Optimal Listing Policy: Why Microsoft and Intel Do Not List on the NYSE

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Reena Aggarwal
U.S. Securities and Exchange Commission and Georgetown University School of Business

James J. Angel
Georgetown University School of Business

Georgetown University
School of Business
Washington, D.C. 20057

Tel. (202) 687-3784
Tel. (202) 687-3765
Fax (202) 687-4031

aggarwal@gunet.georgetown.edu
angelj@gunet.georgetown.edu

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Abstract

Many Nasdaq-listed firms that could list on the NYSE have not listed, despite Nasdaq's traditionally higher bid-ask spreads. These higher spreads give broker-dealers more incentive to market stocks. Analysts make buy recommendations for Nasdaq-listed stocks more frequently than for NYSE-listed stocks. Firms face a tradeoff between the low transaction costs of an auction market and the marketing advantages of a dealer market. The largest firms prefer a dealer market in which institutional investors can bypass the high spreads which motivate broker-dealers to market the stock to retail investors. The model also explains why firms may have positive price reactions when they switch from Nasdaq to AMEX and also when they move from AMEX to Nasdaq. Furthermore, the model is consistent with the curious fact that closed-end funds, unlike operating firms, overwhelmingly list on exchanges, and that brokerage firms tend to list their own stocks on exchanges even while bringing other firms public on Nasdaq.

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One of the decisions faced by a publicly-held company is where its stock should be traded. Traditionally, a small firm first traded over-the-counter. As it grew, it listed on the AMEX and ultimately on the NYSE.[1] However, the evolution of the over-the-counter market into the Nasdaq market has changed this pattern. Over 900 firms that meet the NYSE listing requirements have chosen to continue trading on Nasdaq, including household names such as Microsoft and Intel. This trend away from NYSE-listing has become so pronounced that Nasdaq now reports higher share volumes than the NYSE, as seen in Figure 1.[2]

The reluctance of firms to list on the NYSE is puzzling, since numerous studies show that firms that move from the Nasdaq to the NYSE generally have positive stock price reaction to the listing announcement and lower bid-ask spreads subsequent to listing.[3]

There are other puzzles around stock listings. When firms switch from Nasdaq to the AMEX, there is usually a positive price reaction. There is also, however, a positive price reaction when firms switch from the AMEX to Nasdaq (Clyde, Schultz, and Zaman, 1997). Why is it "good news" when firms join the AMEX *and* when firms leave the AMEX for Nasdaq? Another puzzle stems from the listing policies of closed-end funds, which, unlike operating companies, have chosen almost unanimously to list on either the NYSE or the AMEX. Why are their listing decisions so different from those of other firms? Investment banks also tend to list their own IPOs on the NYSE,

even though they take other firms public on Nasdaq.

Although the NYSE generally provides lower transaction costs, Nasdaq's higher costs provide financial incentives to broker-dealers to generate order flow in a stock, which helps liquidity. The ability of large institutional investors to bypass the dealer market and trade directly among themselves through systems such as Instinet, Bloomberg, and POSIT further reduces the incentives to move to a traditional exchange. Because institutional investors can achieve transaction costs in the largest Nasdaq stocks that are comparable to NYSE transaction costs, there is less reason for the largest firms to list on the NYSE. This paper models these tradeoffs and shows how, for some large firms with high institutional ownership, it is indeed optimal for them to remain on Nasdaq rather than list on the NYSE. Our model also explains the almost unanimous decision of closed-end funds and investment banks to list on exchanges rather than trade on Nasdaq.

The next section discusses the institutional features of the NYSE and Nasdaq. Particular attention is paid to the costs and benefits of listing on each market. Section II reviews previous research on exchange listings.

Section III models the listing decision between a dealer and an auction market. In the model, Nasdaq's promotional activities expand the pool of investors, thus reducing the cost of capital in the sense of Merton (1987). This cost reduction may be offset in whole or in part by an increase in the bid-ask spread, which increases the cost of capital. Nonetheless, firms may rationally choose to list on a higher-cost dealer market because of the expanded pool of investors brought in by the dealers.

