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December 8, 2004

U.S. Securities and Exchange Commission
450 5th Street, N.W.
Washington, DC 20549-0609

Attention: Mr. Jonathan G. Katz, Secretary

***Re: File No. S7-10-04, Regulation NMS, Release No. 34-49325
(February 26, 2004) (the "NMS Release") and File No. SR-NYSE-
2004-5, Release No. 34-50173 (August 10, 2004)***

Ladies and Gentlemen:

I am writing on behalf of Fidelity Investments to present a preliminary study our market structure and economics research team has done to compare the implicit costs of trading NYSE-listed stocks on the New York Stock Exchange to the implicit costs of trading those same securities in other, voluntarily linked market centers: NASDAQ, ECNs and the Archipelago exchange. The study refers to these other market centers as "the Electronic Market." The data used for the study are the "dash-5" data filed with the Commission pursuant to Rule 11Ac1-5 under the Securities Exchange Act of 1934 for the NYSE and each of the market centers in the Electronic Market.

The study indicates that the "hybrid" market on the NYSE is a substantially more costly trading environment than that of the fully automatic trading environment of the Electronic Market. That differential is important to all investors — both individual and institutional.

The NYSE has suggested that its proposed hybrid market combines the best elements of a floor-based trading venue and electronic trading facilities. Our study indicates, however, that a hybrid market which preserves the ability of floor members to intervene in or slow the process of interaction between automated orders to buy and sell

stocks may detract from the quality of executions received by investors. We urge the Commission to take our study into account in making its decisions on Regulation NMS and the NYSE's Direct+ proposal.

The enclosed study does not take into account non-public information in the possession of the NYSE and NASD concerning executions in those markets. Although such data may shed additional light on these issues, it seems to us unlikely that such data would lead to any different conclusions regarding the superior executions provided by the fully automated Electronic Market.

* * *

We appreciate the opportunity to raise these questions with the Commission. If members of the Commission or the staff wish to discuss these matters, please call either me (617-563-7000) or our counsel, Roger D. Blanc (212-728-8206).

Respectfully submitted,



Attachment

cc (w/att.): The Hon. William H. Donaldson, Chairman
The Hon. Paul S. Atkins, Commissioner
The Hon. Cynthia A. Glassman, Commissioner
The Hon. Harvey J. Goldschmid, Commissioner
The Hon. Roel C. Campos, Commissioner
Annette L. Nazareth, Esq., Director,
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**Comparison of effective spreads for the NYSE trades
versus Electronic Market trades in the NYSE listed stocks, as published in
reports filed pursuant to Exchange Act Rule 11Ac1-5**

By: Ginger Meng* and Ani Chitaley**

Version 1.1 — November 7, 2004

Abstract:

Several prior studies comparing implicit execution costs on the NYSE and on Electronic Markets,¹ for individual investors' orders and small institutional orders have used reports filed pursuant to Rule 11Ac1-5 under the Securities Exchange Act of 1934 (dash-5 reports).² Some studies have paired NYSE and NASD stocks. The pairing methods attempt to answer the following question: When an individual investor trades NYSE and NASD stocks in their respective markets, which market gives lower implicit costs to the investor? Other prior studies have attempted to answer a different question: When an individual investor trades NYSE stocks, does the NYSE's existing hybrid system offer lower or higher implicit costs than the Electronic Market? We have also attempted to answer this second question, using more recent (2003) dash-5 data for a wider sample of 1,138 NYSE symbols. We find that, in the case of individual investors' market orders and small institutional market orders in NYSE stocks, implicit trading costs³ are lower on the Electronic Market than on the NYSE's existing hybrid system. The typical explanation proposed by prior research for the NYSE's observed inferior performance is

¹ We use the term "Electronic Market or Electronic Market Center" to refer to the combination of NASDAQ book available to brokers and market makers who are members of NASD, the ECN books available to all brokers, market makers and investors sponsored by brokers, and Archipelago. All these electronic markets are voluntarily inter-connected.

² Adoption of Rule 11Ac1-5 was announced in Securities Exchange Act Release No. 43590 (November 17, 2000).

³ Investors face additional explicit commissions charged by brokers. Brokers charge commission rates of cents per share or dollars per order, independent of whether the stocks are NYSE or NASD stocks. The commissions are independent of the market in which the customer order is actually traded. Hence the explicit costs of commissions do not affect our cost comparisons across markets. Also, the dash-5 data do not include information on commissions or fees, and, as a result, the reported effective spreads provide means of comparing only implicit trading costs.

selectivity bias, such that the NYSE might be receiving a larger proportion of “difficult” market orders. Difficult market orders are generally assumed to be placed in difficult market conditions. For any given stock, order difficulty is assumed to increase with quoted spread, price momentum in the direction of the order (also called information content) and order size. Our analysis suggests that implicit trading costs on the NYSE’s existing hybrid system are inferior to those on the Electronic Market, even with similar ranges of quoted spreads and order sizes. More accurate comparisons, however, between the intrinsic capabilities of the NYSE’s hybrid system and of the Electronic Markets for providing lower costs to investors would require further research based on detailed trade-and-order data maintained by the respective markets. We suggest that a full understanding of intrinsic capabilities would be desirable for policy makers who are contemplating major changes in the current U.S. equity market structure.

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Approach:

We used market order and related execution-quality data from the 2003 dash-5 reports for 1,138 NYSE symbols in comparing the implicit execution costs for individual investors and small orders (less than 10,000 shares) that were electronically received and executed through the NYSE's hybrid system versus the Electronic Market. We describe below our approach to collecting and filtering the required data.

1. The NYSE's SuperDOT⁴ order flow is most relevant for individual investor orders and small orders received from institutions by the NYSE:

The objective of our analysis is to compare trades executed for NYSE stocks on the NYSE versus Electronic Markets, on behalf of individual investors and institutions with small (less than 10,000 shares) orders. Hence it is important to understand how such orders are received and treated by the NYSE, and to locate appropriate databases required for analysis.

Anecdotal evidence and interviews with brokers suggest that such orders are most typically sent to the NYSE through SuperDOT. While accurate data is not publicly available, for the purpose of the current analysis, it would be reasonable to assume that orders sent to the NYSE via SuperDOT (accounting for about 90% of orders received by the NYSE and about 60% of shares executed in the NYSE) contain almost all orders from individual investors and also contain small orders from institutions.

⁴ The NYSE's Super Designated Order Turnaround System (SuperDot)[®] is its primary order processing system that supports equity trading on the trading floor and provides the NYSE with the current status of any equity order. NYSE member firms transmit market and limit orders directly to the trading post where the security is traded. After the order has been completed, an execution report is returned directly to the member firm over the same electronic circuit that brought the order to the NYSE trading floor. SuperDot can currently process about seven billion shares per day.

Orders sent to the NYSE through SuperDOT receive the same order-handling treatment, irrespective of whether they are from institutions or from individual investors. If the order size is up to 1,099 shares, the orders are generally handled subject to the auto-execution rules of the NYSE's Direct+ system. If the orders are for more than 1,099 shares, they are subject to and are available for specialist and floor trader participation. Hence it is reasonable to assume that SuperDOT orders received by the NYSE are executed in accordance with the NYSE's current hybrid system of auto execution, integrated with specialist-facilitated floor auctions. When the specialist uses his/her capital to trade against a SuperDOT order, the specialist acts like an NASD market maker (also referred to as the "third market market-maker"), except that the specialist holds a monopoly on the transactions. In the case of NASD, multiple market makers compete with each other in the use of capital.

On the basis of further anecdotal evidence and broker interviews, we understand that small orders of less than 10,000 shares, if from institutions, do sometimes go directly to the floor brokers, but such orders account for no more than 10% of total shares traded on the NYSE. The bulk of institutional orders received directly by the floor brokers are for blocks (greater than 10,000 shares), and are treated as "market not held" orders. Such orders account for approximately 30% of the shares executed on the NYSE.

2. Dash-5 reports provide the most relevant publicly available data for individual investor orders and small orders from institutions:

Exchange Act Rule 11Ac1-5 mandates that all markets in the United States report order data and regular-way execution data received for all stock orders of less than 10,000 shares. For the initial period, and as of this date, the SEC has exempted non-electronically received orders from such reports. These reports include data only on orders received electronically. They include all orders for less than 10,000 shares received from individual investors and institutions, through the NYSE's SuperDOT and in all other Electronic Markets. Dash-5 reports include market orders and limit orders (including immediate-or-cancel orders) received by a market center during regular trading hours at a time when a consolidated best bid and offer is being disseminated, and,

if executed, are executed during regular trading hours. They do not include any order for which the customer requests special handling, such as orders to be executed at the market opening price or closing price, orders submitted with stop prices, orders to be executed only at their full size, orders to be executed on a particular type of tick or bid, orders submitted on a “not held” basis, orders for other than regular settlement, and orders to be executed at prices unrelated to the market price of the security at the time of execution. The dash-5 reports provide us with the most relevant publicly available data for our analysis of individual investor orders and small orders from institutions.

3. Description of data:

We analyzed effective spread data available in the dash-5 reports for the twelve months of 2003, as published by Transaction Auditing Group, Inc. (“TAG”) on its website. The definitions of effective spread and different types of orders are given in Appendix I. Types of orders included or excluded in the dash-5 reports are given in Appendix II.

We started with all of the 2,557 NYSE securities existing as of December 31, 2002. From this list, as shown in Appendix III, we eliminated foreign-incorporated securities, ADRs, REITS, certificates, SBIs, units, closed-end funds etc., leaving us with the 1,329 NYSE common stocks. This list was further reduced to the 1,138 NYSE securities after removing securities whose daily trading volume was less than \$20,000, whose average closing price was less than \$3 (with some exceptions), as well as securities which changed listing between NASD and the NYSE, or which had missing data, or for which data was not available in dash-5 reports, as shown in Appendix III. The final list of 1,138 symbols selected for analysis is given in Appendix IV.

The total market trading volume for these 1,138 symbols was 318 billion in 2003. Trading volume included in the dash-5 reports was 124 billion shares (39% of total market volume), representing trades for all orders less than 10,000 shares, received electronically by the market centers. The NYSE accounted for 108 billion shares, and the Electronic Market accounted for 9 billion shares (87% and 7% of dash-5 trading volume, respectively). On the NYSE, market orders accounted for 33 billion shares, and marketable limit orders accounted for 40 billion shares (31% and 37% of the NYSE’s

dash-5 volume, respectively). On the Electronic Market, market orders accounted for 4 billion shares, and marketable limit orders accounted for 2.5 billion shares (44% and 28% of the Electronic Market's dash-5 volume, respectively). Figure 1 shows further details of trading volumes and proportions for different types of orders.

In the 2003 dash-5 reports, we noticed that seven NYSE specialists and 32 NASD market centers including ECNs and the Archipelago Exchange, received and executed orders for the 1,138 symbols. We compared effective spreads for the NYSE and NASD market centers for these symbols. The NYSE specialist executions represent trades done through the NYSE's current hybrid system (electronic and specialist-facilitated floor auctions), where the specialist is held responsible for the execution quality and disposition of electronically received (SuperDOT) orders. The NASD market center executions represent electronic executions of the NYSE symbols, for orders received through NASDAQ, ECNs and Archipelago, where these market centers are responsible for the execution quality and disposition of received orders. The names of the seven NYSE specialists and 32 NASD market centers reporting the executions are listed in Appendix V.

4. Data for market orders for NYSE stocks, received electronically through SuperDOT and through other Electronic Markets:

Individual investors are more likely to place market orders than other types of orders. Chakravarty (2001) analyzed the NYSE's TORQ data for orders between 500 through 9,999 shares, for two months from November 1990 through January 1991. This study suggested that individual investors were less informed traders than institutions. When traders have more information, they are more likely to place limit orders, and not market orders. Bae et al. (2003) found that traders place more limit orders than market orders when the order size is large, when the spread is large, and when they expect high volatility.

The expectation of any investor who places a market order is to get a price at or within the National Best Bid and Offer that existed at the time of order submission to the broker

or directly into a computer screen provided by a broker, and to get the order filled immediately or with only minimal delay.

Hence we analyzed only market order data from the dash-5 reports. The TAG data for 2003 shows that market orders for the 1,138 symbols represented 33% of total dash-5 reported trading volume.

Similar ratios are observed for retail SuperDOT order data that is also available in the TAG dash-5 data. Although Exchange Act Rule 11Ac1-5 does not mandate separate reporting of retail (individual investor) orders and executions, the NYSE voluntarily publishes such data. Retail orders, however, are not always accurately identified. Interviews with a mid-size brokerage indicated that they do not tag their orders going to SuperDOT as retail or otherwise. Some brokers believe the NYSE treats as retail orders SuperDOT orders up to 1,099 shares and all other orders specifically tagged as “retail”.

5. Other types of orders that we excluded from analysis of dash-5 data:

a. Marketable limit orders:

It is commonly believed in the securities industry that most individual investors do not intentionally give marketable limit orders to their brokers. As seen from Appendix I, a marketable limit order to buy would have a price higher than the lowest national offer price. Such an aggressive buy order would generally be given by an institutional investor or professional trader acting on information. Because of the time delay between order entry by a customer and actual order receipt by a market center, sometimes a limit order at or within the NBBO at time of placement might be recorded as a marketable or non-marketable limit order since the NBBO at the time of order arrival at the market center might have changed. The treatment of marketable limit orders is significantly different between the NYSE and other electronic market centers. Marketable limit orders sent to Electronic Markets have a disadvantage over similar orders sent to the NYSE through

SuperDOT, in view of the provisions in the ITS rule⁵. The rule requires that an incoming ITS order cannot be cancelled for at least 30 seconds from the time of order entry. This effectively gives the NYSE specialist 30 seconds to respond to the incoming ITS order. The order is not guaranteed an execution, and the NYSE quote is not necessarily firm for the order.

On the NYSE, full execution of a marketable limit order can depend on specialist's or floor broker's participation and the execution can take longer than an auto execution in an electronic book. In an NASD market center, the entire order can be filled by auto execution through the publicly available depth of electronic books, and the aggregate execution may also include the volume shown in the NYSE ITS quote published in the consolidated quotation system.

