilibrium for less actively traded stocks and an equilibrium with multiple specialists for actively traded stocks.³ Their model is based on differences in the cost to market-makers for maintaining a market presence and in the demand by investors for immediacy. Market-makers provide immediacy by their continuous presence and willingness to bear risk between the arrival of final buy and sell orders. When volume is high, a competitive market structure is preferred because forcing all trades through a single specialist can create a bottleneck. Moreover, the cost to market-makers of maintaining a continuous presence is low when the demand for immediacy is high. In such situations,

² Stating that the national exchanges have a monopoly specialist system is an oversimplification because both the AMEX and the NYSE structures have mobile floor brokers or dealers for each stock.

³ Research by Vijh (1990) and Neal (1992) on the difference between a competitive market maker and a specialist market structure for option trading is also consistent with Grossman and Miller (1988). Neal finds that as volume rises, however, differences in alternate structures disappear in terms of providing marketability services.

multiple specialists can fulfill the demand for immediacy in a least costly manner. For low liquidity stocks, however, dual listing increases the aggregate cost of maintaining a continuous presence in the market by allowing multiple specialists to handle a limited order flow. Thus, dual listing increases the supply of immediacy by adding specialists. The larger that group of specialists, the lower (other things being equal) the risk and expected return per unit traded by each and, hence, the lower the effective cost of immediacy to the customers. Increasing these costs is undesirable without also increasing the demand for immediacy.

There is little theoretical justification for believing that either single or dual listing affects all firms equally. Amihud and Mendelson (1988) suggest that the tradeoff between the cost of listing and any increase in value can produce different results among firms—tradeoffs between fragmentation and competition work differently for stocks with different liquidity characteristics. For example, dual listing increases competition for a firm's stock for low liquidity stocks, but also fragments an already small order flow. In this situation, the negative effects of fragmenting the market and listing costs may outweigh any positive effects of increased competition. Thus, differences in market structures may influence the market's response to dual listing of stocks with different characteristics.

Several recent studies have examined the market behavior of listed stocks by partitioning their sample using different prelisting characteristics. The most often used characteristics are liquidity and earning per share growth, a proxy for signaling. Several studies, including Grammatikos and Papaioannou (1986a, 1986b), Edelman and Baker (1990), and Baker and Edelman (1991), show that the market reaction to listing on either the AMEX or NYSE differs based on these characteristics. In a recent study Khan and Baker (1993) also report that the stock market reacts differently to dual trading (without dual listing) of stocks depending on prelisting liquidity characteristics of stocks.⁴

RESEARCH QUESTIONS

We address four research questions in this paper. First, does dual listing influence stock returns? This effect is uncertain because dual listing has two opposing effects—the competitive effect and the fragmentation effect. How these opposing effects offset one another under dual listing is an empirical issue.

Second, does the pattern of market behavior around dual listing differ for stocks with low versus high liquidity while on the AMEX or the NYSE? We hypothesize that the pattern of returns for stocks with different pre-dual listing liquidity (as measured by three volume-based measures) differs around dual listing. As noted before, there is little reason to believe that dual listing affects firms equally.

Third, does a postlisting anomaly exist for dually listed stocks? Ying, Lewellen, Schlarbaum, and Lease (1977), McConnell and Sanger (1987), and several other studies report significantly negative abnormal returns during postlisting for initial listing on the

⁴ Dual trading does not necessarily mean dual listing. A stock can trade on two markets, by having unlisted trading privileges (UTPs), without listing on both markets. Dual listing, however, implies dual trading. The decision to seek dual listing is made solely by a firm. A dually listed firm pays a fixed and variable fee for maintaining its listing status on dual market centers. A regional exchange provides some free publicity, advertising, and service support for a dually listed firm. All the above do not occur for a firm dually traded but not dually listed.

AMEX or NYSE. Theory suggests that investors can arbitrage away any predictable negative postlisting price behavior if market frictions no longer exist.

Fourth, does dual listing affect the liquidity of a stock? We make no prediction because of the uncertain effect that trading structure has on liquidity. This question explores whether the perceived benefits of dual listing (such as increased liquidity) actually exist. In a recent survey study, Baker and Khan (1993) identify two major motives for dual listing. Managers believe dual listing increases the liquidity and visibility of a stock. The expected change in liquidity presumably comes from competitive effects being greater than fragmentation effects, whereas added visibility results from publicity associated with dual listing.

SAMPLE AND METHODOLOGY

SAMPLE

This paper focuses on dual listing from a national exchange, the AMEX or NYSE, to a regional exchange, the Pacific Stock Exchange (PSE). The analysis involves dual listing on the PSE to avoid potentially confounding effects that may result from differences in the market microstructure of various regional exchanges.

We examine the PSE because most PSE stocks have two specialists, resulting from having trading floors in both Los Angeles and San Francisco. Thus, dually listed stocks on the AMEX or the NYSE and the PSE receive competition from three different specialists for an order flow. Such stocks trade in a competitive multispecialist market structure.

The PSE provided the names and dual listing dates of 215 companies that dually listed from the AMEX and NYSE from 1984 to 1990. Unlike the listing process used by the AMEX and the NYSE, the PSE does not make a public announcement of the application or approval dates. Therefore, the dual listing day on the PSE, $t_{list} = 0$, is the critical event date.

Inclusion in the final sample required that each stock meet four criteria. First, daily common stock returns and volume had to be available from the files provided by the Center for Research in Security Prices (CRSP) for $t_{list} - 210$ to $+200$. Second, dual listing had to occur no sooner than 210 trading days after the initial listing on the AMEX or NYSE. Including such stocks could create a bias when estimating market model parameters by having too few days of stock returns. Third, dual trading of a stock listed on the AMEX or the NYSE and on the PSE through unlisted trading privileges (UTPs) could not occur before dual listing. By excluding stocks with UTPs, dual listing changes the market structure in which the stocks trade. That is, the study includes only those stocks resulting in new and added competition for the AMEX or NYSE specialist.