Section IV extends the model to incorporate listing fees, as well as the ability of large investors to bypass the dealer market. The extended model identifies situations in which small firms list on Nasdaq, medium size firms list on the NYSE, and large firms prefer to trade on Nasdaq. The

planned relaxation of Rule 500 should lead some firms to switch from the NYSE to Nasdaq.

Section V presents empirical findings that support this model. Section VI summarizes the results and discusses the implications for firms and exchanges.

I. Institutional Features

The Nasdaq Stock Market consists of computerized linkages among securities dealers who are members of the National Association of Securities Dealers (NASD). The communication system allows dealers to broadcast their bid and offer quotations over computer screens. There is no central trading floor, nor is there a central order book that consolidates all orders in the market. Brokers executing an order consult the screen and may route the order to any of the dealers making a market in the stock. Trades are often conducted via telephone, although small orders may be executed automatically via the Small Order Execution System (SOES).[4]

On the NYSE, trading in each stock is centralized in one physical location and is supervised by a specialist who acts as both auctioneer and market maker. Smaller orders are routed to the specialist via the computerized SuperDot system, and larger orders are worked by brokers on the exchange floor. The specialist keeps a book of the limit orders, which are executed according to price and time priority.

Not all of the trading volume in NYSE-listed stocks takes place on the NYSE. The regional U.S. exchanges trade approximately 9% of the volume and the NASD trades another 8% (NYSE, 1997). Much of the Nasdaq volume in NYSE listed stocks is handled by so-called "third market" firms, such as Madoff and Trimark, that promise to match the best consolidated quotes across all markets. These firms sometimes make payments to brokerage firms in exchange for order flow.

Smaller and unreported amounts of trading in NYSE stocks also occur in international markets.

A. Listing Requirements and Costs

Each market has its own set of listing requirements that a firm must meet before its stock can be listed. These requirements include minimum levels of market capitalization, number of shareholders outstanding, and so forth. Table I summarizes the listing requirements of the primary U.S. markets. Nasdaq has several different tiers, each with different listing requirements and fees. The size requirements for the top tier, the Nasdaq National Market, are approximately the same as the listing requirements of the AMEX. The NYSE listing requirements call for larger firms with larger earnings and with three years of positive pre-tax income.

Please insert Table I approximately here.

However, these requirements are guidelines, not rigid rules. The NYSE sometimes lists firms that do not meet the exact letter of the guidelines. For example, an examination of Compustat data for 59 firms that switched from Nasdaq to the NYSE in 1995 reveals that the NYSE apparently waived one or more of the listing requirements for 10 of the firms.

Listed companies must also agree to obey both current and future corporate governance rules imposed by the exchange. Examples include requirements for outside directors, and disclosure requirements. Firms unwilling to abide by these rules may choose not to list on such exchanges. For example, the historic reluctance of the NYSE to allow share classes with different voting rights led many firms with multiple classes of equity shares to stay on the AMEX even though they were

large enough to trade on the NYSE. There are other minor requirements, such as the NYSE's requirement that stock certificates display the image of a human figure on them to deter counterfeiting.

Once a firm listed on the NYSE, it has been very difficult for it to delist voluntarily. The old NYSE Rule 500 required a supermajority shareholder vote to delist; the NYSE has proposed to relax this so that only board approval will be required.

Each market also charges its own listing fees, which are summarized in Table II. These fees are usually based on the number of shares outstanding. If a company merges with another company, it may have to pay a new set of listing fees as well. The NYSE also charges listing fees on the new shares issued by a firm in a stock split, up to $250,000. In addition, there are annual maintenance fees. Thus, listing on the NYSE is an expensive undertaking.[5] If Intel were to list its 821 million shares, it would incur an immediate listing cost of $504,600 and an annual maintenance fee of $500,000. The present value of this initial listing fee and the perpetuity of the annual maintenance is worth over $5 million at a discount rate of 10%.

Please insert Table II approximately here.

B. Benefits of Listing on an Organized Market

Equity securities trade in organized markets for several reasons. An organized market reduces investors' search costs, and thus reduces the transaction costs of matching buyer and seller.

An organized market provides mechanisms for the clearance and settlement of trades, which reduces the risk that an investor will lose money because of a settlement problem in which a trade does not settle as agreed.[6] In actuality, there are few differences between Nasdaq and the traditional exchanges in clearance and settlement.