Assume a scenario in which a limit order to buy 1,000 shares at \$20.13 is entered while the NBBO is a bid for 500 shares @ \$20.05 and an offer of 200 shares @ \$20.10. The NBBO mid point in such a case would be \$20.075 $\{= (20.05 + 20.10)/2\}$:

- If executed on the NYSE, the order could be filled for 200 shares @ \$20.10, plus 800 shares from the specialist or crowd at a price of their choice, say, \$20.12. This would give an overall volume-weighted average price of \$20.116 for the buy order of 1,000 shares, and the corresponding effective spread is 8.2 cents $\{= 2 \times (20.116 - 20.075)\}$.
- For the same quotes on an NASD market center, auto execution of the 1,000 shares could happen by lifting the offer of 200 shares @ \$20.10, and then sweeping the higher-priced offers to buy the remaining 800 shares. The overall volume-weighted average price for the 1,000-share execution, and the corresponding effective spread would depend on the depth of the published electronic books of NASD market centers. Note that the overall price is dependent on the existing, published quotes, and/or the interjection of the receiving market maker.

b. At-the-quote, inside-the-quote and near-the-quote orders:

⁵ See, e.g., NYSE Rule 15A.

This data has time-stamping uncertainty, similar to that of marketable limit orders. Dash-5 data for NYSE executions shows such orders represent 33% of shares executed for the 1,138 NYSE symbols. Electronic markets show negligible percentages for these three order types in these NYSE stocks, with numerous “null” records for effective spreads. Exchange Act Rule 11Ac1-5 does not require market centers to report on the execution quality (effective spreads etc.) for these three types of orders.

Analysis:

1. Limitations of dash-5 data used for our analysis:

Market centers, including the NYSE, have pointed out limitations of dash-5 data when used to infer execution quality of market centers: (1) Dash-5 reports cover only a limited portion of the NYSE volume, since they exclude orders sent to the floor, short sales, etc.; (2) The measure of effective spread as defined by Exchange Act Rule 11Ac1-5 fails to distinguish trades greater than the quoted depth from trades less than the quoted depth.⁶ (3) Transaction-level results are not available since only monthly aggregations are reported, and matched pairs of best quotes at the receiving market center and the corresponding NBBO are also not available. In summary, dash-5 data could be useful only for overall performance comparisons across market centers, for order flows as received by the market centers.

Despite these limitations, we found dash-5 reports to be relevant for the purpose of our analysis:

- From the perspective of an investor, comparison with the mid-point of the quote at the time of order entry could be viewed as one of the relevant measures of execution performance, irrespective of order size. The mid-point at time of order entry represents a “fair-value” of the stock, to an investor who wishes to enter his/her order

⁶ Paul B. Bennett’s presentation at “Innovation in Finance,” The 15th Annual Conference of the Financial Markets Research Center, supported by a special grant from the NYSE, held on April 11-12, 2002, Vanderbilt University.

in the market at that time. If a market has insufficient depth, and an investor's buy order is filled through several sequential executions, the investor would wish to know the overall purchase price, calculated as the volume-weighted execution price for the total fill. The investor would also wish to know the amount by which the purchase price was more or less than the "fair value" (that was expected for the purchase). Effective spread is defined as twice this difference amount, and dash-5 reports include monthly share-weighted averages of effective spreads for different securities, market centers and size categories.

- Dash-5 data is the only publicly available source of execution quality measures across different markets where all are using the same standardized definitions of execution quality. The quality of dash-5 data has been improving since 2001.
- Dash-5 reports contain almost all of the required execution quality data since most retail and institutional orders, less than 10,000 shares, are now being submitted electronically to the NYSE through SuperDOT.

2. Effective spread comparisons between the NYSE and Electronic Markets:

As stated above in Approach, subsection 4, our analysis focused only on market orders because individual investors are more likely to place market orders. Market orders in an auto-execution order-handling process that features price-time-priority should be expected to get the quoted offer price for a buy order or a quoted bid price for a sell order if the order size is not greater than the quoted sizes in the offer or bid. In this case, the effective spread would be equal to the quoted spread. However, if the NYSE specialist or floor broker, or an NASD market maker, interjects to provide a better price to the incoming order, then the resulting execution would give an effective spread for the executed quantity narrower than the quoted spread. The expectation of an investor placing a market order is very simple: "At this instant I see an NBBO and I calculate the mid point as a "fair" price to expect. So, execute my buy order as fast as possible, as close to the mid point as possible, yet not above the best offer." After the market order is executed, the effective spread can be calculated to measure the degree to which the investor's "fair" price expectation was met.

Referring to Figures II through V, we observe that:

- a. The overall effective spread reported by Electronic Market Centers has a share-weighted mean of 2.17 cents, versus a wider spread of 3.06 cents for the NYSE, the difference being statistically significant (Figure II).
- b. 24 out of the total of 32 Electronic Market Centers reported narrower effective spreads than the 3.06 cents reported by the NYSE. Knight Capital Markets, Bernard L. Madoff and Schwab Capital Markets accounted for 82% of the total shares executed for orders received by Electronic Market Centers. These three market centers reported an effective spread of 2.09 cents, versus the NYSE effective spread of 3.06 cents (Figure III).
- c. Electronic Market superiority of reported effective spreads (versus the NYSE) is even greater for small orders (less than 500, and between 500 to 2,000 shares), which would be more representative of executions done for individual investors (Figure IV).
- d. For the market as a whole, including the NYSE, and the Electronic Market, the overall share-weighted effective spread for market orders diminished over the 12 months of 2003 (Figure V). This suggests that competition for and selectivity of order flow between the Electronic Market Centers and the NYSE has been beneficial to investors.

3. Comparison of intrinsic capabilities of the NYSE's existing hybrid system and Electronic Markets:

To compare accurately the intrinsic capabilities of the NYSE and Electronic Markets, it would be useful to identify the sensitivity of their effective spreads to changes in market conditions, causing changes in order "difficulty." Recent work by Lehn et al. (2004) appears to indicate that the NYSE's hybrid system is less effective than some Electronic Market centers, in dealing with news- or event-driven market swings.

It would be preferable if future research were to use order and transaction-level data and focus on market orders across all market conditions and all Electronic Markets. Such data, which is available only within each market center, would more accurately answer the following questions:

- What are the actual market factors that define the “difficulty” for executing market orders for a given NYSE stock?
- What are the effective spreads for orders of similar “difficulty,” in the NYSE’s hybrid system, and separately in the Electronic Market?

3a. Intrinsic capabilities of Electronic Market Centers:

The share-weighted average effective spread of two Electronic Market centers, namely Archipelago and Instinet, is 2.75 cents compared to the NYSE’s effective spread of 3.06 cents. ECNs have no explicit “market maker” or “specialist” intervention. Smart routers which can route orders to ECNs effectively allow incoming market buy or sell orders to trade at the best displayed offer or bid that is available in the Electronic Market. If the NYSE or the NASDAQ book or another ECN has a better quote, then the market order is sent through SuperDOT or ITS to the NYSE, or through private networks to another ECN or NASDAQ. Hence effective spreads in Electronic Markets such as ECNs depend highly on the depth of quotes or liquidity available from other investors and market makers.

It would be reasonable to assume that order flow to ECNs is a typical mix of “easy” and “difficult” orders. ECNs, by design, cannot be selective about the orders they receive or execute, and thus cannot elect to receive or execute only “easy” orders. The lower execution cost for orders received by ECNs might be indicative of the superior intrinsic order-handling performance by Electronic Markets which have order-driven auto-execution. While it is possible that order-entry firms perform a selection function to prefer one market over others for “difficult” orders, there is no data that we are aware of,

to show that order-entry firms routinely select the NYSE over other markets for such orders.⁷

In a hybrid market such as the NYSE, the effective spread provided to an investor order depends on the specialist's participation. Bondarenko et al. (2003) suggest that a specialist's participation might depend on the depth of the limit order book and its uncertainty. Seppi (1997) suggests that, in a hybrid system like the NYSE, a specialist would trade to maximize his /her profits by executing arriving market orders in the face of competition from limit orders. This would mean that price improvement for market orders is contrary to specialist's profits. Panayides et al. (2004) analyzed the NYSE's TORQ data from November 1, 1990 through January 31, 1991, for 144 NYSE stocks (before decimalization). They proposed a specialist's inventory-balancing model and suggested that the specialist might self-subsidize his/ her costs when the constraints of the NYSE's price continuity rule are not binding. The authors showed that the specialist loses money when he/ she is passive (participation when price continuity rule is binding), but makes money when he/ she is active (participation when price continuity rule is not binding). One implication of this finding is that the self-interests of the specialists might be contrary to better execution prices for investors since the specialists are in business to make profits (within the constraints of the NYSE regulations).

3b. Effect of order "difficulty" on execution costs (effective spread):

Since various inter-connected cost factors are used to evaluate execution performance and order "difficulty," some definitions might be useful to keep in mind:

Execution cost factors for a given number of shares bought with a purchase order:

$$\text{Effective Spread} = 2 \times (\text{Purchase Price less [Mid Point]}) \quad (1)$$

$$\text{Effective Spread} = [\text{Quoted Spread}] \text{ less } 2 \times \text{Price Improvement} \quad (2)$$

⁷ See Figure VI, which casts doubt on the arguments that the NYSE's performance was adversely affected by selectivity bias so that it received a disproportionate share of "difficult" orders.

$$\text{Realized Spread} = \text{Effective Spread less } 2 \times [\text{Mid}_5 - \text{Mid Point}] \quad (3)$$

$$\text{Price Impact} = 2 \times [\text{Mid}_5 \text{ less Mid Point}] \quad (4)$$

In the above equations, Price Improvement, Price Impact and Mid₅ are calculated as: Price Improvement = Ask less Purchase Price; Price Impact = Effective Spread less Realized Spread; Mid₅ = Mid Point of the NBBO, five minutes after completion of order.

From equations (1) through (4), note that [Mid Point], [Quoted Spread] and [Mid₅] are three variables that describe market conditions for the purchase order. All other factors such as Effective Spread, Price Improvement, Price Impact and Realized Spread are calculations representing the characteristics of execution costs. Note also that for given market conditions, Price Improvement, Price Impact and Realized Spread are directly related to Effective Spread. In other words, if we know Effective Spread and two factors of market conditions surrounding the order (example: Quoted Spread and [Mid₅ less Mid Point]), then we have the full picture of cost relative to market conditions. The variable [Mid₅ less Mid Point] is an approximation representing the movement of the stock price after the execution. When aggregated over several executions, it could be interpreted as a measure of difficulty for liquidity providers, including market makers and specialists.

Quoted Spread is a factor that measures order “difficulty.” Our analysis shows that for similar share-weighted average quoted spread-ranges, Electronic Market provides lower effective spreads than does the NYSE (Figure VI). For this analysis, we segmented all monthly symbol records from our dash-5 data set into eight ranges of Quoted Spreads, from four cents or less through 16 cents or more. Then we calculated the share-weighted effective spreads for all the NYSE records in each of the eight Quoted Spread segments. We repeated the calculation for all records in the Electronic Market. The results suggest that the Electronic Market might be more effective than the NYSE hybrid system in providing lower effective spreads for market orders, for small as well as large Quoted Spreads.

Order size is another factor that indicates “difficulty.” Executions for large orders are generally expected to have higher effective spreads than those for small orders. Even for

this “difficulty” factor, our analysis indicates that Electronic Markets provide lower effective spreads than does the NYSE (Figure IV).

A particular limitation of dash-5 reports must also be kept in mind while interpreting the effects of order flow selectivity. Effective spreads and other execution cost factors are reported by the receiving market center for all executions against all orders received by the market center, irrespective of whether the order was partially or fully executed inside the market center or was passed on to other market centers, and executed by them. This means that the effective spread reported against a market center includes the result of how effectively that market center traded orders and how effectively the other market centers which received remaining portions traded the remaining orders.

On the basis of the above clarification of dash-5 data, we observe that if the reported NYSE effective spread is higher than the Electronic Market effective spread, it could not simply be due to Electronic Markets passing on difficult orders to the NYSE because the inferior results for the corresponding NYSE executions would be included in the results reported by the market center. In fact, one of the intentions of Exchange Act Rule 11Ac1-5 was to hold the receiving market centers responsible for the total result of executions for the orders they receive, and not simply for their own executions. Individual investors generally do not care, nor do they always know, if their order was executed by the market center to which it was sent, or was executed by other market centers which were passed on the order. Investors care about the final results, and the receiving market centers compete with each other to provide the best results for the orders they receive.

4. Prior Research:

Bessembinder (2003), Lipson (2004), and Boehmer et al. (2003) have all used dash-5 data on order flow and execution quality for NYSE stocks reported by the NYSE and by selected non-NYSE market centers. Their studies also appear to suggest that the NYSE’s effective spread for its own stocks is not always the lowest, compared to executions in other electronic markets. Data used in our analysis covers more number of stocks over a more recent full-year period, compared to prior studies.

The above prior studies have also attempted to draw further conclusions from the dash-5 data. In particular, the studies have attempted to find the reasons behind the observed differences in execution costs (as measured by effective spreads) on the NYSE versus other market centers. The studies have indicated that one of the reasons for lower effective spreads reported by the non-NYSE market centers compared to the NYSE could be that the non-NYSE market centers received order flow under “easier” market conditions. In other words, the NYSE could have received a larger proportion of “difficult” orders than the proportion received by Electronic Markets. However, these studies have not explicitly reported the proportions of “easy” or “difficult” orders received by the market centers, nor have they demonstrated that other market centers are sending “difficult” orders to the NYSE. Our dash-5 data set for the 1,138 NYSE symbols shows that the Electronic Market centers and the regional exchanges could not have contributed more than 1% of the total market orders received by the NYSE through SuperDOT and ITS. It is also possible, however, that some non-NYSE market centers might not be correctly reporting their “in” and “away” execution volumes.

4a. Bessembinder (2003)

Bessembinder’s study used two months (July and August 2002) of dash-5 data for 500 NYSE stocks. The study found the simple mean effective spreads of Instinet, Madoff and Knight (between 1.95 cents to 4.89 cents) to be lower than the NYSE’s effective spread of 6.95 cents. Bessembinder then applied various explanatory factors in a regression equation, and also applied variables created from Probit estimation to control for selection biases. The purpose was to compare execution cost results across market centers, after adjusting for order “difficulty” and other variables. The complete list of explanatory variables and Probit controls is explained in Table 4 of Bessembinder’s paper.