Fourth, stocks traded on the PSE are included in the Intermarket Trading System (ITS). This system displays quotes posted in different markets to market makers on the national exchanges, regional exchanges, and the Nasdaq Stock Market and provides an electronic linkage for intermarket executions. Applying these criteria reduced the initial sample from 215 to 87 dually listed companies.

METHODOLOGY

We use standard time event methodology, specifically the market model, as described in Brown and Warner (1980, 1985) and Sanger and McConnell (1986) to examine the

effect of dual listing on stock returns. Abnormal returns (AR_{jt}) for each security j on day t are calculated as:

$$(1) AR_{jt} = R_{jt} - (\hat{\alpha}_j + \hat{\beta}_j R_{mt})$$

where:

- R_{jt} = Return on security j on day t ;
- R_{mt} = Return on the CRSP equally weighted market index; and
- $\hat{\alpha}_j, \hat{\beta}_j$ = Parameters of the market model.

Market model parameters are estimated using 159 trading days before the dual listing date ($t_{list} = -210$ to -51). The CRSP equally weighted index, which includes AMEX and NYSE stocks with dividends reinvested, serves as the market index.⁵

After estimating the average daily abnormal returns (ARs), the cumulative average abnormal returns (CARs) are calculated for various intervals around the dual listing date. To test for statistical significance, each stock's abnormal return is standardized by the standard deviation of its forecast error. Two-tailed z - and t -tests are used to decide if the ARs and CARs, respectively, differ significantly from zero around dual listing. A sign test is used to decide whether the percent of positive returns differs significantly from 50 percent.

Because information could leak earlier or be delayed in reaching investors about dual listing, the effects are measured daily over weekly periods around each announcement. Because daily abnormal returns produce similar results, we do not report these findings.

We used three volume-based measures—average daily trading volume, the liquidity ratio, and market-adjusted liquidity (MAL)—to assess the effect of dual listing on a stock's liquidity.⁶ Volume data are gathered from the CRSP tapes. These liquidity measures are not independent, but simply provide a somewhat different way of viewing liquidity.

We conduct a series of chi-square tests to test the independence of classification of the liquidity measures. The null hypothesis of independence is rejected for the three liquidity measures at the 0.01 level ($\chi^2 = 48.4$ with 14 degrees of freedom). In this situation, all three liquidity measures classify 46 of 87 firms (52.9 percent) into the same low or high liquidity groups. Chi-square tests also reject the null hypothesis of independence at the 0.01 level for volume and the liquidity ratio ($\chi^2 = 34.5$ with 1 degree of freedom) and volume and market-adjusted liquidity ($\chi^2 = 11.0$ with 1 degree of freedom). In these two comparisons, the liquidity measures give the same low and high classifications in 81.6 percent and 67.8 percent of the cases, respectively. The null hypothesis can not be rejected at the 0.10 level for the liquidity ratio and market-adjusted liquidity ($\chi^2 = 2.6$ with 1 degree of freedom). These two measures classify 56.3 percent of the stocks into the same

⁵ We also use the S&P 500 as the market index to test for robustness. Because the results are similar using both market indices, we report only those using the CRSP equally weighted index.

⁶ Bernstein (1987, p. 61) concludes that "no single measure tells the whole story about liquidity." Volume-based measures are popular and intuitively appealing.

low and high liquidity groups. These results suggest that trading volume serves as a reasonable proxy for the other two other volume-based liquidity measures.

The liquidity ratio measures the average dollar volume of trading to the average price change during some interval. Equation (2) gives the liquidity ratio as

$$(2) L_{jt} = \sum_{t=1}^N P_{jt} V_{jt} / \sum_{t=1}^N |\% \Delta P_{jt}|$$

where:

- P_{jt} = Price of stock j on day t ;
- V_{jt} = Volume of stock j on day t ; and
- $|\% \Delta P_{jt}|$ = Absolute value of the percentage change in price of stock j on day t .

The value of L represents the dollar value required to move the stock price by 1 percent. A high value of the ratio means that many shares are traded with little change in price. This is a property characteristic of a liquid stock.

Market-adjusted liquidity, developed by Hui and Heubel (1984), measures the change in price for a given volume traded adjusted for market influence. Its construction involves two steps. The first step uses the market model of total stock returns to identify and take out the market effects of price changes. That is, the market model residuals are estimated, which gives the return volatility not accounted for by market influence. Variations in stock returns are attributable primarily to market returns (specific risk), but influences other than market-related influences also may affect returns. Hui and Heubel suggest that part of a stock's specific risk will reflect the liquidity of its market. Stocks with high liquidity will tend to perform as the market model suggests because random fluctuations will be small. Stocks with low liquidity will have wide price fluctuations and will tend to deviate from the market model. These larger deviations will reflect greater specific risk.

The second step is to measure the effect of volume changes on the volatility of market-adjusted prices. That is, the estimated squared residuals are regressed on the daily percentage change in dollar volume traded (V_i) on the i^{th} stock. The coefficient of V_i is a measure for the market-adjusted liquidity. A small coefficient of V_i in the regression suggests little price change in response to volume change, after considering market conditions. When comparing stocks, those with the lower coefficient of V_i have less liquidity risk for a given market condition. Therefore, the high liquidity group consists of those stocks with relatively lower coefficients of V_i .