Organized markets also provide important regulation of the securities markets. The traditional exchanges have long had listing standards, required certain disclosures, and monitored trading for irregularities. Exchange membership signals compliance with a certain standard of ethical behavior and shareholder protection both by the firm and in the marketplace for its stock. However, now that government securities regulation has superseded much of the self-regulation of the exchanges, and the NASD provides similar regulation of Nasdaq firms, it is debatable how much of an advantage there is to the regulation provided by the traditional exchanges.

Organized markets not only monitor the listed firms, but in their role as self-regulatory organizations (SROs) also regulate trading in their markets and the activities of member firms. This regulation reduces the amount of fraudulent, manipulative or otherwise abusive practices that take place in the trading of a stock. It is not clear that either market has an overwhelming advantage in this area, although recent investigations have certainly tarnished the NASD's image.[7] The important differences between the Nasdaq dealer market and the traditional exchanges have to do with transaction costs and the marketing of stocks.

B.1. Marketing

One advantage of a dealer market such as Nasdaq is that a dealer market provides strong incentives for broker-dealers to market a stock, which is euphemistically termed "sponsorship."

Brokerage firms generate order flow in stocks by conducting "research" and by recommending stock transactions to their customers. If a brokerage firm generates an order for an exchange-listed stock, it earns the brokerage commission. Many brokerage firms receive payments for sending their orders to a given market. Some brokerage firms may potentially earn the bid-ask spread by taking the other side of trades itself, which is known as “internalizing” orders. This can be done for an exchange-listed stock by routing orders to an exchange where the brokerage firm owns the specialist firm that handles the stock. However, to do this, the firm must first purchase a seat on an exchange and be awarded (or purchase) the franchise to be the specialist in that stock. However, on the NYSE and the AMEX, customer orders take precedence over the specialists, making it harder for a firm to internalize order flow even if it owns the specialist firm.[8] Furthermore, NYSE Rule 98 creates a firewall between a brokerage firm and its affiliated specialist operations that restricts interactions between the specialist and brokerage operations.

With a Nasdaq stock, it is easier to internalize the order by routing it to an affiliated market maker. The entry costs of becoming a Nasdaq market maker are much lower than those of becoming an exchange specialist.[9] Furthermore, a Nasdaq order does not have to interact with a central limit order book that aggregates the limit order in the market, because there is no central limit order book in Nasdaq. A Nasdaq broker-dealer has to provide price protection only to its own customers' limit orders, not to any orders generated outside the firm. (Before recent changes in order handling practices mandated by the SEC, Nasdaq market makers could trade through their own customer's limit orders.)

In addition, the generally wider percentage spreads on Nasdaq stocks make it more lucrative for the brokerage firm to generate an order in a Nasdaq stock than in an exchange-listed stock.

Indeed, the higher profitability of trading in Nasdaq stocks has led some brokerage firms to offer "commission free" trades in some Nasdaq stocks, since the firms earn trading revenue from their affiliated market makers. Morgenson (1993) reports that most brokerage firms pay their brokers higher percentages of the gross commissions on those Nasdaq stocks in which the firms make markets.[10] The higher commissions provide additional incentive to the brokers to recommend trades in those stocks.

While there are financial incentives for Nasdaq broker-dealers to market stocks, NYSE specialist firms are prohibited by NYSE Rule 113.20 from "popularizing" a stock. Thus, not only is there less incentive for a NYSE specialist to generate order flow because NYSE spreads are narrower, but there is actually a prohibition against it.

The effects of these differences in incentives to market NYSE and Nasdaq stocks can be seen in analyst recommendations. An examination of brokerage firm recommendations from the Standard and Poors' Analysts' Consensus Estimates (ACE) database in July 1996 indicates that buy recommendations are a higher proportion of analyst's total recommendations for Nasdaq-listed stocks than for NYSE-listed stocks. As seen in Table III, analysts recommended buying 38.3% of the Nasdaq stocks analyzed, while they recommended the purchase of only 26.8% of the NYSE-listed stocks. The average quality of opinion, a weighted average of buy, hold, and sell recommendations, is also higher for Nasdaq-listed stocks than for NYSE-listed stocks.[11]

Please insert Table III approximately here.