Bessembinder found that Instinet and Madoff effective spreads were lower than those of the NYSE, even after adjusting for regression variables representing order difficulty and adjusting for selectivity bias. Even Knight’s effective spread was superior to the NYSE after adjusting for regression variables, but was inferior after adjusting for selectivity

bias. However, the p-value for a null hypothesis was high for this latter case, and this reduced its statistical significance.

Bessembinder's methodology could be extended in future work, to understand the reasons behind the lower effective spreads for Instinet and Madoff compared to the NYSE, even after adjusting for regression variables and selectivity bias. Are there some structural reasons (not accounted for in the study) that might suggest superior intrinsic performance of the ECN and the NASD market makers compared to the NYSE's hybrid system?

4b. Lipson (2004)

Lipson's work reports simple average effective spreads of 11.5 cents for market orders on the NYSE, versus 3.81 cents, 6.17 cents and 8.40 cents for Madoff, Archipelago ECN and Knight, respectively. These calculations were based on dash-5 data from July 2001 through June 2002, for a selection of 350 NYSE stocks. We tend to disregard the results for Archipelago because its execution volume was only 1% of the overall executions of the NYSE stocks, during the reporting period. Archipelago ECN had merged with RediBook ECN in March 2002, just before the study period, and investors had just begun directing orders in NYSE stocks to Archipelago.

Lipson goes beyond the comparison of execution quality for the NYSE stocks across market centers, and investigates potential reasons for the NYSE's inferior overall effective spreads versus those for the other market centers. Based on analysis of market conditions at time of order receipt, he suggests selective behavior by market makers and other non-NYSE market centers in directing investor orders to the NYSE, such that the NYSE receives a larger proportion of "difficult" orders than non-NYSE market centers. The latter tend to specialize in accepting orders with "easier" market conditions. Lipson defines the degree of difficulty through two primary factors: the Quoted Spread at time of order receipt, and the Realized Spread after the order execution. Lipson's regression analysis also suggests that Madoff's lower effective spread compared to the NYSE's could be explained at least partially by higher relative quoted spread, higher relative price

improvement, lower relative liquidity (turnover), smaller market capitalization (log of market value) and higher volatility for orders received by the NYSE versus Madoff.

Lipson concludes by stipulating that competition for NYSE stocks, amongst market centers, and the resulting fragmentation of order flow, might be contrary to a single, dominant, lowest cost architecture. While the study appears to explain the NYSE's higher effective spreads as due to more difficult orders, the analysis does not specifically support the argument that the NYSE's hybrid system could provide smaller effective spreads than those of competing market makers and ECNs, had the NYSE received "easier" orders. Hence Lipson's stipulation that competition appears to be contrary to a lowest cost market structure to investors remains unsupported by his analysis.

4c. Boehmer, Jennings and Wei (2003)

This study analyzed dash-5 data from June 2001 through February 2003 for 255 NYSE securities. The study period of 21 months is the longest amongst the three prior studies we discuss. The study found that routing decisions by broker-dealers and traders depend significantly on execution quality. Market centers reporting low execution costs and fast fills progressively received more order flow. The authors state that their results are "consistent with active competition for order flow that can be influenced by public disclosure in contrast to several allegations and admissions of non-competitive behavior in the recent past."

One of the goals for the dash-5 rule was to "empower market forces with the means to achieve a more competitive and efficient national market system for public investors."⁸ Boehmer's study suggests that competition was effective and that order flow was selectively moving to competing market centers. In future, similar studies could address the question of why the market share of a competing new exchange (Archipelago), which is electronic, has been steadily increasing.

⁸ SEC Release No. 34-43590 (November 17, 2000), last line under Introduction.

It might be realistic to assume that competition for order flow based on execution performance would facilitate continued improvement of execution performance across all markets and would thereby benefit all investors in the long run.

Conclusions:

Our current research shows that executions of market orders up to 10,000 shares for NYSE stocks have better (lower) effective spreads on Electronic Markets, than executions of market orders received by the NYSE specialists. The share-weighted effective spread is 2.17 cents for Electronic Market executions, versus 3.06 cents for the NYSE.

Effective spreads on Electronic Market Centers are even more advantageous than the NYSE effective spreads for small market orders. Small market orders are more representative of orders from individual investors than of institutional orders.

Our study also suggests that Electronic Markets provide lower effective spreads, for market orders in NYSE stocks, for all order sizes, and for large as well as small quoted spreads.

In its monthly “Market Quality” report,⁹ the NYSE claims that its execution quality as measured by effective spreads is superior to that of NASD, including market makers and ECNs. Our analysis raises doubts about the validity of these claims, in the context of individual investor orders and small institutional orders. In the same report, the NYSE also claims superiority over NASD by quoting results supplied by industry benchmarking firms that measure institutional trade execution quality. While this comparison of institutional trading capability is outside the scope of our current research, it is important to note that the benchmarking firms compare the “all-in” execution prices for daily or multi-day trades received by institutions from brokers, with “reference” prices that are

⁹ Published on nyse.com. See “New York Stock Exchange Market Quality,” in the “Disclosure of Order Execution” section, under the “Best Ex/11Ac1-5” tab. Refer to the August and September 2004 issues.

based on the benchmarking company's models. The execution price obtained by an institution is highly dependent on its trading strategy, trading skill and effectiveness of working with brokers. It is not the execution price for each small order or partial print executed in the market center on behalf of the institutional investor. As such, these benchmarking reports do not represent execution quality comparisons between markets.¹⁰

There are two key questions (amongst others) that could be helpful in making informed decisions about changing the NYSE's current hybrid system:

- Would competition between market centers, for attracting and trading order flow be hindered by the proposed changes to the NYSE hybrid system? Dash-5 data points to the benefits of competition in reducing trading costs to investors.
- Which market system is better, the NYSE's recently proposed expanded hybrid system, or the system of fully electronic, interconnected market centers with auto execution? Under similarly difficult market conditions, which system would provide lower execution costs to investors?

Further quantitative research is needed to respond to these questions accurately.

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¹⁰ The reference prices are calculated from market data for trades reported in the consolidated market. The execution price used by these firms is the "all-in" share-weighted average price for the total execution for the whole day or for multiple executions over multiple days. Some benchmarks also include commissions charged by brokers. Furthermore, the benchmarking comparisons are for institutional execution quality for NYSE stocks versus NASD stocks, and are not for NYSE stocks traded on the NYSE versus Electronic Market.

Cap Trading, LLC, and two other broker-dealers for their explanations of the order-handling process in the NYSE and NASD markets. The two broker-dealers wish to remain anonymous. Jamie was also gracious in verifying some of our observations and providing ideas for our analysis. Our special thanks also go to Erik Sirri, Professor of Finance, Babson College, Massachusetts, for his review and comments of our paper, and to Vinod Pujar, Manager of High Performance Computing with Fidelity's Global Equity Trading division, for his diligent and resourceful efforts in collecting and understanding the dash-5 reports. Without his help, this work would not have been possible. Our thanks also go to other members of Fidelity's Global Equity Trading, Trading Techniques and Measurement group. The analysis presented and opinions expressed here are those of the authors only. They do not necessarily represent the views, opinions or approval of Fidelity Investments. Contact the authors at 82 Devonshire Street, E30B, Boston, Massachusetts, or at mengj@bc.edu, or ani.chitaley@fmr.com.

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References:

Bae, K., Jang, H., Park, K., 2003, "Traders' choice between limit and market orders: evidence from NYSE stocks," *Journal of Financial Markets* 6 (2003) 517-538.

Bessembinder, H., May 2003, "Selection Biases and Cross-Market Trading Cost Comparisons." Some results of this paper were presented at the December 2002 NYSE conference "SEC Rule 11Ac1-5 Market Quality Statistics" in Washington, DC, under the title "Selection Biases and Average Trade Execution Costs."

Boehmer, E., Jennings, R., and Wei, L., 2003, "Public Disclosure and Private Decisions: The Case of Equity Market Execution Quality," working paper, NYSE Research.

Bondarenko, O., Sung, J., 2003, "Specialist Participation and Limit Orders," *Journal of Financial Markets* 6, 539-571.

Chakravarty, S., 2001, "Stealth-trading: which traders' trades move stock prices?" *Journal of Financial Economics*, 61, 289-307.

Lehn, K., Patro, S., and Shastri, K., 2004, "Information shocks and stock market liquidity: a comparison of the New York Stock Exchange and Nasdaq," working paper, University of Pittsburgh.

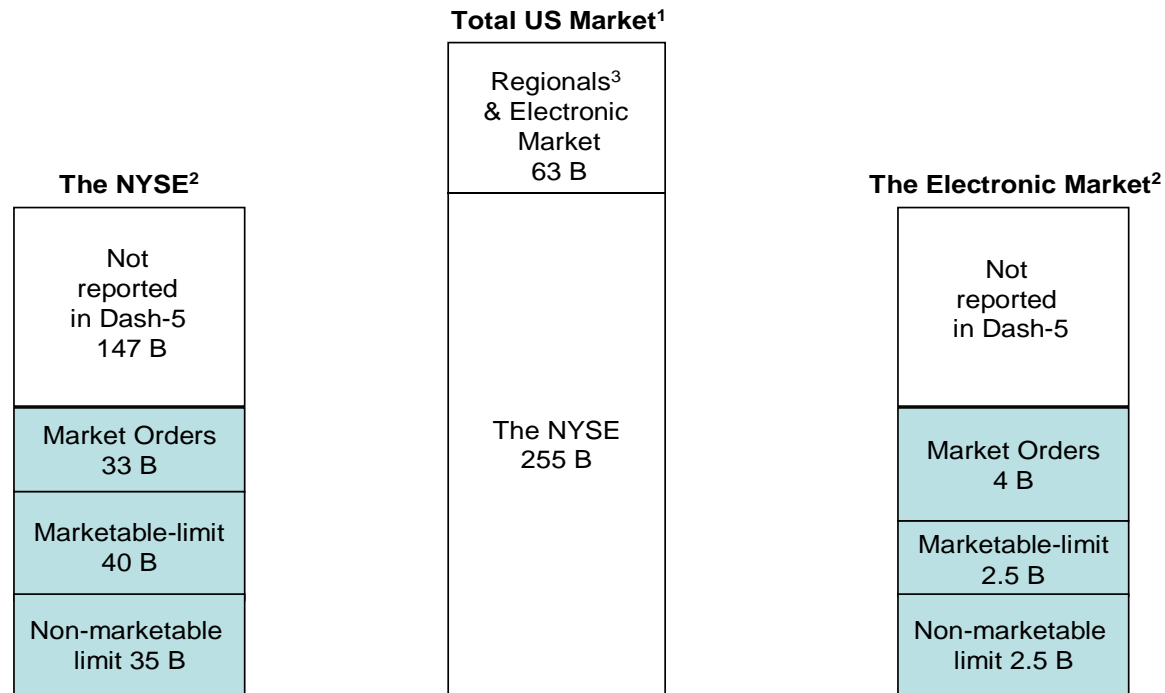
Lipson, M., 2004, "Competition Among Market Centers," working paper, University of Georgia.

Panayides, M., 2004, "The Specialist's Participation in Quoted Prices and the NYSE's Price Continuity Rule," working paper, Yale University.

Seppi, D., 1997, "Liquidity Provision with Limit Orders and Strategic Specialist," *Review of Financial Studies* 10, 103-150.

SEC Release No. 34-43590 (November 17, 2000).

**Figure I – Total Market Volume (Shares Traded) And
Dash-5 Reported Volume For 1,138 NYSE Symbols in 2003**



Bar heights are not proportional

1. Total market volume (based on market data from Bloomberg, B = billion shares): 318 B.
2. Due to potential double counting, dash-5 reported executed shares (shaded boxes) have been divided by 2 to represent trading volume. Total dash-5 trading volume: 124 B; Market orders: 41 B; Marketable limit: 44 B; Non-marketable: 39 B
3. Total dash-5 volume on Regionals (not shown): 7 B; Market orders: 4 B; Marketable limit: 1.5 B; Non-marketable: 1.5 B.

**Figure II - Overall Effective Spreads
Of Market Order Executions**

	total # of shares executed for orders received by market center per month	total # of shares executed at the market center per month	median (cents)	share weighted mean (cents)	$H_0: \mu_{NYSE} = \mu_{Electronic}$
Reported by NYSE Specialists	5,447,491,775	5,438,927,034	4.32	3.06 (0.0288)	test statistic = 12.76 p-value = 0.0000%
Reported by Electronic Markets	745,654,076	675,368,946	2.60	2.17 (0.0638)	

Standard error is reported in () parenthesis.