The full sample is divided at the median into low and high liquidity subsamples. This partitioning is based on each of the three liquidity measures estimated for each stock over the period $t_{\text{list}} = -210$ to -51 . Using this period avoids possible contamination effects associated with news announcements before the dual listing day. Two sample t -tests are

used to test if the stock returns for the low liquidity group differ significantly from those returns of their high liquidity counterpart.⁷

The matched pairs t-test, Wilcoxon matched-pairs signed-ranks test, and sign test are used to examine whether liquidity changes for each subsample between pre- and post-dual listing. The pre- and post-dual listing periods are defined as $t_{list} = -50$ to -1 and $+1$ to $+50$, respectively.⁸ These related samples tests are useful because they examine differences in the three liquidity measures before and after dual listing for individual stocks. We only report the results of average daily trading volume because it serves as a reasonable proxy for the liquidity ratio and market-adjusted liquidity. The two nonparametric tests (the Wilcoxon and sign tests) are used to test for robustness of the data. All tests are two-tailed because the direction of the difference is not predicted.

EMPIRICAL RESULTS

DUAL LISTING AND STOCK RETURNS

The first research question focuses on learning the impact of dual listing on stock returns. The null hypothesis is that the abnormal returns do not differ significantly from zero around dual listing. Rejecting the null hypothesis shows the presence of systematic abnormal performance of dually listed stocks.

Table 1 presents the results of the event analyses around the dual listing date for the full sample and the subsamples partitioned by the three proxies for liquidity. Panel A shows a significantly negative market reaction of -0.563 percent on the dual listing day at the 0.01 level. Rejecting the null hypothesis on this day suggests that dual listing conveys new information to the market. Therefore, market participants, on average, view this new information negatively. The average daily ARs are insignificant at normal levels during the week before or the week after the dual listing day.

The second research question is whether the market reacts differently to dually listed stocks with low versus high pre-listing liquidity. The null hypothesis is that neither the average daily ARs nor the CARs differ significantly from zero around dual listing.

Partitioning the full sample by the three liquidity measures produces different results for the low and high liquidity subsamples.⁹ Panels B through E of Table 1 show that only the low liquidity groups have significantly negative ARs at the 0.01 level on $t_{list} = 0$. Using volume, the liquidity ratio, and market-adjusted liquidity, the ARs for each low liquidity group on the dual listing day are -0.793 percent, -1.134 percent, and -0.934 percent, respectively. Therefore, the negative market reaction on the dual listing day shown in Panel A of Table 1 for the full sample results mainly from the stocks with low liquidity.

⁷ Summary statistics of low and high liquidity groups during the pre-PSE dual listing period based on the three volume measures are available from the authors. The results show that the low and high liquidity groups differ significantly from each other.

⁸ Comparisons also are made using each liquidity measures between $t_{list} = -210$ and -51 and $+1$ to $+50$. The liquidity differences between pre- and post-dual listing are not statistically significant at normal levels using any of the statistical tests. Therefore, the results are not shown.

⁹ Examination of daily returns and sign tests shows that the negative (or positive) stock price adjustment is not due to a few firms.

Table 1—Abnormal Stock Returns for AMEX and NYSE Stocks Dually Listed on the PSE Around the Dual Listing Day

Test Interval	Average Daily Abnormal Returns (%)	z-Values	Positive Returns (%)
Panel A: Full Sample			
Week before dual listing	0.215	1.467	48.8
Dual listing day	-0.563	-3.239 ^a	43.5
Week after dual listing	-0.081	-0.353	45.3
Panel B: Low Liquidity, Volume			
Week before dual listing	0.286	1.421	51.6
Dual listing day	-0.793	-4.359 ^a	45.2
Week after dual listing	-0.217	-0.710	44.9
Panel C: High Liquidity, Volume			
Week before dual listing	0.144	0.655	46.0
Dual listing day	-0.337	-0.245	41.9
Week after dual listing	0.049	0.202	45.6
Panel D: Low Liquidity, Liquidity Ratio			
Week before dual listing	0.228	0.875	48.4
Dual listing day	-1.134	-5.030 ^a	45.2
Week after dual listing	-0.217	-0.777	43.0
Panel E: High Liquidity, Liquidity Ratio			
Week before dual listing	0.201	1.199	49.3
Dual listing day	-0.005	0.418	41.9
Week after dual listing	0.049	0.269	47.4
Panel F: Low Liquidity, Market-Adjusted Liquidity			
Week before dual listing	0.361	1.605	51.6
Dual listing day	-0.934	-2.706 ^a	50.0
Week after dual listing	-0.236	-0.740	45.4
Panel E: High Liquidity, Market-Adjusted Liquidity			
Week before dual listing	0.058	0.406	45.5
Dual listing day	-0.177	-0.537	38.6
Week after dual listing	0.052	0.112	45.0

^adenotes significance (using a two-tailed test) at the 0.01 level

This evidence suggests that ending the specialist's role as a monopolist, and thus introducing competition, is harmful for low liquidity stocks. Comparing these findings to those of earlier studies by Grammatikos and Papaioannou (1986) and Edelman and Baker (1990) provides a useful parallel. These two previous studies document that stocks of firms with low pre-listing liquidity benefit more from initial listing than do those with high pre-listing liquidity. For stocks moving from Nasdaq to the NYSE or AMEX, the trading structure changes from a competitive dealer system to a monopoly specialist system. When the process is reversed by adding competition through dual listing, the market responds negatively for low liquidity stocks. The specialist plays a prominent role for low liquidity stocks making the single specialist trading structure preferable for such stocks. The findings also confirm the Ho (1984) securities habitat hypothesis.