However, potentially confounding factors other than exchange membership may also affect

analyst recommendations. In particular, the aggregate results may be affected if analysts are bullish on a particular industry that just happens to trade on Nasdaq, or on a particular class of stocks such as small stocks. To control for this, we perform a regression analysis of the percentage of buy recommendations on explanatory variables for exchange membership, size, membership in the S&P 500 index, and industry at the level of two-digit SIC codes. As seen in Table IV, after controlling for these factors analysts are still more likely to recommend the purchase of Nasdaq-listed stocks and to give them a higher average quality of opinion. Table IV also indicates that analysts are more likely to recommend the purchase of larger stocks that are not in the S&P 500, as well as the stocks in certain industries.[12]

Please insert Table IV approximately here.

B.2. Specific trading practices

Some companies may prefer the specific practices of a particular market. The centralized nature of trading on an exchange may make it easier for a firm to monitor trading in its stock by contacting the specialist for that stock. Even though specialists participate in less than 20% of NYSE trades (NYSE, 1997), they are usually quite knowledgeable about the identities of participants.[13] In contrast, the decentralized nature of Nasdaq trading may make it harder for a firm to find out who is trading its stock and why. On the other hand, many firms may prefer having multiple market makers who theoretically compete for order flow. Multiple market makers may provide additional liquidity and provide a better market than a single specialist can.

Some companies may prefer Nasdaq because the higher dealer participation rate on Nasdaq causes a large number of Nasdaq trades to be reported twice, once when the dealer purchases from a seller and again when the dealer sells to a buyer. Gould and Kleidon (1994) find that investor trading represented less than half of the reported trading volume in their sample of Nasdaq stocks. This inflates the reported volume compared with an auction market such as the NYSE. Some companies may prefer this volume inflation because it makes their stocks appear more active. A higher reported volume also could make it easier for a firm to execute stock repurchases, which are restricted under SEC Rule 10b-18 to a maximum of 25% of the average daily trading volume per day.

Furthermore, companies concerned that short sellers could manipulate their stock may have preferred in the past to have their stock traded on an exchange where the "uptick rule" restricts short selling. However, Nasdaq has instituted a “bid-test” on a pilot basis that restricts short selling on Nasdaq in a manner similar to the uptick rule.

II. Previous Research on Stock Exchange Listings

Previous research has primarily studied firms that switch from one market to another. Numerous studies find that when a Nasdaq firm announces it will list on the NYSE or AMEX, there is, on average, an immediate increase in the price of the stock. However, over the long-run, newly listed NYSE firms have underperformed, as documented in McConnell and Sanger (1987). Dharan and Ikenberry (1995) find that this underperformance is concentrated among smaller firms that opportunistically time their listing decisions ahead of bad news that could cause the firms to fail the

earnings test for NYSE listing. Baker, Powell, and Weaver (1996) look at firm visibility, as measured by analyst coverage, and find that it does increase after listing on the NYSE, but as a result of pre-listing performance and not of the listing itself.

Although Rule 500 makes it difficult for NYSE-listed firms to move to Nasdaq, the AMEX has no equivalent rule. Clyde, Schultz and Zaman (1997) find positive stock price reactions for AMEX-listed firms that move to Nasdaq. The empirical studies present an interesting paradox: firms appear to have positive price reactions when they move from Nasdaq to the AMEX *and* when they move from the AMEX to Nasdaq.

Several papers examine the market microstructure of the NYSE and Nasdaq, focusing on transaction costs such as the bid-ask spread. Almost invariably, they find that quoted as well as effective spreads are higher on Nasdaq, both for stocks that switch from Nasdaq to the NYSE and for matched pairs of stocks. Recent examples of this literature are Huang and Stoll (1996ab) and Bessembinder and Kaufman (1997ab).[14] LaPlante and Muscarella (1996) examine block transactions for matching samples of NYSE and Nasdaq firms and find that the NYSE furnishes more liquidity.