**Figure III - Effective Spreads And Executions
By Different Electronic Market Centers**

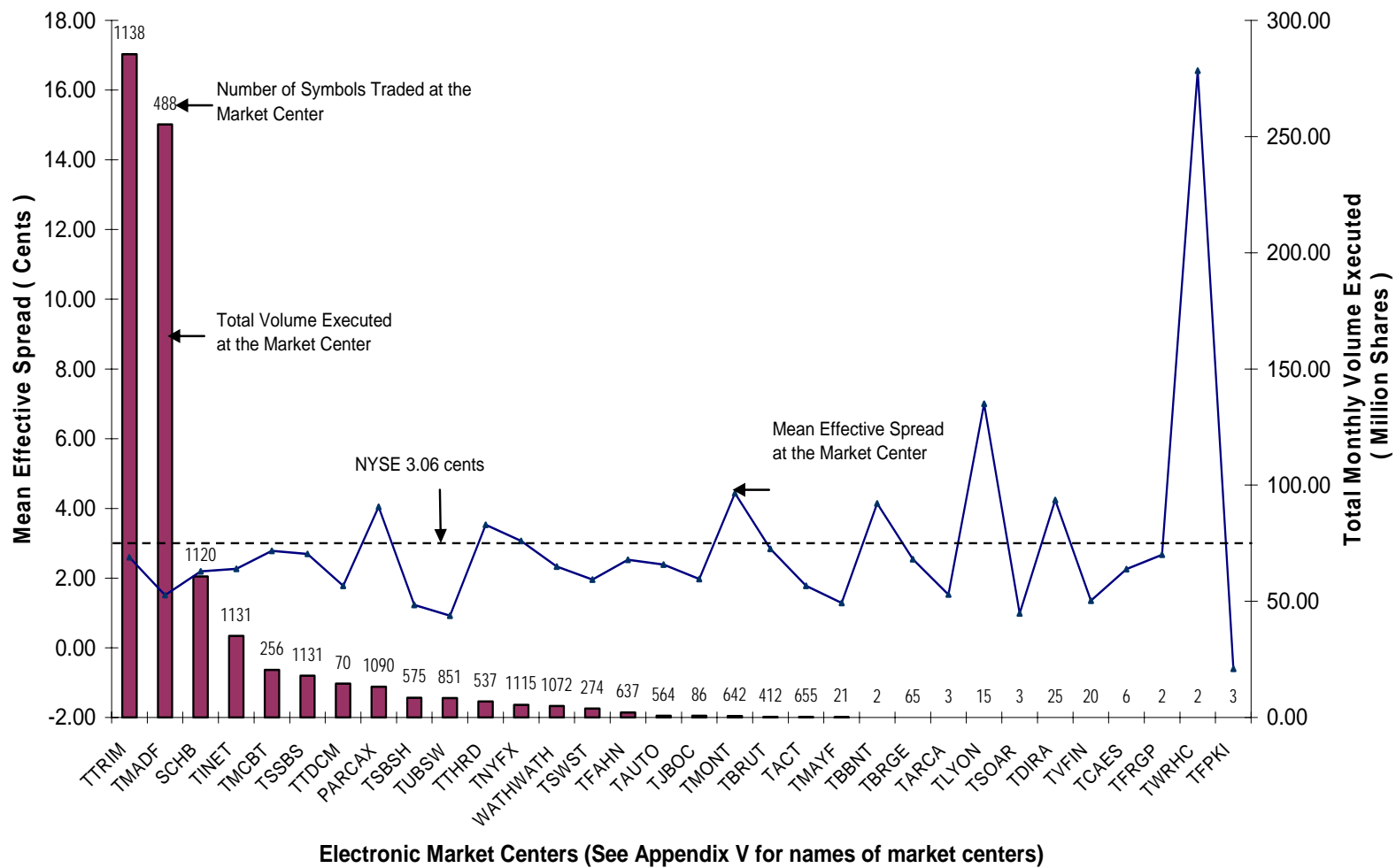
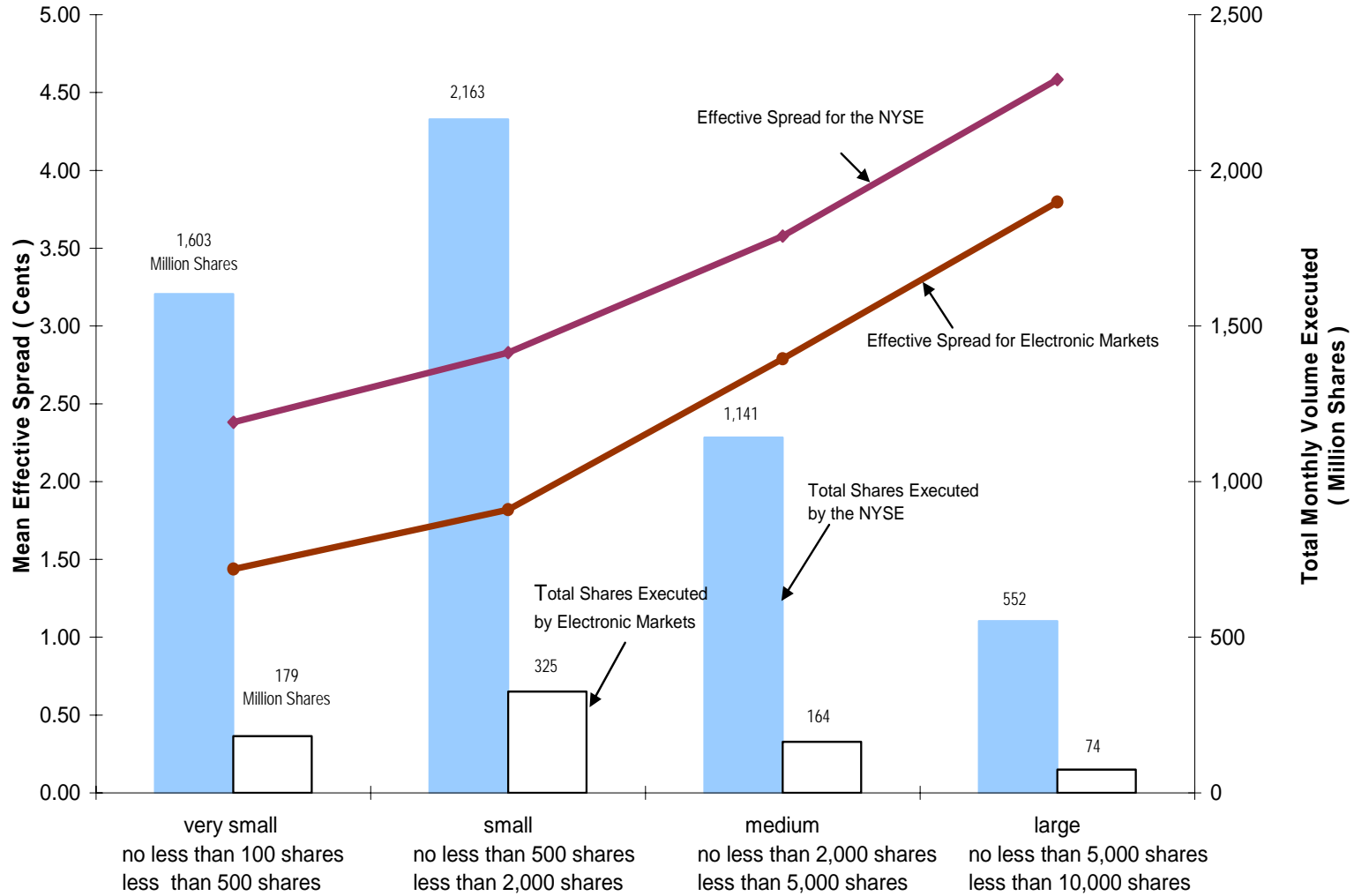
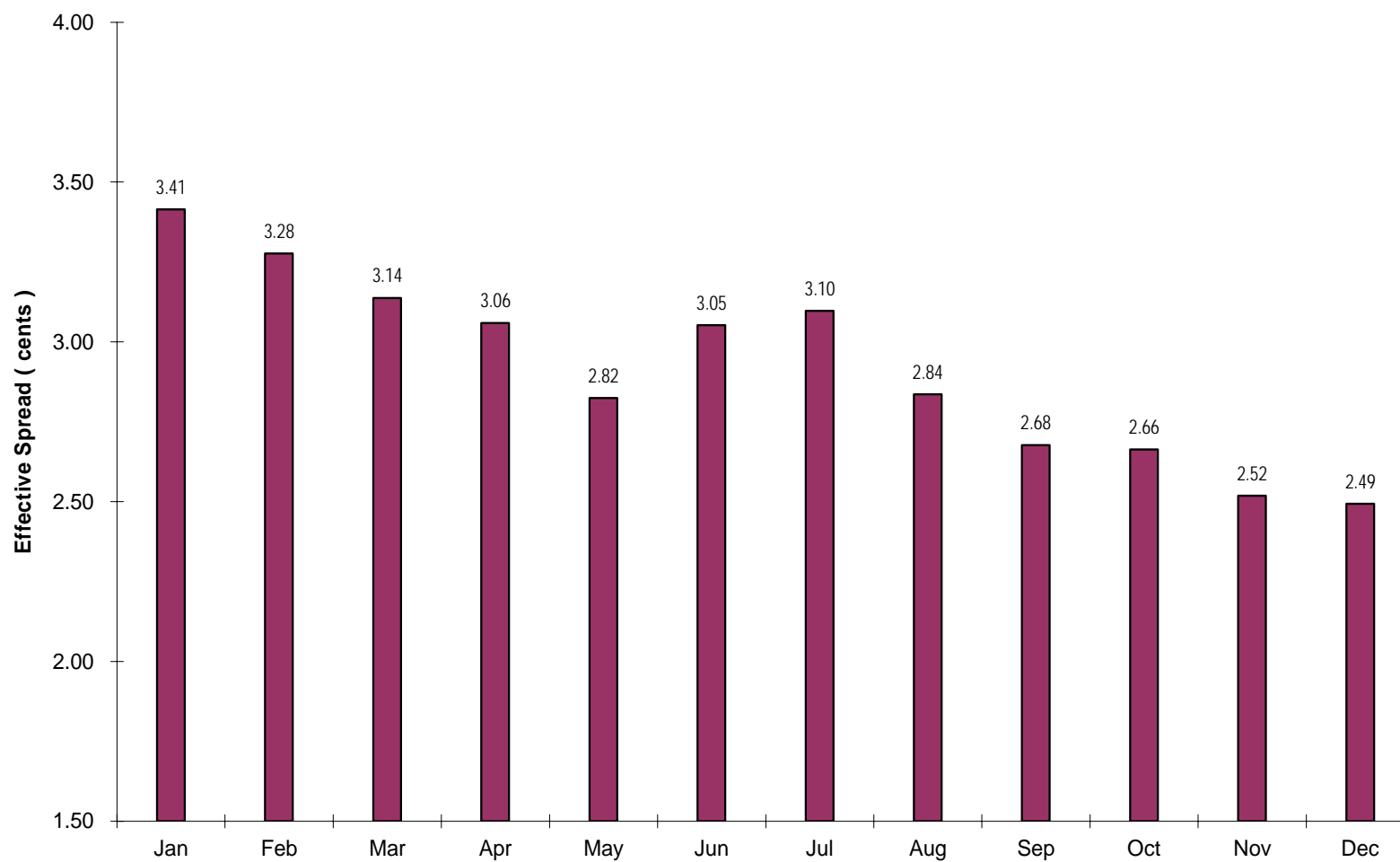


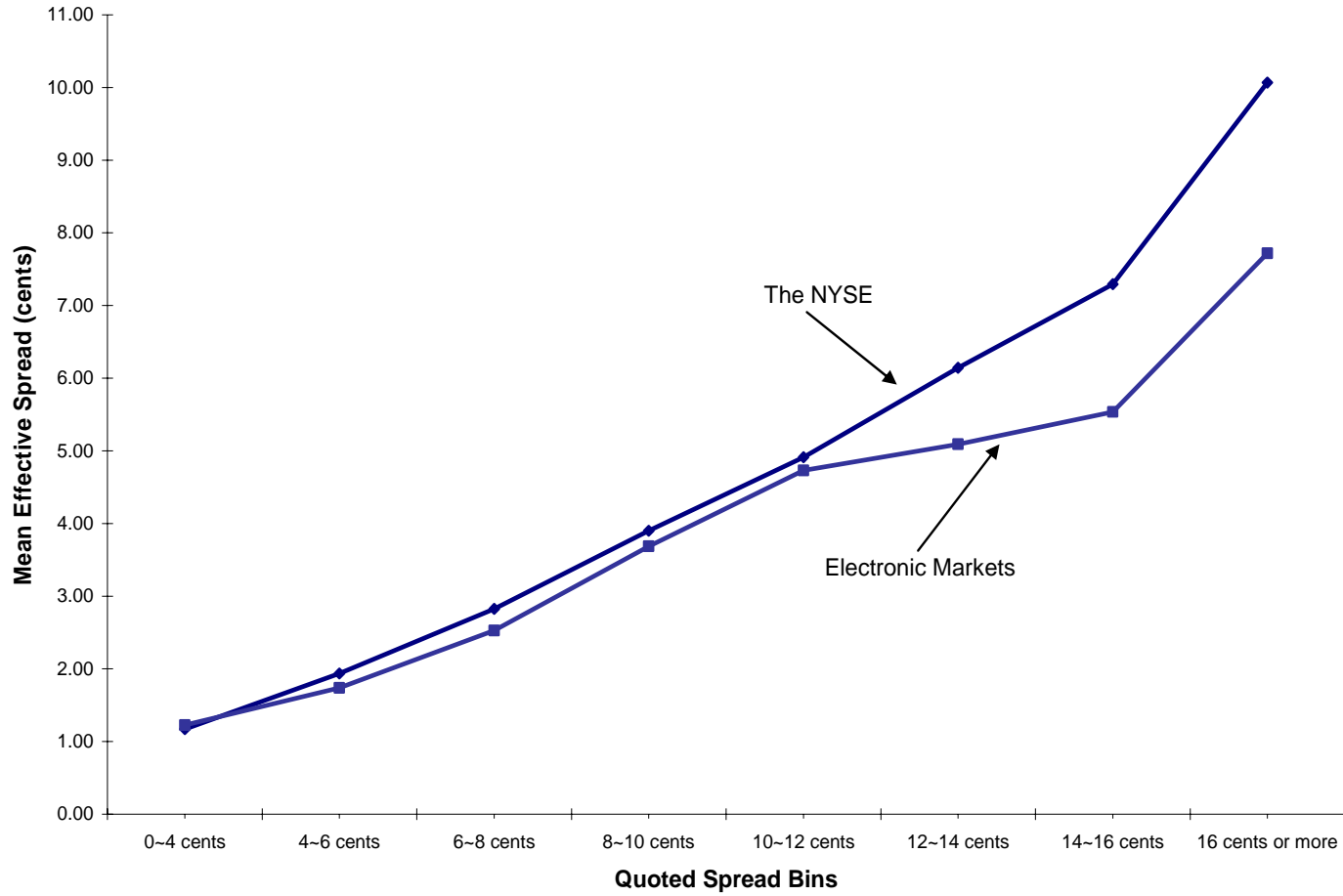
Figure IV - Effective Spread Versus Market Order Size