Table 2—Cumulative Abnormal Returns (CARs) and Statistical Tests for AMEX and NYSE Stocks Dually Listed on the PSE for Various Intervals Around the Listing Date

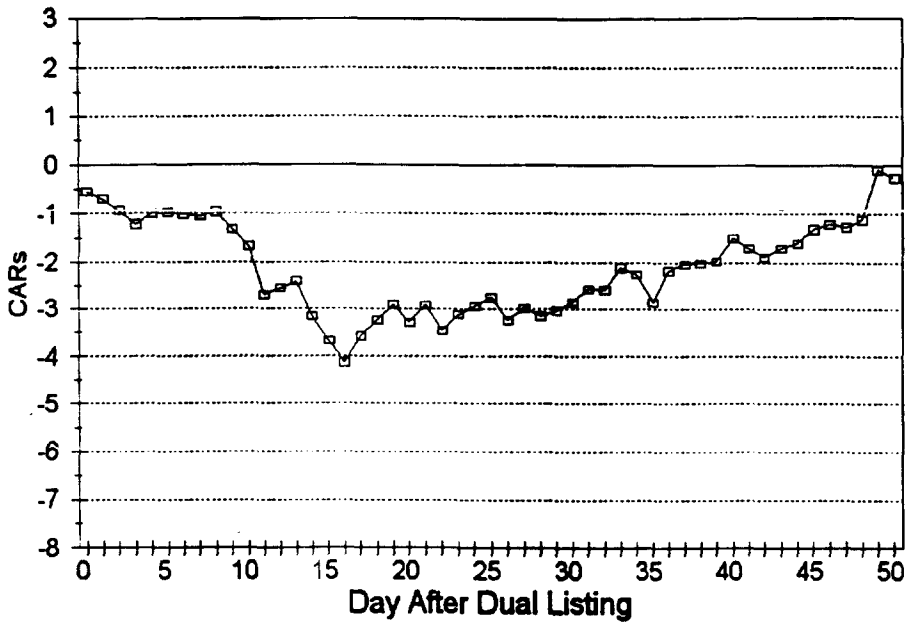
Test Interval	Low Liquidity		High Liquidity		Two-Sample
	CARs %	t-Values	CARs %	t-Values	t-Values
Panel A: Volume					
Pre-Dual Listing					
-50 to -1	3.147	0.765	-0.895	-0.398	5.119 ^a
-20 to -1	2.294	0.839	1.312	0.857	2.036 ^b
-10 to -1	2.126	1.263	1.256	1.237	2.876 ^a
Post-Dual Listing					
0 to + 5	-1.944	-1.315	-0.073	-0.092	- 7.201 ^a
0 to + 10	-2.762	-1.507	-0.560	-0.557	- 6.631 ^a
0 to + 15	-4.875	-1.995 ^c	-2.541	-1.617	- 5.285 ^a
0 to + 20	-4.841	-1.662	-1.810	-1.002	- 5.767 ^a
0 to + 30	-5.715	-1.705 ^c	-0.100	-0.045	- 9.084 ^a
0 to + 40	-3.619	-0.950	0.594	0.233	- 5.948 ^a
0 to + 50	-3.346	-0.770	2.769	0.932	- 7.647 ^a
Panel B: Liquidity Ratio					
Pre-Dual Listing					
-50 to -1	2.705	0.596	-0.425	-0.172	3.936 ^a
-20 to -1	2.596	0.953	1.006	0.653	3.302 ^a
-10 to -1	2.453	1.378	0.927	1.090	5.026 ^a
Post-Dual Listing					
0 to + 5	-2.325	-1.465	0.289	0.510	- 9.971 ^a
0 to + 10	-3.052	-1.548	-0.323	-0.388	- 8.297 ^a
0 to + 15	-6.457	-2.469 ^b	-1.009	-0.797	-12.320 ^a
0 to + 20	-6.623	-2.128 ^b	-0.087	-0.061	-12.413 ^a
0 to + 30	-7.040	-1.924 ^c	1.166	0.684	-13.231 ^a
0 to + 40	-3.504	-0.845	0.478	0.241	- 5.586 ^a
0 to + 50	-1.890	-0.393	1.354	0.616	- 4.033 ^a
Panel C: Market-Adjusted Liquidity					
Pre-Dual Listing					
-50 to -1	6.465	2.041 ^b	-4.004	-1.010	13.557 ^a
-20 to -1	4.273	2.017 ^b	-0.650	0.289	10.446 ^a
-10 to -1	3.706	2.449 ^b	-0.353	-0.285	13.589 ^a
Post-Dual Listing					
0 to + 5	-2.111	-1.581	0.083	0.084	- 8.554 ^a
0 to + 10	-2.712	-1.807 ^c	-0.680	-0.463	- 6.343 ^a
0 to + 15	-4.873	-2.259 ^b	-2.556	-1.342	- 5.274 ^a
0 to + 20	-4.899	-1.857 ^c	-1.778	-0.829	- 6.003 ^a
0 to + 30	-4.529	-1.464	-1.287	-0.507	- 5.299 ^a
0 to + 40	-2.865	-0.834	-0.174	-0.058	- 3.850 ^a
0 to + 50	-0.677	-0.177	0.110	0.016	-0.991

^{a, b, c}denote significance (using a two-tailed test) at the 0.01, 0.05 and 0.10 levels, respectively

Table 2 presents the additional evidence on the effect of dual listing on stock returns.¹⁰ For the low liquidity group, the CARs are positive during pre-dual listing but become negative during post-dual listing. A possible explanation for this finding is that the low liquidity group generates good news before listing and bad news after listing. For

¹⁰ Brown and Warner (1980, 1985) note that cumulative abnormal returns constructed for various periods around an event can provide additional and useful information about the precise pattern of abnormal returns.