However, recent changes call into question whether these results are still valid. In 1997, the tick size used in the U.S. for most stocks over $1 per share fell from $.125 to $.0625. This caused a large decrease in quoted bid-ask spreads on both Nasdaq and the NYSE. In addition, the institution of the SEC's new order handling rules (17 CFR 240.11), which require market makers to reflect customer limit orders in their quotations, also caused a significant narrowing of quoted Nasdaq spreads. However, even with the new rules, quoted spreads on Nasdaq are still generally higher than on the NYSE.

Others have investigated the quote-setting behavior of Nasdaq market makers. Christie and Schultz' (1994) finding that Nasdaq market makers avoided using odd-eighths in their quotes set off a series of investigations and lawsuits over the fairness of Nasdaq trading practices.[15]

The evidence is not all one-sided, however. It appears that Nasdaq does have some advantages. Reinganum (1990) finds that Nasdaq has a liquidity advantage over the NYSE for small firms, but not for big ones. Affleck-Graves, Hegde, and Miller (1994) examine a matched sample of NYSE and Nasdaq stocks and find, on average, lower bid-ask spreads for the Nasdaq stocks. Their spread decomposition finds lower adverse selection costs for matched Nasdaq-listed stocks, but higher order processing costs.

Investigations of institutional trades show that institutional trading costs for comparable stocks finds similar execution costs on the NYSE and Nasdaq. Chan and Lakonishok (1997) find that some types of institutional trades are more expensive for Nasdaq-listed stocks and others for NYSE-listed stocks, with results so close that changes in the time period or the benchmark change the results. Keim and Madhavan (1995) examine trades by institutions and find that, on average, institutional trading costs are higher for smaller Nasdaq firms, but in the largest quintile of market capitalization, the costs faced by institutions are no higher for the largest trades in Nasdaq-listed stocks than for NYSE-listed stocks. Jones and Lipson (1997) examine institutional trading costs for firms that change listings and find little difference in execution costs between the NYSE and Nasdaq for orders of less than 100,000 shares. Above 100,000 shares, they find that institutional execution costs appear smaller on Nasdaq.

Practitioners also find evidence that neither the NYSE nor Nasdaq is always better. Plexus Group (1996), a firm that monitors trade execution costs for institutions, examines over 800,000

institutional trades made in 1995 and concludes, "When difficulty is held constant, NASDAQ execution costs compare favorably against exchange costs. This apparent advantage is mitigated by the timing costs associated with waiting for liquidity. Net of timing and execution costs, exchange trading dominates for difficult trades while NASDAQ trading dominates for easier trades."

One explanation of these findings that NYSE and Nasdaq institutional trading costs are similar is that the market mechanism for large block trades is very similar for both NYSE- and Nasdaq-listed stocks. Large blocks in the largest stocks are usually shopped to institutional investors in the "upstairs" market by brokers who specialize in block trading.[16] The NYSE specialist usually does not take an active role in arranging such trades for NYSE-listed stocks. Another similarity in the market structure for the largest Nasdaq firms stems from the fact that 100 of the most active Nasdaq stocks also trade on the auction market of the Chicago Stock Exchange, as documented in Lau, McCorry, McInish, and Van Ness (1996).

A few scholars examine listing decisions directly. Lipson (1996) independently develops a model of listing policy in his examination of single-dealer and multiple-dealer markets, but his model does not explain the listing behavior of large firms such as Intel. Cowan, Carter, Dark, and Singh (1992) empirically examine the NYSE-listing practices of Nasdaq firms and find that firms with unexpectedly high bid-ask spreads tend to move from the Nasdaq to the NYSE. Furthermore, Nasdaq firms tend either to list on the NYSE soon after meeting NYSE requirements or not to list at all.

III. A Model of Stock Listing Policy

Firms list their stocks on an organized market to secure a more liquid secondary market for

them. Academics and practitioners have long known that "liquidity" is a valuable security attribute. However, the value of liquidity is hard to measure, in part because the concept itself is hard to define. The concept of liquidity usually involves both a transaction cost component and a time or difficulty component. *Ceteris paribus*, an asset that incurs lower transaction costs is thought of as being more liquid than an asset with higher transaction costs. Similarly, an asset that can be bought or sold quickly is more liquid than one that takes longer to trade. Academics have evolved two approaches to value these attributes. The first one, exemplified by Amihud and Mendelson (1986), emphasizes the transaction costs of an asset, such as the bid-ask spread. Brennan and Subrahmanyam (1996) use the price impact resulting from trades. Since investors know when they purchase a security that they will incur transaction costs when they sell it, the price of a security will be discounted to reflect the present value of expected future transaction costs. Thus, a company issuing a security with a higher transaction cost faces a higher cost of capital.