**Figure V -Effective Spreads Of 1,138 NYSE Stocks In 2003,
For Market Orders (The NYSE And Electronic Markets)**



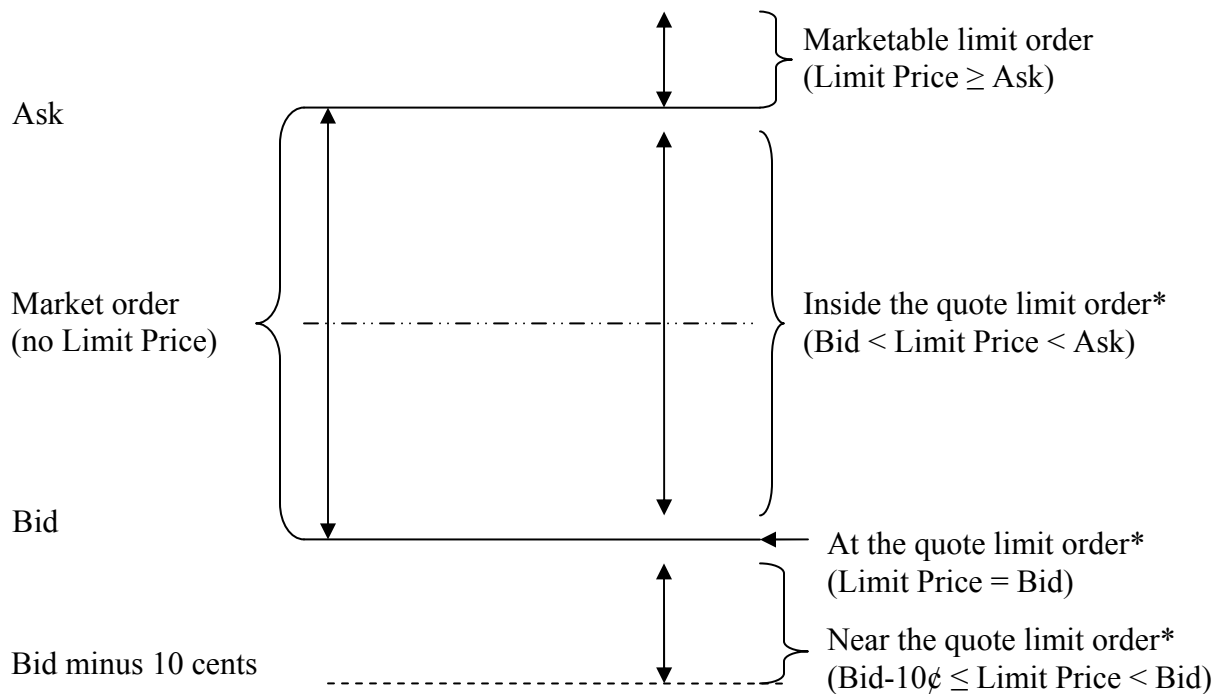
**Figure VI - Quoted Spreads Versus Effective Spreads
For Market Orders On The NYSE and Electronic Markets**



Appendix I

Definitions

The following illustration is for buy orders.



*: These are labeled as “non-marketable” limit orders.

$$Effective\ Spread = 2 \times \left(Execution\ price - \frac{Ask + Bid}{2} \right)$$

Appendix II

Orders Covered in Dash-5 Reports

The definition of "covered order" in Rule 11Ac1-5 contains several conditions and exclusions that are intended to limit its scope to those orders that provide a basis for meaningful and comparable statistical measures of execution quality.

- The Rule applies only to market orders or limit orders that are received by a market center during regular trading hours of 09:30 AM to 04:00 PM ET and, if executed, executed during such time.
- Covered orders must be received during the time that a consolidated BBO is being disseminated.
- The definition of covered order excludes any orders for which the customer requested special handling for execution. Types of orders specifically excluded from the Rule include, but are not limited to,
 - orders to be executed at a market opening or closing price, stop orders, orders such as short sales that must be executed on a particular tick or bid, orders submitted on a "not held" basis, orders for other than regular settlement, and orders to be executed at prices unrelated to the market price at the time of execution.
 - In addition, the Rule specifically excludes all-or-none orders on the basis that they often may be more difficult to execute than orders without a substantial minimum quantity requirement
- Immediate-or-cancel orders are included in the Rule. Orders to be executed at a market opening price - is excluded
- The Commission temporarily exempts orders received by a market center otherwise than through automated systems.
- The Commission has exempted from the Rule any order with a size of 10,000 shares or greater.

Appendix III

General Filters

All securities on 12/31/2002	2557
+ Single class	2355
+ Ordinary common stock which need not be further defined	1329
+ not “no price on 12/31/2002”	1329
+ not “no SIC code on 12/31/2002”	1328
+ no “missing daily price during 01/01/2001 and 12/31/2003”	1218
+ no switch	1204
+ mean daily trading volume \geq \$20,000	1192
+ no missing daily volume, any day during the fourth quarter of 2002	1192
+ no daily price during the fourth quarter of 2002 $<$ \$3.00	1111
+ no change exchange	1108
Total symbols	1116

Take back these symbols

Top 10% of market capitalization on 2002/12/31	19 (out of 343)
Top 10% of average daily volume during the fourth quarter of 2002	18 (out of 135)
Top 10% of average daily dollar volume during the fourth quarter of 2002	8 (out of 135)
Total final symbols	1146
For dash 5 data	1142 (no records for NMG, CCR, PZL, KM)
Exclude those without full year’s data	1138 (HI, MIR, PHA, UAL)

Appendix IV

Final List of 1,138 NYSE Symbols

A	AGILENT TECHNOLOGIES INC	LEN	LENNAR CORP
AA	ALCOA INC	LFB	LONGVIEW FIBRE CO
ABI	APPLERA CORP	LFG	LANDAMERICA FINANCIAL GROUP INC
ABK	AMBAC FINANCIAL GROUP INC	LG	LACLEDE GROUP INC
ABM	A B M INDUSTRIES INC	LH	LABORATORY CORP AMERICA HLDGS
ABS	ALBERTSONS INC	LII	LENNOX INTERNATIONAL INC
ABT	ABBOTT LABS	LIN	LINENS N THINGS INC
ACF	AMERICREDIT CORP	LIZ	LIZ CLAIBORNE INC
ACI	ARCH COAL INC	LLL	L 3 COMMUNICATIONS HLDGS INC
ACO	AMCOL INTERNATIONAL CORP	LLY	LILLY ELI & CO
AD	ADVO INC	LM	LEGG MASON INC
ADI	ANALOG DEVICES INC	LMT	LOCKHEED MARTIN CORP
ADM	ARCHER DANIELS MIDLAND CO	LNC	LINCOLN NATIONAL CORP IN
ADP	AUTOMATIC DATA PROCESSING INC	LNN	LINDSAY MANUFACTURING CO
AEE	AMEREN CORP	LNR	L N R PROPERTY CORP
AEP	AMERICAN ELECTRIC POWER INC	LNT	ALLIANT ENERGY CORP
AET	AETNA INC NEW	LNK	LANDRYS RESTAURANTS INC
AF	ASTORIA FINANCIAL CORP	LOW	LOWES COMPANIES INC
AFC	ALLMERICA FINANCIAL CORP	LPX	LOUISIANA PACIFIC CORP
AFG	AMERICAN FINANCIAL GROUP INC NEW	LQI	LA QUINTA CORP
AFL	A F L A C INC	LRW	LABOR READY INC
AG	A G C O CORP	LSI	L S I LOGIC CORP
AGE	EDWARDS A G INC	LSS	LONE STAR TECHNOLOGIES INC
AGL	ANGELICA CORP	LTD	LIMITED BRANDS INC
AGN	ALLERGAN INC	LTR	LOEWS CORP
AGY	ARGOSY GAMING CO	LUK	LEUCADIA NATIONAL CORP
AH	ARMOR HOLDINGS INC	LUV	SOUTHWEST AIRLINES CO
AHC	AMERADA HESS CORP	LVB	STEINWAY MUSICAL INSTRUMENTS INC
AHG	APRIA HEALTHCARE GROUP INC	LYO	LYONDELL CHEMICAL CO
AIG	AMERICAN INTERNATIONAL GROUP INC	LZ	LUBRIZOL CORP
AIR	A A R CORP	LZB	LA Z BOY INC
AIT	APPLIED INDUSTRIAL TECHS INC	MAG	MAGNETEK INC
AJG	GALLAGHER ARTHUR J & CO	MAS	MASCO CORP
AKS	A K STEEL HOLDING CORP	MAT	MATTEL INC
ALB	ALBEMARLE CORP	MAY	MAY DEPARTMENT STORES CO
ALD	ALLIED CAPITAL CORP NEW	MBG	MANDALAY RESORT GROUP
ALE	ALLETE	MBI	M B I A INC
ALG	ALAMO GROUP INC	MCC	MESTEK INC
ALK	ALASKA AIRGROUP INC	MCD	MCDONALDS CORP
ALL	ALLSTATE CORP	MCH	MILLENIUM CHEMICALS INC
AMD	ADVANCED MICRO DEVICES INC	MCK	MCKESSON H B O C INC
AME	AMETEK INC NEW	MCO	MOODYS CORP
AMG	AFFILIATED MANAGERS GROUP INC	MCS	MARCUS CORP
AMH	AMERUS GROUP CO	MCY	MERCURY GENERAL CORP NEW
AMN	AMERON INTERNATIONAL CORP DEL	MDC	M D C HOLDINGS INC
AMR	A M R CORP DEL	MDP	MEREDITH CORP
AMZ	AMERICAN MEDICAL SECURITY GR INC	MDS	MIDAS INC

AN	AUTONATION INC DEL	MDT	MEDTRONIC INC
ANN	ANNTAYLOR STORES CORP	MDU	M D U RESOURCES GROUP INC
ANS	AIRNET SYSTEMS INC	MEE	MASSEY ENERGY CO
AOC	AON CORP	MEH	MIDWEST EXPRESS HOLDINGS INC
AOL	A O L TIME WARNER INC	MEL	MELLON FINANCIAL CORP
AOS	SMITH A O CORP	MER	MERRILL LYNCH & CO INC
AOT	APOGENT TECHNOLOGIES INC	MET	METLIFE INC
AP	AMPCO PITTSBURGH CORP	MFW	M & F WORLDWIDE CORP
APA	APACHE CORP	MGG	M G M MIRAGE
APC	ANADARKO PETROLEUM CORP	MGM	METRO GOLDWYN MAYER INC NEW
APD	AIR PRODUCTS & CHEMICALS INC	MHK	MOHAWK INDUSTRIES INC
APH	AMPHENOL CORP NEW	MHO	M I SCHOTTENSTEIN HOMES INC NEW
APN	APPLICA INC	MHP	MCGRAW HILL COS INC
ARG	AIRGAS INC	MHR	MAGNUM HUNTER RESOURCES INC
ARJ	ARCH CHEMICALS INC	MI	MARSHALL & ILSLEY CORP
ARM	ARVINMERITOR INC	MIK	MICHAELS STORES INC
ARW	ARROW ELECTRONICS INC	MIL	MILLIPORE CORP
ASF	ADMINISTAFF INC	MKC	MCCORMICK & CO INC
ASH	ASHLAND INC	MKL	MARKEL CORP
ASO	AMSOUTH BANCORPORATION	MKT	ADVANCED MARKETING SERVICES INC
ASV	AG SERVICES OF AMERICA INC	MLI	MUELLER INDUSTRIES INC
AT	ALLTEL CORP	MLM	MARTIN MARIETTA MATERIALS INC
ATG	A G L RESOURCES INC	MMA	MUNICIPAL MORTGAGE & EQUITY LLC
ATI	ALLEGHENY TECHNOLOGIES	MMC	MARSH & MCLENNAN COS INC
ATK	ALLIANT TECHSYSTEMS INC	MME	MID ATLANTIC MEDICAL SVCS INC
ATN	ACTION PERFORMANCE COS INC	MMM	3M CO
ATO	ATMOS ENERGY CORP	MMS	MAXIMUS INC
ATR	APTARGROUP INC	MNC	MONACO COACH CORP
ATW	ATWOOD OCEANICS INC	MNS	M S C SOFTWARE CORP
AVA	AVISTA CORP	MNY	MONY GROUP INC
AVL	AVIALL INC NEW	MO	ALTRIA GROUP INC
AVP	AVON PRODUCTS INC	MON	MONSANTO CO NEW
AVT	AVNET INC	MOT	MOTOROLA INC
AVX	A V X CORP NEW	MOV	MOVADO GROUP INC
AVY	AVERY DENNISON CORP	MPR	MET PRO CORP
AW	ALLIED WASTE INDUSTRIES INC	MPS	M P S GROUP INC
AWR	AMERICAN STATES WATER CO	MRD	MACDERMID INC
AXE	ANIXTER INTERNATIONAL INC	MRK	MERCK & CO INC
AXL	AMERICAN AXLE & MFG HLGDS INC	MRO	MARATHON OIL CORP
AXP	AMERICAN EXPRESS CO	MSC	MATERIAL SCIENCES CORP
AYE	ALLEGHENY ENERGY INC	MTB	M & T BANK CORP
AZO	AUTOZONE INC	MTG	M G I C INVESTMENT CORP WIS
AZR	AZTAR CORP	MTH	MERITAGE CORPORATION
AZZ	A Z Z INC	MTN	VAIL RESORTS INC
B	BARNES GROUP INC	MTW	MANITOWOC INC
BA	BOEING CO	MTX	MINERALS TECHNOLOGIES INC
BAC	BANK OF AMERICA CORP	MU	MICRON TECHNOLOGY INC
BAX	BAXTER INTERNATIONAL INC	MUR	MURPHY OIL CORP
BBI	BLOCKBUSTER INC	MVK	MAVERICK TUBE CORP
BBR	BUTLER MANUFACTURING CO DE	MVL	MARVEL ENTERPRISES INC