Figure 1—Post-Listing CARs for the Full Sample of 87 AMEX and NYSE Stocks That Dually Listed on the PSE Between 1984 and 1990



the high liquidity group, the sign of the CARs varies during pre- and post-dual listing, depending on the test interval.

Table 2 also gives the results of the two sample t-tests. These tests are used to decide whether significant differences exist in the CARs between the low and high liquidity groups. As shown by the positive t-values, the low liquidity group significantly outperforms the high liquidity group during all three pre-dual listing intervals. Yet the low liquidity group significantly underperforms the high liquidity group during each post-listing interval. Analysis of the data suggests that the abnormal gains made by the low liquidity group during pre-dual listing do not offset the abnormal losses experienced during the post-dual listing.¹¹ This statement applies only for the volume-related results but not for the other to liquidity measures (the liquidity ratio and market-adjusted liquidity).

The results in Tables 1 and 2 suggest that the market behavior around dual listing differs significantly for stocks with low versus high pre-dual listing liquidity. Stocks of

¹¹ The stock price movement over a long interval does not necessarily reflect the impact of an event due to possible contemporaneous effects. For the purpose of completeness, we examine the price behavior for a 200 trading day period and various subintervals, such as $t_{\text{test}} = 0$ to +100, +150, and +200. The results, especially for volume and the liquidity ratio, are similar to those already reported.

firms with low pre-listing liquidity experience significantly negative abnormal returns while those with high pre-dual listing liquidity do not.

DUAL LISTING ANOMALY

The third research question examines whether a post-listing anomaly exists for dually listed stock. Figure 1 illustrates the CARs for the full sample for $t_{list} = 0$ to +50. The CARs drift downward until they reach their lowest point of -4.118 percent on $t_{list} = +16$, remain negative until $t_{list} = +50$.

Table 3 presents the CARs and t-values around various test intervals for the full sample. The CARs differ significantly from zero during the intervals $t_{list} = 0$ to +15 and 0 to +20.¹² This evidence supports the presence of a post-dual listing anomaly. As noted before, prior studies on single listing also show significantly negative abnormal returns for several weeks after listing.

Table 3—Return Behavior of AMEX and NYSE Stocks After Dual Listing on the PSE, Full Sample

Test Interval	CARs %	t-Values
0 to + 5	-0.981	-1.189
0 to + 10	-1.653	-1.577
0 to + 15	-3.677	-2.563 ^b
0 to + 20	-3.286	-1.943 ^c
0 to + 30	-2.850	-1.429
0 to + 40	-1.473	-0.649
0 to + 50	-0.252	-0.096

a, b, c denote significance (using a two-tailed test) at the 0.01, 0.05 and 0.10 levels, respectively

Figure 2 shows that the CARs for the sample split into low and high volume stocks. The pattern of CARs differs between the two groups. The CARs of the high volume stocks exceed those of the low volume stocks throughout the total test period, $t_{list} = 0$ to +50. As Figure 2 shows, the CARs of the high volume group are negative only for the intervals $t_{list} = 0$ to +5, +9 to +32, and +39. None of these CARs is statistically different from zero at the 0.10 level. The CARs of the low volume group remain negative over the entire test period, $t_{list} = 0$ to +50. These CARs differ significantly from zero at the 0.10 level during 11 intervals, $t_{list} = 0$ to +11, +12, +14, +15, +17, +22, +26, +28 through +30, and +35, and at the 0.05 level during the interval $t_{list} = 0$ to +16.

Panel A of Table 2 shows statistically negative CARs for the low volume group during two intervals, $t_{list} = 0$ to +15 and 0 to +30. None of the CARs differs significantly from zero during the intervals shown for the high volume group. Based on these results, the post-dual listing anomaly applies only to the group with low pre-listing volume.

¹² The post-dual listing CARs are statistically different from zero at the 0.10 level during the intervals $t_{list} = 0$ to +13 and 0 to +19 through +23, at the 0.05 level during intervals $t_{list} = 0$ to +11, +12, +14, +15, +17, and +18, and at the 0.01 level on $t_{list} = 0$ to +16.

Figure 2—Post-Listing CARs for AMEX and NYSE Stocks Dually Listed on the PSE Split by Average Daily Trading Volume