However, there is more to liquidity than a low bid-ask spread. Many auction markets with lower bid-ask spreads have failed in their attempts to compete against the OTC market and, later, against Nasdaq in the market for small-cap stocks. Aggarwal and Angel (1997) chronicle how the regional stock exchanges, the National Stock Exchange of the 1960s, and the AMEX Emerging Company Marketplace all failed in this market segment.

Having a larger pool of investors willing to invest in the stock also makes it easier to trade the stock. Merton's (1987) model of segmented capital markets reflects this second aspect of liquidity. If more investors "know about" a security in the sense that they are willing to consider owning the stock, then it will have a lower cost of capital. The incentives built into the Nasdaq system to generate order flow naturally increase the pool of investors who "know about" a stock,

effectively reducing the required rate of return on the stock.

Thus, it is not clear *a priori* which market mechanism produces the lowest required rate of return. For some companies, the added benefits of increased exposure via the Nasdaq system may provide lower capital costs despite higher transaction costs. This situation is analogous to that of a manufacturer who willingly pays a "slotting fee" to a supermarket in order to get desirable shelf space for a product. In this case, the "slotting fee" is paid for through higher transaction costs for the investors who trade with the dealers.

We now model the intuition that firms face trade-offs between the benefits of a potentially larger pool of investors in a dealer market and the cost there of higher transaction costs. This model assumes that a company already fulfills the listing requirements for both the NYSE and the top tier of Nasdaq, where it is presently listed. Therefore, the initial Nasdaq listing expense is a sunk cost. Furthermore, there are no additional costs to listing on a traditional exchange other than the direct listing and maintenance costs.

Valuing the benefits from increased investor knowledge about a firm is difficult, and will vary from firm to firm. Moreover, a firm also can spend money on shareholder relations, advertising, and other projects to disseminate information about the firm. However, third party analysts provide at least the appearance of independent information about the firm, which is something that a company press release cannot do. The Merton (1987) model of an informationally incomplete capital market allows us to value this benefit of an expanded pool of investors.

By combining the Merton model with Amihud and Mendelson's (1986) finding that higher bid-ask spreads are associated with higher rates of return, it is possible to construct a model of the optimal listing policy. In the Merton (1987) model, the fraction q of investors who "know about"

a stock is less than the total number of investors. This causes an increase, λ, in the required rate that is also a function of firm size and idiosyncratic risk:

$$\lambda = \frac{(1 - q)}{q} x \delta \sigma^2 \qquad \textbf{(1)}$$

Here, x is the weight of the firm in the market portfolio, δ is the common risk aversion parameter for each investor in the model, and σ^2 is the idiosyncratic risk of the stock. Let the total fraction of investors who would "know about" the firm if it traded only on Nasdaq be denoted q_d, and the fraction of investors who would "know about" the firm if it were listed on the NYSE be denoted q_a. (The subscript $_d$ denotes the Nasdaq dealer market, and the subscript $_a$ denotes the NYSE auction market.) We assume that any value that the firm places on the prestige or other intangible benefits of membership in a particular market is captured in q_d and q_a, because such prestige affects the fraction of investors who would "know about" the firm if it traded on a particular market. These values will differ across firms because of different natural levels of visibility as well as differences in the ease with which brokerage firms' promotional activities can expand the pool of investors in a firm.