BBT	B B & T CORP	MW	MENS WAREHOUSE INC
BBY	BEST BUY COMPANY INC	MWD	MORGAN STANLEY DEAN WITTER & CO
BC	BRUNSWICK CORP	MWV	MEADWESTVACO CORP
BCC	BOISE CASCADE CORP	MWY	MIDWAY GAMES INC
BCF	BURLINGTON COAT FACTORY	MYE	MYERS INDUSTRIES INC
BCO	BRINKS CO	MYG	MAYTAG CORP
BCR	BARD C R INC	MYL	MYLAN LABS INC
BDG	BANDAG INC	MZ	MILACRON INC
BDK	BLACK & DECKER CORP	NAP	NATIONAL PROCESSING INC
BDX	BECTON DICKINSON & CO	NAV	NAVISTAR INTERNATIONAL CORP
BEC	BECKMAN COULTER INC	NBL	NOBLE ENERGY INC
BEN	FRANKLIN RESOURCES INC	NCC	NATIONAL CITY CORP
BER	BERKLEY W R CORP	NCF	NATIONAL COMMERCE FINANCIAL CORP
BEZ	BALDOR ELECTRIC CO	NCI	NAVIGANT CONSULTING INC
BFT	BALLY TOTAL FITNESS HOLDING CORP	NCR	N C R CORP NEW
BGG	BRIGGS & STRATTON CORP	NCS	N C I BUILDING SYSTEMS INC
BGP	BORDERS GROUP INC	NDC	NDC HEALTH CORP
BHE	BENCHMARK ELECTRONICS INC	NDE	INDYMAC BANCORP INC
BHI	BAKER HUGHES INC	NDN	99 CENTS ONLY STORES
BJ	B J S WHOLESALE CLUB INC	NEB	NEW ENGLAND BUSINESS SVC INC
BJS	B J SERVICES CO	NEM	NEWMONT MINING CORP
BK	BANK NEW YORK INC	NET	NETWORKS ASSOCIATES INC
BKE	BUCKLE INC	NEV	NUEVO ENERGY CO
BKH	BLACK HILLS CORP	NFB	NORTH FORK BANCORPORATION NY INC
BKI	BUCKEYE TECHNOLOGIES INC	NFG	NATIONAL FUEL GAS CO N J
BKS	BARNES & NOBLE INC	NFX	NEWFIELD EXPLORATION CO
BLI	BIG LOTS INC	NI	NISOURCE INC
BLK	BLACKROCK INC	NJR	NEW JERSEY RES
BLL	BALL CORP	NL	N L INDUSTRIES INC
BLS	BELLSOUTH CORP	NLS	NAUTILUS GROUP INC
BMC	B M C SOFTWARE INC	NOC	NORTHROP GRUMMAN CORP
BMS	BEMIS INC	NOI	NATIONAL OILWELL INC
BMY	BRISTOL MYERS SQUIBB CO	NPK	NATIONAL PRESTO INDS INC
BN	BANTA CORP	NSC	NORFOLK SOUTHERN CORP
BNE	BOWNE & CO INC	NSH	NASHUA CORP
BNI	BURLINGTON NORTHERN SANTA FE CP	NSM	NATIONAL SEMICONDUCTOR CORP
BOH	BANK OF HAWAII CORP	NSS	N S GROUP INC
BOL	BAUSCH & LOMB INC	NST	NSTAR
BOW	BOWATER INC	NTG	NATCO GROUP INC
BR	BURLINGTON RESOURCES INC	NU	NORTHEAST UTILITIES
BRL	BARR LABORATORIES INC	NUE	NUCOR CORP
BRO	BROWN & BROWN INC	NUI	N U I CORP NEW
BSC	BEAR STEARNS COS INC	NVH	NATIONAL R V HOLDINGS INC
BSG	BISYS GROUP INC	NWL	NEWELL RUBBERMAID INC
BSX	BOSTON SCIENTIFIC CORP	NWN	NORTHWEST NATURAL GAS CO
BTH	BLYTH INC	NX	QUANEX CORP
BUD	ANHEUSER BUSCH COS INC	NYM	N Y M A G I C INC
BVC	BAY VIEW CAPITAL CORP	OCA	ORTHODONTIC CENTERS OF AMER INC
BW	BRUSH WELLMAN INC	OCQ	ONEIDA LTD
BWA	BORGWARNER INC	OCR	OMNICARE INC

BWC	BELDEN INC	ODC	OIL DRI CORP OF AMERICA
BWS	BROWN SHOE INC NEW	ODP	OFFICE DEPOT INC
BXG	BLUEGREEN CORP	OFG	ORIENTAL FINANCIAL GROUP INC
BXS	BANCORPSOUTH INC	OGE	O G E ENERGY CORP
BYD	BOYD GAMING CORP	OHP	OXFORD HEALTH PLANS INC
BZH	BEAZER HOMES USA INC	OI	OWENS ILL INC
C	CITIGROUP INC	OII	OCEANEERING INTERNATIONAL INC
CA	COMPUTER ASSOCIATES INTL INC	OKE	ONEOK INC NEW
CAE	CASCADE CORP	OLN	OLIN CORP
CAG	CONAGRA INC	OMC	OMNICOM GROUP INC
CAH	CARDINAL HEALTH INC	OME	OMEGA PROTEIN CORP
CAM	COOPER CAMERON CORP	OMG	O M GROUP INC
CAO	C S K AUTO CORP	OMI	OWENS & MINOR INC NEW
CAT	CATERPILLAR INC	OMN	OMNOVA SOLUTIONS INC
CB	CHUBB CORP	ONB	OLD NATIONAL BANCORP
CBC	CLARK BARDES INC	ONE	BANK ONE CORP
CBH	COMMERCE BANCORP INC NJ	OO	OAKLEY INC
CBK	CHRISTOPHER AND BANKS CORP	ORI	OLD REPUBLIC INTERNATIONAL CORP
CBM	CAMBREX CORP	OS	OREGON STEEL MILLS INC
CBR	CIBER INC	OSG	OVERSEAS SHIPHOLDING GROUP INC
CBT	CABOT CORP	OSI	OUTBACK STEAKHOUSE INC
CBU	COMMUNITY BANK SYSTEM INC	OSK	OSHKOSH TRUCK CORP
CC	CIRCUIT CITY STORES INC	OXM	OXFORD INDUSTRIES INC
CCC	CALGON CARBON CORP	OXY	OCCIDENTAL PETROLEUM CORP
CCE	COCA COLA ENTERPRISES INC	PAS	PEPSIAMERICAS INC
CCK	CROWN CORK & SEAL INC	PBG	PEPSI BOTTLING GROUP INC
CCU	CLEAR CHANNEL COMMUNICATIONS INC	PBI	PITNEY BOWES INC
CD	CENDANT CORP	PBY	PEP BOYS MANNY MOE & JACK
CDI	C D I CORP	PCG	P G & E CORP
CDN	CADENCE DESIGN SYSTEMS INC	PCH	POTLATCH CORP
CDT	CABLE DESIGN TECHNOLOGIES CORP	PCP	PRECISION CASTPARTS CORP
CDX	CATELLUS DEVELOPMENT CORP	PCU	SOUTHERN PERU COPPER CORP
CEC	C E C ENTERTAINMENT INC	PD	PHELPS DODGE CORP
CEG	CONSTELLATION ENERGY GROUP INC	PDE	PRIDE INTERNATIONAL INC DEL
CEN	CERIDIAN CORP NEW	PDQ	PRIME HOSPITALITY CORP
CF	CHARTER ONE FINANCIAL INC	PDX	PEDIATRIX MEDICAL GROUP
CFB	COMMERCIAL FEDERAL CORP	PEG	PUBLIC SERVICE ENTERPRISE GROUP
CFC	COUNTRYWIDE FINANCIAL CORP	PEP	PEPSICO INC
CFI	CULP INC	PFB	P F F BANCORP INC
CFR	CULLEN FROST BANKERS INC	PFE	PFIZER INC
CGC	CASCADE NATURAL GAS CORP	PG	PROCTER & GAMBLE CO
CGI	COMMERCE GROUP INC MASS	PGL	PEOPLES ENERGY CORP
CGX	CONSOLIDATED GRAPHICS INC	PGN	PROGRESS ENERGY INC
CHD	CHURCH & DWIGHT INC	PGR	PROGRESSIVE CORP OH
CHE	CHEMED CORP	PH	PARKER HANNIFIN CORP
CHG	C H ENERGY GROUP INC	PHM	PULTE HOMES INC
CHH	CHOICE HOTELS INTERNATIONAL INC	PIK	WATER PIK TECHNOLOGIES
CHK	CHESAPEAKE ENERGY CORP	PIR	PIER 1 IMPORTS INC DE
CHP	C & D TECHNOLOGIES INC	PKE	PARK ELECTROCHEMICAL CORP
CHS	CHICOS FAS INC	PKG	PACKAGING CORP AMERICA

CHX	PILGRIMS PRIDE CORP	PKI	PERKINELMER INC
CHZ	CHITTENDEN CORP	PKS	SIX FLAGS INC
CI	C I G N A CORP	PL	PROTECTIVE LIFE CORP
CIN	CINERGY CORP	PLL	PALL CORP
CK	CROMPTON CORP	PLT	PLANTRONICS INC NEW
CKH	SEACOR SMIT INC	PLX	PLAINS RESOURCES INC
CKP	CHECKPOINT SYSTEMS INC	PMI	P M I GROUP INC
CKR	C K E RESTAURANTS INC	PNC	P N C FINANCIAL SERVICES GRP INC
CL	COLGATE PALMOLIVE CO	PNG	PENN AMERICA GROUP INC
CLC	CLARCOR INC	PNK	PINNACLE ENTERTAINMENT GROUP INC
CLE	CLAIRES STORES INC	PNM	P N M RESOURCES INC
CLF	CLEVELAND CLIFFS INC	PNN	PENN ENGINEERING & MFG CORP
CLK	CLARK INC	PNR	PENTAIR INC
CLX	CLOROX CO	PNW	PINNACLE WEST CAPITAL CORP
CMA	COMERICA INC	PNY	PIEDMONT NATURAL GAS INC
CMC	COMMERCIAL METALS CO	POG	PATINA OIL & GAS CORP
CMI	CUMMINS INC	POL	POLYONE CORP
CMN	CANTEL MEDICAL CORP	POM	PEPCO HOLDINGS INC
CMS	C M S ENERGY CORP	POP	POPE & TALBOT INC
CMX	CAREMARK RX INC	POS	CATALINA MARKETING CORP
CNA	C N A FINANCIAL CORP	PPC	PILGRIMS PRIDE CORP
CNB	COLONIAL BANCGROUP INC	PPD	PRE PAID LEGAL SERVICES INC
CNF	C N F INC	PPE	PARK PLACE ENTERTAINMENT CORP
CNL	CLECO CORP NEW	PPG	P P G INDUSTRIES INC
CNP	CENTERPOINT ENERGY INC	PPL	P P L CORP
CNX	CONSOL ENERGY INC	PPP	POGO PRODUCING CO
COA	COACHMEN INDUSTRIES INC	PQE	PROQUEST CO
COF	CAPITAL ONE FINANCIAL CORP	PR	PRICE COMMUNICATIONS CORP
COG	CABOT OIL & GAS CORP	PRA	PROASSURANCE CORP
COH	COACH INC	PRV	PROVINCE HEALTHCARE CO
COO	COOPER COMPANIES INC	PRX	PHARMACEUTICAL RESOURCES INC
COP	CONOCOPHILLIPS	PSC	PHILADELPHIA SUBURBAN CORP
CPB	CAMPBELL SOUP CO	PSD	PUGET ENERGY INC
CPC	CENTRAL PARKING CORP	PSS	PAYLESS SHOESOURCE INC
CPE	CALLON PETROLEUM CO DEL	PTC	PAR TECHNOLOGY CORP
CPK	CHESAPEAKE UTILITIES CORP	PTV	PACTIV CORP
CPO	CORN PRODUCTS INTERNATIONAL INC	PTZ	PULITZER INC
CPS	CHOICEPOINT INC	PVA	PENN VIRGINIA CORP
CPY	C P I CORP	PVH	PHILLIPS VAN HEUSEN CORP
CR	CRANE CO	PVN	PROVIDIAN FINANCIAL CORP
CRA	APPLERA CORP	PWN	CASH AMERICA INTERNATIONAL INC
CRK	COMSTOCK RESOURCES INC	PX	PRAXAIR INC
CRL	CHARLES RIVER LABS INTL INC	PXD	PIONEER NATURAL RESOURCES CO
CRN	CORNELL COMPANIES INC	PXR	PAXAR CORP
CRR	CARBO CERAMICS INC	PYX	PLAYTEX PRODUCTS INC
CRS	CARPENTER TECHNOLOGY CORP	PZB	PITTSTON COMPANY
CSC	COMPUTER SCIENCES CORP	R	RYDER SYSTEMS INC
CSK	CHESAPEAKE CORP VA	RAH	RALCORP HOLDINGS INC NEW
CSL	CARLISLE COMPANIES	RAY	RAYTECH CORP DE
CSS	C S S INDUSTRIES INC	RBK	REEBOK INTERNATIONAL LTD

CSV	CARRIAGE SERVICES INC	RBN	ROBBINS & MYERS INC
CSX	C S X CORP	RCI	RENAL CARE GROUP INC
CTB	COOPER TIRE & RUBBER CO	RDC	ROWAN COMPANIES INC
CTL	CENTURYTEL INC	RDK	RUDDICK CORP
CTS	C T S CORP	RDN	RADIAN GROUP INC
CTV	COMMSCOPE INC	REM	REMINGTON OIL & GAS CORP
CTX	CENTEX CORP	RES	R P C INC
CUM	CUMMINS INC	RF	REGIONS FINANCIAL CORP
CV	CENTRAL VERMONT PUB SVC CORP	RGA	REINSURANCE GROUP OF AMERICA INC
CVD	COVANCE INC	RGB	BARRY R G CORP OHIO
CVG	CONVERGYS CORP	RGR	STURM RUGER & CO INC
CVH	COVENTRY HEALTH CARE INC	RHB	REHABCARE GROUP INC
CVS	C V S CORP	RHD	R H DONNELLEY CORP
CVX	CHEVRONTEXACO CORP	RHI	ROBERT HALF INTERNATIONAL INC
CW	CURTISS WRIGHT CORP	RI	RUBY TUESDAY INC
CWT	CALIFORNIA WATER SERVICE GROUP	RJF	RAYMOND JAMES FINANCIAL INC
CXP	CENTEX CONSTRUCTION PRODUCTS INC	RJR	REYNOLDS R J TOBACCO HLDGS INC
CY	CYPRESS SEMICONDUCTOR CORP	RKY	COORS ADOLPH CO
CYH	COMMUNITY HEALTH SYS INC NEW	RLI	R L I CORP
CYN	CITY NATIONAL CORP	RMD	RESMED INC
CYT	CYTEC INDUSTRIES INC	RML	RUSSELL CORP
CZN	CITIZENS COMMUNICATIONS CO	RNT	AARON RENTS INC
D	DOMINION RESOURCES INC VA NEW	ROG	ROGERS CORP
DAB	DAVE & BUSTERS INC	ROH	ROHM & HAAS CO
DAL	DELTA AIR LINES INC	ROK	ROCKWELL AUTOMATION INC
DBD	DIEBOLD INC	ROL	ROLLINS INC
DCI	DONALDSON INC	ROP	ROPER INDUSTRIES INC NEW
DCN	DANA CORP	ROV	RAYOVAC CORP
DCO	DUCOMMUN INC DE	RPM	R P M INTERNATIONAL INC
DD	DU PONT E I DE NEMOURS & CO	RRA	RAILAMERICA INC
DE	DEERE & CO	RRC	RANGE RESOURCES CORP
DEL	DELTIC TIMBER CORP	RRR	ROTO ROOTER INC NEW
DF	DEAN FOODS CO NEW	RS	RELIANCE STEEL & ALUMINUM CO
DFS	DEPARTMENT 56 INC	RSC	REX STORES CORP
DG	DOLLAR GENERAL CORP	RSG	REPUBLIC SERVICES INC
DGX	QUEST DIAGNOSTICS INC	RSH	RADIOSHACK CORP
DHI	D R HORTON INC	RST	BOCA RESORTS INC
DHR	DANAHER CORP	RT	RYERSON TULL INC NEW
DIS	DISNEY WALT CO	RTI	R T I INTERNATIONAL METALS INC
DJ	DOW JONES & CO INC	RUS	RUSS BERRIE & CO
DL	DIAL CORP NEW	RX	I M S HEALTH INC
DLM	DEL MONTE FOODS CO	RYL	RYLAND GROUP INC A
DLX	DELUXE CORP	RYN	RAYONIER INC
DMN	DIMON INC	S	SEARS ROEBUCK & CO
DNA	GENENTECH INC	SAH	SONIC AUTOMOTIVE INC
DNB	DUN & BRADSTREET CORP DEL NEW	SBC	S B C COMMUNICATIONS INC
DNR	DENBURY RESOURCES INC	SBL	SYMBOL TECHNOLOGIES INC
DNY	DONNELLEY R R & SONS CO	SCG	SCANA CORP NEW
DO	DIAMOND OFFSHORE DRILLING INC	SCH	SCHWAB CHARLES CORP NEW
DOV	DOVER CORP	SCL	STEPAN CO