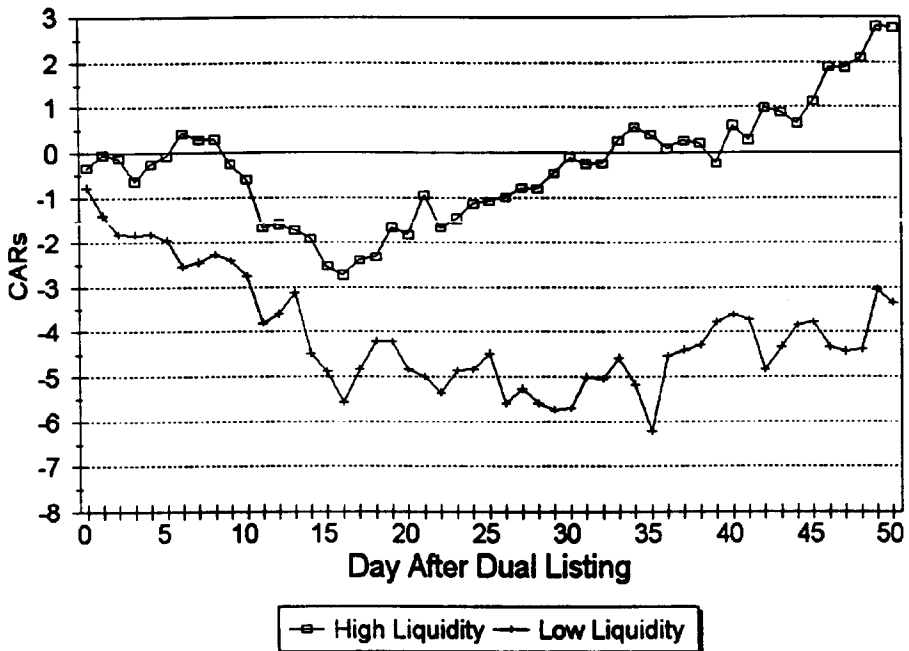


Figure 3 shows that the CARs for the sample split into groups by low and high liquidity ratios. The pattern of CARs differs between the two groups, especially at the beginning and end of the total test period. That is, the CARs of the low liquidity ratio group are less than those of its high liquidity ratio counterpart. The CARs of the high liquidity ratio group are mainly positive, but none of the CARs differs significantly from zero at the 0.10 level. By contrast, the CARs of the low liquidity ratio group are all negative and are significant at the 0.10 level during $t_{list} = 0$ to +3, +13, +18, +19, +21 through +24, and +27 through +32, and at the 0.05 level during $t_{list} = 0$ to +11, +12, +14 through +17, +20 and +26.

Panel B of Table 2 shows that the CARs of the low liquidity ratio group differ significantly from zero during three test intervals, $t_{list} = 0$ to +15, 0 to +20, and 0 to +30. No significant differences are found for the high liquidity ratio group for the test intervals examined.

Figure 4 shows that the CARs from $t_{list} = 0$ through +50 are negative for both the low and high market-adjusted liquidity groups, except $t_{list} = +5, +8, +44, +45$, and +50 for the high market-adjusted liquidity group. The CARs for the high liquidity group are insignificant, however, and much smaller than its low liquidity counterpart based on

Figure 3—Post-Listing CARs for AMEX and NYSE Stocks Dually Listed on the PSE Split by the Liquidity Ratio

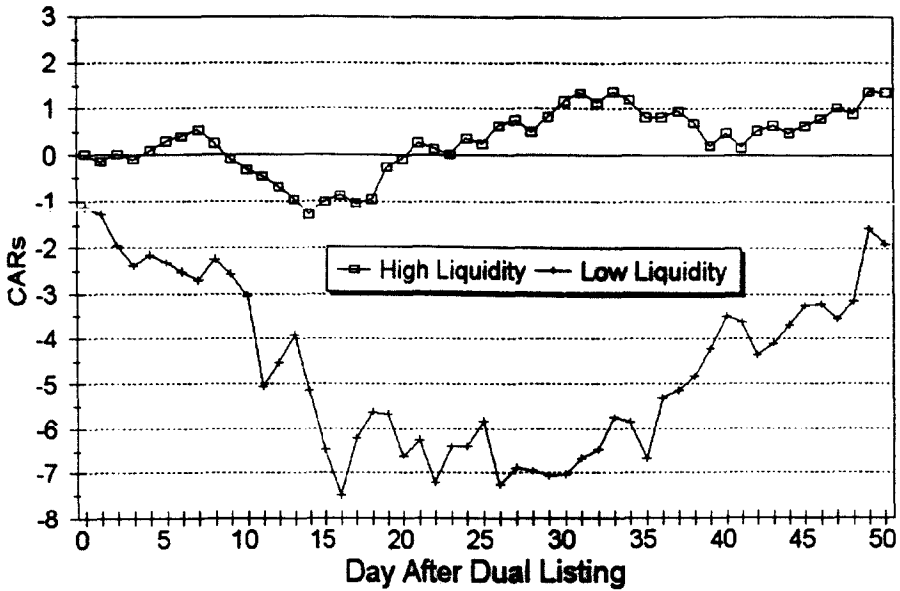
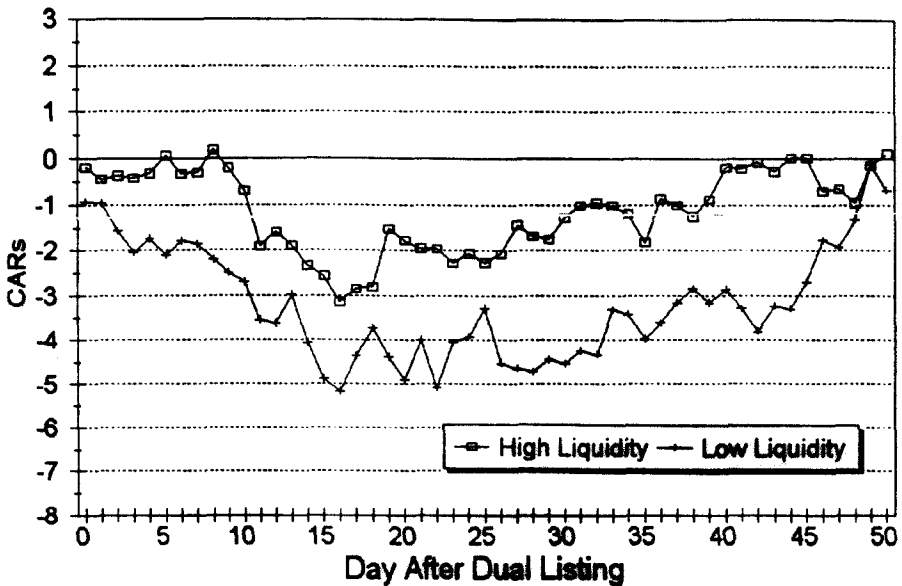


Figure 4—Post-Listing CARs for AMEX and NYSE Stocks Dually Listed on the PSE Split by Market-Adjusted Liquidity



market-adjusted liquidity. The CARs of the low liquidity sample are significant at the 0.10 level during $t_{list} = 0$ to +9, +10, +13, +14, +17, +19, +20, and +22 and at the 0.05 level during $t_{list} = 0$ to +11, +12, +15 and +16.

Panel C of Table 2 shows that the CARs of the low liquidity group differ significantly from zero during all pre-dual listing intervals and $t_{list} = 0$ to +15 and 0 to +20 during the post-listing period. In contrast, none of the CARs for the high liquidity group is statistically significant.

Overall, this evidence suggests that the post-dual listing anomaly does not exist for all AMEX or NYSE stocks that dually listed on the PSE. The results show that the post-dual listing anomaly applies, on average, only to the stocks with low pre-dual listing liquidity, despite the liquidity measure used.

DUAL LISTING AND LIQUIDITY

The fourth research question examines the issue of whether dual listing affects a stock's liquidity. For the matched pairs t-test, the null hypothesis is that the mean difference in the post- and pre-dual listing average daily trading volume does not differ significantly from zero.

Table 4—Pre- and Post-Dual Listing Changes in Average Daily Trading Volume for AMEX and NYSE Stocks Dually Listing on the PSE from 1984 to 1990

Panel A: Volume Measurement

Group	Average Daily Trading Volume Pre-Dual Listing	Post-Dual Listing	Post - Pre Difference	% Change	Matched-Pairs t-Tests t-Values
Low Liquidity	21,683	24,430	+2,747	+12.7	1.51
High Liquidity	140,389	139,866	- 523	-0.4	-0.07

Panel B: Nonparametric Tests

	Low Liquidity	High Liquidity
Sign test		
Post-Dual Listing > Pre-Dual Listing (+)	62.8%	51.2%
Post-Dual Listing < Pre-Dual Listing (-)	37.2%	47.8%
z-Value	1.525	0.000
Wilcoxon Matched-Pairs Signed-Ranks Test		
z-Value	1.232	1.121

As Panel A of Table 4 shows, the low liquidity stocks are the main beneficiaries of increased average daily trading volume. That is, the average daily trading volume increases by +12.7 percent for the low liquidity group but decreases by -0.4 percent for the high liquidity group between $t_{list} = -50$ to -1 and +1 to +50. The matched pairs t-tests, however, show that these changes are not statistically significant at normal levels. The non-parametric tests shown in Panel B of Table 3 confirm these findings of an insignificant change in liquidity from pre- to post-dual listing.¹³

¹³ Similar analyses using the liquidity ratio and market adjusted liquidity yield no statistically significant differences between the pre- and post-dual listing period. Therefore, we do not report these results.

SUMMARY AND CONCLUSIONS

The study examines the market behavior of AMEX- and NYSE-listed common stocks that dually listed on the PSE. For the full sample, the results show that, on average, the market has a significantly negative reaction to dual listing. The evidence also suggests the presence of a post-dual listing anomaly for several weeks after listing. Partitioning the sample, however, shows that this anomaly is attributable mainly to stocks with low liquidity before dually listing on the PSE. The results also show that the returns of dually listed stocks are significantly less for the low versus high liquidity group. Finally, there is no significant change in trading volume after dual listing either for the full sample or partitioned samples.

In theory, a competitive market structure is plausible for high volume stocks because the presence of multiple specialists can reduce queuing bottlenecks for order execution. The presence of other competition, however, obscures the full benefits of multiple specialists for high liquidity stocks. These large, high volume stocks induce higher interest and visibility on an exchange. Therefore, the specialist faces competition from floor brokers or traders who actively participate in trading these stocks. Adding more competition through dual listing does not appear harmful to high volume stocks.

In contrast, theory suggests that the monopoly specialist structure is desirable for low volume stocks. The results support this view. For small, low volume firms, the market reacts negatively upon a change in trading mechanics. For much of post-listing period there is a negative price adjustment for these stocks. The evidence suggests that for low volume stocks the incremental costs of fragmenting the order flow among multiple specialists outweigh the incremental benefits of increased competition. That is, fragmentation has greater negative effects for these stocks. Dual listing also fragments the trading volume across exchanges, but little trading volume may occur on the PSE. Overall, the results suggest that low volume stocks suffer a relative loss compared with their high liquidity counterparts.

Corporate managers attach much importance to improved liquidity of a stock as a perceived benefit of dual listing. Evidence provided by this study, however, does not support the view that this benefit actually exists. Thus, other factors such as added visibility and increasing the number of trading hours may be more important benefits for dual listing.

The evidence suggests value implications differ for AMEX or NYSE stocks with different liquidity that dually list on the PSE. Firms whose stocks are already highly liquid have little to gain or lose by dually listing on the PSE. Managers of firms with less liquid stocks should avoid listing on the PSE if their intent is to increase shareholder wealth. The monopoly specialist system appears better suited for such stocks with low liquidity because splitting the order flow for such stocks between a national and regional exchange has negative results.

REFERENCES

1. Amihud, Y., and H. Mendelson, "Dealership Markets: Market-Making with Inventory," *Journal of Financial Economics*, 8 (March 1980), pp. 31-53.
2. Amihud, Y., and H. Mendelson, "Liquidity and Asset Prices: Financial Management Implications," *Financial Management*, 17 (Spring 1988), pp. 5-15.