DOW	DOW CHEMICAL CO	SDS	SUNGARD DATA SYSTEMS INC
DP	DIAGNOSTIC PRODUCTS CORP	SE	7 ELEVEN INC
DPH	DELPHI CORP	SEE	SEALED AIR CORP NEW
DPL	D P L INC	SEH	SPARTECH CORP
DQE	D Q E INC	SEN	SEMCO ENERGY INC
DRD	DUANE READE INC	SF	STIFEL FINANCIAL CORP
DRQ	DRIL QUIP INC	SFA	SCIENTIFIC ATLANTA INC
DRS	D R S TECHNOLOGIES INC	SFD	SMITHFIELD FOODS INC
DSL	DOWNEY FINANCIAL CORP	SFG	STANCORP FINANCIAL GROUP INC
DST	D S T SYSTEMS INC DEL	SFN	SPHERION CORP
DTE	D T E ENERGY CO	SFP	SALTON INC
DTG	DOLLAR THRIFTY AUTOMOTIVE GRP IN	SFY	SWIFT ENERGY CO
DUK	DUKE ENERGY CORP	SGP	SCHERING PLOUGH CORP
DV	DEVRY INC DEL	SGR	SHAW GROUP INC
DVA	DAVITA INC	SGY	STONE ENERGY CORP
DVD	DOVER MOTORSPORTS INC	SHS	SAUER DANFOSS INC
DY	DYCOM INDUSTRIES INC	SHW	SHERWIN WILLIAMS CO
EAS	ENERGY EAST CORP	SIB	STATEN ISLAND BANCORP INC
EAT	BRINKER INTERNATIONAL INC	SIE	SIERRA HEALTH SERVICES INC
EBF	ENNIS BUSINESS FORMS INC	SII	SMITH INTERNATIONAL INC
EC	ENGELHARD CORP	SJI	SOUTH JERSEY INDS INC
ECL	ECOLAB INC	SJM	SMUCKER J M CO
ED	CONSOLIDATED EDISON INC	SKE	SPINNAKER EXPLORATION CO
EDE	EMPIRE DISTRICT ELEC CO	SKO	SHOPKO STORES INC
EDO	EDO CORP	SKP	S C P I E HOLDINGS INC
EDS	ELECTRONIC DATA SYS CORP NEW	SKS	SAKS INC
EFX	EQUIFAX INC	SKY	SKYLINE CORP
EGN	ENERGEN CORP	SLE	SARA LEE CORP
EIX	EDISON INTERNATIONAL	SLM	S L M CORP
EK	EASTMAN KODAK CO	SMF	SMART & FINAL INC
ELK	ELKCORP	SMP	STANDARD MOTOR PRODUCTS INC
ELX	EMULEX CORP	SNA	SNAP ON INC
ELY	CALLAWAY GOLF CO	SNS	STEAK N SHAKE CO
EMC	E M C CORP MA	SNV	SYNOVUS FINANCIAL CORP
EME	EMCOR GROUP INC	SO	SOUTHERN CO
EMN	EASTMAN CHEMICAL CO	SON	SONOCO PRODUCTS CO
EMR	EMERSON ELECTRIC CO	SOV	SOVEREIGN BANCORP INC
ENC	ENESCO GROUP INC	SP	SPECIALTY LABORATORIES INC
ENR	ENERGIZER HOLDINGS INC	SPC	ST PAUL COS INC
ENZ	ENZO BIOCHEM INC	SPF	STANDARD PACIFIC CORP NEW
EOG	EOG RESOURCES INC	SPN	SUPERIOR ENERGY SERVICES INC
EP	EL PASO CORP	SPW	S P X CORP
EPL	ENERGY PARTNERS LTD	SR	STANDARD REGISTER CO
EQT	EQUITABLE RESOURCES INC	SRE	SEMPRA ENERGY
ESA	EXTENDED STAY AMERICA INC	SRI	STONERIDGE INC
ESE	E S C O TECHNOLOGIES INC	SRP	SIERRA PACIFIC RESOURCES NEW
ESI	I T T EDUCATIONAL SERVICES INC	SRR	STRIDE RITE CORP
ESL	ESTERLINE TECHNOLOGIES CORP	SRT	STARTEK INC
ESV	E N S C O INTERNATIONAL INC	SRZ	SUNRISE ASSISTED LIVING INC
ET	E TRADE GROUP INC	SSD	SIMPSON MANUFACTURING INC

ETH	ETHAN ALLEN INTERIORS INC	STC	STEWART INFORMATION SVCS CORP
ETM	ENTERCOM COMMUNICATIONS CORP	STE	STERIS CORP
ETN	EATON CORP	STI	SUNTRUST BANKS INC
ETR	ENTERGY CORP NEW	STJ	ST JUDE MEDICAL INCA
EV	EATON VANCE CORP	STK	STORAGE TECHNOLOGY CORP
EVG	EVERGREEN RESOURCES INC	STL	STERLING BANCORP
EW	EDWARDS LIFESCIENCES CORP	STN	STATION CASINOS INC
EXC	EXELON CORP	STR	QUESTAR CORP
EYE	V I S X INC	STT	STATE STREET CORP
F	FORD MOTOR CO DEL	STU	STUDENT LOAN CORP
FAF	FIRST AMERICAN CORP CALIF	STW	STANDARD COMMERCIAL CORP
FBC	FLAGSTAR BANCORP INC	SUG	SOUTHERN UNION CO NEW
FBF	FLEETBOSTON FINANCIAL CORP	SUN	SUNOCO INC
FBN	FURNITURE BRANDS INTL INC	SUP	SUPERIOR INDUSTRIES INTL INC
FBP	FIRST BANCORP P R	SUR	C N A SURETY CORP
FCF	FIRST COMMONWEALTH FINANCIAL COR	SVM	SERVICEMASTER CO
FCN	F T I CONSULTING INC	SVU	SUPERVALU INC
FCP	FALCON PRODUCTS INC	SWC	STILLWATER MINING CO
FD	FEDERATED DEPT STORES INC DEL	SWK	STANLEY WORKS
FDC	FIRST DATA CORP	SWM	SCHWEITZER MAUDUIT INTL INC
FDO	FAMILY DOLLAR STORES INC	SWN	SOUTHWESTERN ENERGY CO
FDS	FACTSET RESEARCH SYSTEMS INC	SWS	S W S GROUP INC
FDX	FEDEX CORP	SWX	SOUTHWEST GAS CORP
FE	FIRSTENERGY CORP	SWY	SAFEWAY INC
FED	FIRSTFED FINANCIAL CORP	SXI	STANDEX INTERNATIONAL CORP
FIC	FAIR ISAAC & CO INC	SXT	SENSIENT TECHNOLOGIES CORP
FIF	FINANCIAL FEDERAL CORP	SY	SYBASE INC
FL	FOOT LOCKER INC	SYD	SYBRON DENTAL SPECIALTIES INC
FLE	FLEETWOOD ENTERPRISES INC	SYK	STRYKER CORP
FLR	FLUOR CORP NEW	SYM	SYMS CORP
FLS	FLOWSERVE CORP	SYY	SYSCO CORP
FMC	F M C CORP	T	A T & T CORP
FMT	FREMONT GENERAL CORP	TBC	TASTY BAKING CO
FNF	FIDELITY NATIONAL FINANCIAL INC	TBI	BROWN TOM INC
FNM	FEDERAL NATIONAL MORTGAGE ASSN	TCB	T C F FINANCIAL CORP
FO	FORTUNE BRANDS INC	TCC	TRAMMELL CROW CO
FOB	BOYDS COLLECTION LTD	TDI	TWIN DISC INC
FOE	FERRO CORP	TDW	TIDEWATER INC
FON	SPRINT CORP	TDY	TELEDYNE TECHNOLOGIES
FPL	F P L GROUP INC	TE	T E C O ENERGY INC
FRC	FIRST REPUBLIC BANK S F	TEK	TEKTRONIX INC
FRE	FEDERAL HOME LOAN MORTGAGE CORP	TEN	TENNECO AUTOMOTIVE INC
FRK	FLORIDA ROCK INDS INC	TER	TERADYNE IN
FRX	FOREST LABS INC	TEX	TEREX CORP NEW
FSH	FISHER SCIENTIFIC INTL INC	TFS	THREE FIVE SYSTEMS INC
FSS	FEDERAL SIGNAL CORP	TFX	TELEFLEX INC
FST	FOREST OIL CORP	TG	TREDEGAR CORP
FTN	FIRST TENNESSEE NATIONAL CORP	TGI	TRIUMPH GROUP INC NEW
FTO	FRONTIER OIL CORP	TGT	TARGET CORP
G	GILLETTE CO	TGX	THERAGENICS CORP

GAP	GREAT ATLANTIC & PAC TEA INC	THC	TENET HEALTHCARE CORP
GAS	NICOR INC	THO	THOR INDUSTRIES INC
GB	WILSON GREATBATCH TECH	THX	HOUSTON EXPLORATION CO
GBX	GREENBRIER COMPANIES INC	TIF	TIFFANY & CO NEW
GCI	GANNETT INC	TII	THOMAS INDUSTRIES INC
GCO	GENESCO INC	TIN	TEMPLE INLAND INC
GD	GENERAL DYNAMICS CORP	TJX	T J X COMPANIES INC NEW
GDI	GARDNER DENVER CO	TKR	TIMKEN COMPANY
GDT	GUIDANT CORP	TLB	TALBOTS INC
GDW	GOLDEN WEST FINANCIAL CORP	TMK	TORCHMARK CORP
GE	GENERAL ELECTRIC CO	TMO	THERMO ELECTRON CORP
GES	GUESS INC	TNB	THOMAS & BETTS CORP
GET	GAYLORD ENTERTAINMENT CO NEW	TNC	TENNANT CO
GFF	GRIFFON CORP	TNL	TECHNITROL INC
GFR	GREAT AMERICAN FINANCIAL RES INC	TOD	TODD SHIPYARDS CORP
GGC	GEORGIA GULF CORP	TOL	TOLL BROTHERS INC
GGG	GRACO INC	TOO	TOO INC
GIS	GENERAL MILLS INC	TOY	TOYS R US INC
GLK	GREAT LAKES CHEM CORP	TR	TOOTSIE ROLL INDS INC
GLT	GLATFELTER P H CO	TRB	TRIBUNE COMPANY NEW
GM	GENERAL MOTORS CORP	TRC	TEJON RANCH CO
GMP	GREEN MOUNTAIN PWR CORP	TRH	TRANSATLANTIC HOLDINGS INC
GMT	G A T X CORP	TRI	TRIAD HOSPITALS INC
GP	GEORGIA PACIFIC CORP	TRK	SPEEDWAY MOTORSPORTS INC
GPC	GENUINE PARTS CO	TRN	TRINITY INDUSTRIES INC
GPI	GROUP 1 AUTOMOTIVE INC	TRR	T R C COMPANIES INC
GPS	GAP INC	TSS	TOTAL SYSTEM SERVICES INC
GPT	GREENPOINT FINANCIAL CORP	TT	TRANSTECHNOLOGY CORP
GPX	G P STRATEGIES CORP	TTC	TORO COMPANY
GR	GOODRICH CORP	TTI	TETRA TECHNOLOGIES INC
GRP	GRANT PRIDECO INC	TTN	TITAN CORP
GS	GOLDMAN SACHS GROUP INC	TUG	MARITRANS INC
GSE	GUNDLE S L T ENVIRONMENTAL INC	TUP	TUPPERWARE CORP
GT	GOODYEAR TIRE & RUBR CO	TW	21ST CENTURY INSURANCE GROUP
GTI	GRAFTECH INTERNATIONAL LTD	TWP	TREX INC
GTK	GTECH HOLDINGS CORP	TWR	TOWER AUTOMOTIVE INC
GTN	GRAY TELEVISION INC	TWX	TIMER WARNER INC
GTY	GETTY REALTY CORP NEW	TXI	TEXAS INDUSTRIES INC
GVA	GRANITE CONSTRUCTION INC	TXN	TEXAS INSTRUMENTS INC
GWW	GRAINGER W W INC	TXT	TEXTRON INC
GXP	GREAT PLAINS ENERGY INC	TXU	T X U CORP
GY	GENCORP INC	TYL	TYLER TECHNOLOGIES INC
HAE	HAEMONETICS CORP MASS	UAG	UNITED AUTO GROUP INC
HAL	HALLIBURTON COMPANY	UB	UNIONBANCAL CORP
HAR	HARMAN INTL INDS INC NEW	UBH	U S B HOLDING CO INC
HAS	HASBRO INC	UCI	UICI
HB	HILLENBRAND INDS INC	UCL	UNOCAL CORP
HC	HANOVER COMPRESSOR CO	UCO	UNIVERSAL COMPRESSION HLDGS INC
HCA	H C A INC	UFI	UNIFI INC
HCR	MANOR CARE INC NEW	UGI	U G I CORP