3. Baker, H.K., and R.B. Edelman, "Valuation Implications of AMEX listings: A Joint Test of the Liquidity-Signalling Hypothesis," *Quarterly Journal of Business and Economics*, 30 (Winter 1991), pp. 87-109.
4. Baker, H.K., and S.E. Meeks, "Research on Exchange Listings and Delistings: A Review and Synthesis," *Financial Practice and Education*, 1 (Spring 1991), pp. 57-71.
5. Bernstein, P.L., "Liquidity, Stock Markets, and Market Makers," *Financial Management*, 16 (Summer 1987), pp. 54-62.
6. Branch, B., and W. Freed, "Bid-asked Spreads on the AMEX and the Big Board," *Journal of Finance*, 32 (March 1977), pp. 159-163.
7. Brown, S.J., and J.B. Warner, "Measuring Price Performance," *Journal of Financial Economics*, 8 (September 1980), pp. 205-258.
8. Brown, S.J., and J.B. Warner, "Using Daily Stock Returns: The Case of Event Studies," *Journal of Financial Economics*, 14 (March 1985), pp. 3-31.
9. Cohen, K.J., R.M. Conroy, and S.F. Maier, "Order Flow and the Quality of the Market," in Y. Amihud, T.S.Y. Ho, and R.A. Schwartz (eds.), *Market Making and the Changing Structure of the Securities Industry* (Lexington, KY: Lexington Books, 1985).
10. Cohen, K.J., S.F. Maier, W.L. Ness, Jr., H. Okuda, R.A. Schwartz, and D.K. Whitcomb, "The Impact of Designated Market Makers on Security Prices: Empirical Evidence," *Journal of Banking and Finance*, 1 (November 1977), pp. 219-247.
11. Cohen, K.J., S.F. Maier, R.A. Schwartz, and D.K. Whitcomb, "The Returns Generation Process, Returns Variance and the Effect of Thinness in Securities Markets," *Journal of Finance*, 33 (March 1978), pp. 149-167.
12. Cohen, K.J., W.L. Ness, Jr., H. Okuda, R.A. Schwartz, and D.K. Whitcomb, "The Determinants of Common Stock Returns Volatility: An International Comparison," *Journal of Finance*, 31 (May 1976), pp. 733-739.
13. Demsetz, H., "The Cost of Transacting," *Quarterly Journal of Economics*, 82 (February 1968), pp. 33-53.
14. Edelman, R.B., and H.K. Baker, "Liquidity and Stock Exchange Listing," *The Financial Review*, 25 (May 1990), pp. 231-250.
15. Gerety, M.S., H. McMillan, and J.H. Mulherin, "Market Microstructure and Securities Regulation," *Financial Practice and Education*, 1 (Fall/Winter 1991), pp. 25-28.
16. Grammatikos, T., and G. Papaioannou, "Market Reaction to NYSE Listings: Tests of the Marketability Gains Hypothesis," *Journal of Financial Research*, 9 (Fall 1986a), pp. 215-227.
17. Grammatikos, T., and G. Papaioannou, "The Information Value of Listing on the NYSE," *The Financial Review*, 21 (November 1986b), pp. 485-499.
18. Grossman, S.J., and M.H. Miller, "Liquidity and Market Structure," *Journal of Finance*, 43 (July 1988), pp. 617-637.
19. Hamilton, J.L., "Marketplace Fragmentation, Competition, and the Efficiency of the Stock Exchange," *Journal of Finance*, 34 (March 1979), pp. 171-187.
20. Hamilton, J.L., "Off-Board Trading on NYSE-Listed Stocks: The Effects of Deregulation and the National Market System," *Journal of Finance*, 42 (December 1987), pp. 1331-1345.
21. Hasbrouck, J., "Security Markets, Information and Liquidity," *Financial Practice and Education*, 1 (Fall/Winter 1991), pp. 7-16.
22. Ho, T., "Market Structure and Performance," paper presented at the conference on *Market Making and the Changing Structure of the Securities Industry*, Solomon Brothers Center for the Study of Financial Institutions, New York (1984), pp. 17-18.

23. Hui, B., and B. Heubel, "Comparative Liquidity Advantages Among Major U.S. Stock Markets," DRI Financial Information Group, Study Series #84081 (1984).
24. Khan W., and H.K. Baker, "Unlisted Trading Privileges, Liquidity, and Stock Returns," *Journal of Financial Research*, 16 (Fall 1993), pp. 221-236.
25. Khan, W, H.K. Baker, R.E., Kennedy, and L. G. Perry, "Dual Domestic Listing, Market Structure, and Shareholder Wealth," *The Financial Review*, 28 (August), pp. 371-383.
26. Klemkosky, R.C. and R.M. Conroy, "Competition and Cost of Liquidity to Investors," *Journal of Economics and Business*, 37 (August 1985), pp. 183-195.
27. Marsh, T., and K. Rock, "Exchange Listing and Liquidity: A Comparison of the American Stock Exchange With the NASDAQ National Market System," American Stock Exchange Transactions Data Research Project, Report #2 (1986).
28. McConnell, J.J., and G.C. Sanger, "The Puzzle in Post-Listing Common Stock Returns," *Journal of Finance*, 42 (March 1987), pp. 119-140.
29. Neal, R. "Potential Competition and Actual Competition in Equity Options," *Journal of Finance*, 42 (July 1987), pp. 511-531.
30. Neal, R., "A Comparison of Transaction Costs Between Competitive Market Maker and Specialist Market Structures," *Journal of Business*, 65 (July 1992), pp. 317-334.
31. Sanger, G.C., and J.J. McConnell, "Stock Exchange Listing, Firm Value, and Security Market Efficiency: The Impact of NASDAQ," *Journal of Financial and Quantitative Analysis*, 21 (March 1986), pp. 1-25.
32. Vijh, A.M. "Liquidity of CBOE Equity Options," *Journal of Finance*, 45 (September 1990), pp. 1157-1179.
33. Ying, L.K.W., W.G. Lewellen, G.G. Schlarbaum, and R.C. Lease, "Stock Exchange Listing and Securities Returns," *Journal of Financial and Quantitative Analysis*, 12 (September 1977), pp. 415-432.