HD	HOME DEPOT INC	UIC	UNITED INDUSTRIAL CORP
HDI	HARLEY DAVIDSON INC	UIL	U I L HOLDING CORP
HDL	HANDLEMAN CO	UIS	UNISYS CORP
HE	HAWAIIAN ELECTRIC INDUSTRIES	UNA	UNOVA INC
HEI	HEICO CORP NEW	UNF	UNIFIRST CORP
HET	HARRAHS ENTERTAINMENT INC	UNH	UNITEDHEALTH GROUP INC
HGR	HANGER ORTHOPEDIC GROUP INC	UNM	UNUMPROVIDENT CORP
HHS	HARTE HANKS INC	UNP	UNION PACIFIC CORP
HIG	HARTFORD FINANCIAL SVCS GROUP IN	UNS	UNISOURCE ENERGY CORP
HKF	HANCOCK FABRICS INC	UNT	UNIT CORP
HL	HECLA MINING CO	UPC	UNION PLANTERS CORP
HLT	HILTON HOTELS CORP	URI	UNITED RENTALS INC
HMN	HORACE MANN EDUCATORS CORP NEW	URS	U R S CORP NEW
HNI	HON INDUSTRIES INC	USB	U S BANCORP DEL
HNR	HARVEST NATURAL RESOURCES INC	USG	U S G CORP
HNZ	HEINZ H J CO	UST	U S T INC
HON	HONEYWELL INTERNATIONAL INC	USU	U S E C INC
HP	HELMERICH & PAYNE INC	UTR	UNITRIN INC
HPC	HERCULES INC	UTX	UNITED TECHNOLOGIES CORP
HPQ	HEWLETT PACKARD CO	UVV	UNIVERSAL CORPORATION
HRB	BLOCK H & R INC	VAL	VALSPAR CORP
HRH	HILB ROGAL & HAMILTON CO	VAR	VARIAN MEDICAL SYSTEMS INC
HRL	HORMEL FOODS CORP	VC	VISTEON CORP
HRS	HARRIS CORP	VCI	VALASSIS COMMUNICATIONS INC
HSC	HARSCO CORP	VFC	V F CORP
HSY	HERSHEY FOODS CORP	VGR	VECTOR GROUP LTD
HU	HUDSON UNITED BANCORP	VHI	VALHI INC NEW
HUF	HUFFY CORP	VLO	VALERO ENERGY CORP NEW
HUG	HUGHES SUPPLY INC	VLY	VALLEY NATIONAL BANCORP
HUM	HUMANA INC	VMC	VULCAN MATERIALS CO
HVT	HAVERTY FURNITURE COS INC	VMI	VALMONT INDUSTRIES INC
HZO	MARINEMAX INC	VOL	VOLT INFORMATION SCIENCES INC
IAL	INTERNATIONAL ALUMINUM CORP	VPI	VINTAGE PETROLEUM INC
IBC	INTERSTATE BAKERIES CORP	VRC	VARCO INTERNATIONAL INC DEL
IBM	INTERNATIONAL BUSINESS MACHS COR	VRX	VALEANT PHARMACEUTICALS INTL
ICN	I C N PHARMACEUTICALS INC NEW	VSH	VISHAY INTERTECHNOLOGY INC
IDA	IDACORP INC	VTS	VERITAS D G C INC
IDT	I D T CORP	VVC	VECTREN CORP
IES	INTEGRATED ELECTRICAL SRVCS INC	VVI	VIAD CORP
IEX	IDEX CORP	VZ	VERIZON COMMUNICATIONS
IFC	IRWIN FINANCIAL CORP	WAB	WABTEC CORP
IFF	INTERNATIONAL FLAVORS & FRAG INC	WAG	WALGREEN CO
IGT	INTERNATIONAL GAME TECHNOLOGY	WAT	WATERS CORP
IHI	INFORMATION HOLDINGS INC	WB	WACHOVIA CORP
IHP	I H O P CORP NEW	WCC	WESCO INTERNATIONAL INC
IHR	INTERSTATE HOTELS & RESORTS INC	WDC	WESTERN DIGITAL CORP
IKN	IKON OFFICE SOLUTIONS INC	WEC	WISCONSIN ENERGY CORP
IMC	INTERNATIONAL MULTIFOODS CORP	WEH	WESTCOAST HOSPITALITY CORP
IMN	IMATION CORP	WEN	WENDYS INTERNATIONAL INC
IMR	I M C O RECYCLING INC	WES	WESTCORP INC

INT	WORLD FUEL SERVICES CORP	WFC	WELLS FARGO & CO NEW
IO	INPUT OUTPUT INC	WFR	M E M C ELECTRONIC MATERIALS INC
IOM	IOMEGA CORP	WGL	W G L HOLDINGS INC
ION	IONICS INC	WGO	WINNEBAGO INDUSTRIES INC
IP	INTERNATIONAL PAPER CO	WGR	WESTERN GAS RESOURCES INC
IPG	INTERPUBLIC GROUP COS INC	WHC	WACKENHUT CORRECTIONS CORP
IRF	INTERNATIONAL RECTIFIER CORP	WHI	W HOLDING CO INC
IRM	IRON MOUNTAIN INC PA	WHR	WHIRLPOOL CORP
ITG	INVESTMENT TECHNOLOGY GP INC NEW	WIN	WINN DIXIE STORES INC
ITN	INTERTAN INC	WL	WILMINGTON TRUST CORP
ITT	I T T INDUSTRIES INC IND	WLM	WELLMAN INC
ITW	ILLINOIS TOOL WORKS INC	WLP	WELLPOINT HEALTH NETWORKS INC
IVC	INVACARE CORP	WLS	LYON WILLIAM HOMES
JAH	JARDEN CORP	WLT	WALTER INDUSTRIES INC
JBL	JABIL CIRCUIT INC	WLV	WOLVERINE TUBE INC
JBX	JACK IN THE BOX INC	WM	WASHINGTON MUTUAL INC
JCI	JOHNSON CONTROLS INC	WMI	WASTE MANAGEMENT INC DEL
JCP	PENNEY J C CO INC	WMK	WEIS MARKETS INC
JEC	JACOBS ENGINEERING GROUP INC	WMO	WAUSAU MOSINEE PAPER CORP
JEF	JEFFERIES GROUP INC NEW	WMS	W M S INDUSTRIES INC
JH	HARLAND JOHN H CO	WMT	WAL MART STORES INC
JHF	HANCOCK JOHN FINANCIAL SVCS INC	WNC	WABASH NATIONAL CORP
JLG	J L G INDUSTRIES INC	WON	WESTWOOD ONE INC
JLL	JONES LANG LASALLE INC	WOR	WORTHINGTON INDUSTRIES INC
JNJ	JOHNSON & JOHNSON	WPC	W P CAREY & CO LLC
JNS	JANUS CAP GROUP INC	WPI	WATSON PHARMACEUTICALS INC
JNY	JONES APPAREL GROUP INC	WPS	W P S RESOURCES CORP HOLDING CO
JOE	ST JOE CO	WR	WESTAR ENERGY INC
JP	JEFFERSON PILOT CORP	WRC	WESTPORT RESOURCES CORP NEW
JPM	J P MORGAN CHASE & CO	WSM	WILLIAMS SONOMA INC
JRC	JOURNAL REGISTER CO	WST	WEST PHARMACEUTICAL SERVICES INC
JWL	WHITEHALL JEWELLERS INC	WWW	WOLVERINE WORLD WIDE INC
JWN	NORDSTROM INC	WWY	WRIGLEY WILLIAM JR CO
K	KELLOGG CO	WY	WEYERHAEUSER CO
KBH	K B HOME	WYE	WYETH
KDE	4 KIDS ENTERTAINMENT INC	X	UNITED STATES STEEL CORP NEW
KDN	KAYDON CORP	XEL	X C E L ENERGY INC
KEG	KEY ENERGY SERVICES INC	XOM	EXXON MOBIL CORP
KEI	KEITHLEY INSTRUMENTS INC	XRX	XEROX CORP
KEM	KEMET CORP	XTO	X T O ENERGY INC
KEX	KIRBY CORP	Y	ALLEGHANY CORP DE
KEY	KEYCORP NEW	YCC	YANKEE CANDLE INC
KFY	KORN FERRY INTERNATIONAL	YRK	YORK INTL CORP NEW
KG	KING PHARMACEUTICALS INC	YUM	YUM BRANDS INC
KKD	KRISPY KREME DOUGHNUTS INC	Z	FOOT LOCKER INC
KMB	KIMBERLY CLARK CORP	ZAP	ZAPATA CORP
KMG	KERR MCGEE CORP	ZLC	ZALE CORP NEW
KMI	KINDER MORGAN INC KANSAS	ZNT	ZENITH NATIONAL INSURANCE CORP
KMT	KENNAMETAL INC	ZQK	QUIKSILVER INC
KO	COCA COLA CO	AES	A E S CORP

KR	KROGER COMPANY	ATH	ANTHEM INC
KRB	M B N A CORP	AWE	A T & T WIRELESS SVCS INC
KRI	KNIGHT RIDDER INC	AWK	AMERICAN WATER WORKS INC
KSE	KEYSPAN CORP	BNK	BANKNORTH GROUP INC
KSS	KOHL'S CORP	CE	CONCORD E F S INC
KSU	KANSAS CITY SOUTHERN INDS INC	CIT	C I T GROUP INC NEW
KTO	K 2 INC	COL	ROCKWELL COLLINS INC
KWD	KELLWOOD COMPANY	CPN	CALPINE CORP
KWK	QUICKSILVER RESOURCES INC	GLW	CORNING INC
KWR	QUAKER CHEMICAL CORP	KFT	KRAFT FOODS INC
LAB	LABRANCHE & CO INC	L	LIBERTY MEDIA CORP NEW
LAD	LITHIA MOTORS INC	LU	LUCENT TECHNOLOGIES INC
LAF	LAFARGE CORP	OEI	OCEAN ENERGY INC NEW
LBY	LIBBEY INC	PCS	SPRINT CORP
LC	LIBERTY CORP SC	PFG	PRINCIPAL FINANCIAL GROUP INC
LDG	LONGS DRUG STORES INC	PRU	PRUDENTIAL FINANCIAL INC
LDL	LYDALL INC	Q	QWEST COMMUNICATIONS INTL INC
LDR	LANDAUER INC	RRI	RELIANT RESOURCES INC
LEA	LEAR CORP	SLR	SOLETRON CORP
LEE	LEE ENTERPRISES INC	WMB	WILLIAMS COS
LEG	LEGGETT & PLATT INC	WTW	WEIGHT WATCHERS INTL INC NEW
LEH	LEHMAN BROTHERS HOLDINGS INC	ZMH	ZIMMER HOLDINGS INC

Appendix V

NYSE Specialist Firms

N0003	WAGNER STOTT BEAR SPEC.
N0034	LA BRANCHE CO.
N0041	FLEET MEEHAN SPECIALIST
N0050	SUSQUEHANNA SPECIALISTS
N0055	SPEAR LEEDS AND KELLOGG
N0061	VAN DER MOOLEN SPECIALISTS USA
N0070	PERFORMANCE SPECIALIST GROUP LLC

NASD Market Centers

SCHB	SCHB(US) SCHWAB CAPITAL MARKETS L.P.
TACT	TACT(US) AUTOMATED CONFIRMATION TRANSACTION SERVICE
TARCA	ARCA(US) ARCHIPELAGO SECURITIES L.L.C.
TAUTO	*AUTO(US) AUTOMATED TRADING DESK FINANCIAL SERVICES, LLC
TBBNT	BBNT (US) SCOTT AND STRINGFELLOW INC.
TBRGE	BRGE (US) NEWBRIDGE SECURITIES CORPORATION
TBRUT	BRUT(US) BRUT, LLC
TCAES	CAES(US) COMPUTER ASSISTED EXECUTED SYSTEM
TDIRA	DIRA (US) DIRECT ACCESS BROKERAGE SERVICES
TFAHN	FAHN (US) OPPENHEIMER & CO. INC.
TFPKI	FPKI (US) FOX-PITT KELTON INC.
TFRGP	FRGP (US) FORGE FINANCIAL GROUP, INC.
TINET	INET(US) INET ATS, INC.
TJBOC	JBOC (US) NATIONAL CLEARING CORP.
TLYON	CREDIT LYONNAIS SECURITIES
TMADF	MADF(US) BERNARD L. MADOFF
TMAYF	MAYF(US) MAY FINANCIAL CORP
TMCBT	MCBT(US) MOORS AND CABOT INC.
TMONT	MONT(US) BANC OF AMERICA SECURITIES LLC
TNYFX	NYFX(US) NYFIX MILLENIUM, L.L.C.
TSBSH	*SBSH (US) CITIGROUP GLOBAL MARKETS INC.
TSOAR	STERLING FINANCIAL INVESTMENT GROUP
TSSBS	SSBS(US) STATE STREET GLOBAL MARKETS, LLC
TSWST	SWST(US) SOUTHWEST SECURITIES, INC.
TTDCM	TDCM(US) TD WATERHOUSE CAPITAL MARKETS, INC.
TTHRD	THRD(US) THE THIRD MARKET CORP.
TTRIM	TRIM(US) KNIGHT CAPITAL MARKETS, INC.
TUBSW	UBS SECURITIES LLC
TVFIN	VFIN (US) VFINANCE INVESTMENTS INC.
TWRHC	WRHC (US) WILLIAM R. HOUGH & CO.
WATHWATH	WATH(US) TD WATERHOUSE INVESTOR SERVICES, INC.

PARCAX	PACIFIC EQUITIES ARCHIPELAGO EXCHANGE
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