In the spirit of Amihud and Mendelson (1986), we assume that the extra return γ required to compensate investors for a higher bid-ask spread is related to the relative bid-ask spread S. For tractability and simplicity, we assume a linear model with a constant of proportionality α:

$$\gamma = \alpha S \qquad \textbf{(2)}$$

Let the bid-ask spread that would occur in the dealer market be S_d, and in the auction market be S_a. We assume, *ceteris paribus*, that more investors "know about" the firm in the dealer market ($q_d > q_a$) because of the marketing paid for by the higher bid-ask spreads ($S_d > S_a$) there. This is

consistent with the above findings that analysts are more likely to recommend the purchase of Nasdaq stocks, as well as the findings of Baker, Powell, and Weaver (1996) that NYSE listing by itself does not increase firm visibility as measured by analyst coverage. In the absence of listing fees, a firm will rationally choose to have its stock traded in the market with the lowest cost stemming from the sum of these frictions, $\lambda+\gamma$. Thus, a firm will choose to stay listed on Nasdaq as long as the required rate of return penalties from segmented capital markets and bid-ask spreads is lower on Nasdaq:

$$\lambda_d + \gamma_d < \lambda_a + \gamma_a \qquad \textbf{(3)}$$

Substituting terms yields:

$$\frac{(1-q_d)}{q_d} x\delta\sigma^2 + \alpha S_d < \frac{(1 - q_a)}{q_a} x\delta\sigma^2 + \alpha S_a \qquad \textbf{(4)}$$

As noted above, the NYSE charges both an initial listing fee and an annual maintenance fee. Since these fees are based on the number of shares listed, they are roughly proportional to the size of the firm.[17] For this reason and for modeling simplicity, we model the fees by annualizing them as a constant addition to the cost of capital, C_a. Adding this term and rearranging brings us to our first proposition :

Proposition 1 (Optimal Listing Policy):

The firm will prefer the dealer market if the benefits in reduced cost of capital from greater exposure in the dealer market are greater than the benefits of reduced bid-ask spread in the auction market less the annualized listing fees:

$$\frac{(q_d - q_a)}{q_a q_d} x\delta\sigma^2 > \alpha(S_d - S_a) - C_a \qquad \textbf{(5)}$$

Thus, the best market for a given firm will be a function of the spreads that it would see in the different markets, along with the relative visibility it would have in the two markets, and the firm's idiosyncratic risk, size, and overall investor risk aversion.

IV. Bypassing the Dealer Network

A. Evidence of Bypass

The above analysis models the traditional view of the Nasdaq as a high-cost dealer market and the NYSE as a low-cost auction market. However, both markets are more complex than suggested by this stylized image. There are many dealers who make markets in NYSE-listed stocks in competition with the NYSE specialist, including Nasdaq dealers and regional stock exchange specialists.

Nasdaq is also more complex. Institutional investors can and do bypass the traditional dealer network to trade among themselves and avoid the dealer's bid-ask spread. This behavior is important, because institutional investors own 47% of the market value of the Nasdaq National Market stocks, and in some of the largest stocks they own more than 85% (NASD, 1997). Institutions can use the expertise of brokerage firms' block trading desks in the "upstairs market" as well as systems such as POSIT and Instinet that offer very low transaction costs. The SEC (1997) reports that such alternative trading systems handle almost 20% of OTC orders but only 4% of the orders in NYSE-listed stocks. The higher market share of these systems for Nasdaq-listed stocks is evidence that they provide a partial low-cost substitute for the auction market of the NYSE. The NYSE generally has lower quoted bid-ask spreads than Nasdaq has, and there is thus less incentive for traders to use systems such as POSIT and Instinet to beat the spread.

Instinet (a subsidiary of Reuters) provides an electronic brokerage communication service that allows users to trade both NYSE and Nasdaq stocks in a computerized and anonymous limit book system (as well as to negotiate trades with each other). Instinet has been enormously successful, trading over two billion shares a month in early 1996 according to Reuters (1996). The NASD (1996) reports that Instinet's volume represents 15% of Nasdaq's total volume. In the top 250 Nasdaq stocks, most of which are NYSE-eligible, Instinet's market share is approximately 20%. However, many Nasdaq market makers are actively involved in Instinet, so that it is difficult to determine how much of Instinet's volume is directly between institutions, because such statistics are not released. Indeed, Instinet appears to play a role similar to the inter-dealer brokers that are active on the London Stock Exchange.

In addition, both POSIT (a product of ITG) and Instinet operate crossing systems that match institutional buyers and sellers at prices that are set at the midpoint of the quoted bid-ask spread, leading to an effective bid-ask spread of zero. In 1996, POSIT operated four crosses per day, at approximately 10:00 AM, 11:30 AM, 1:30 PM, and 3:00 PM, and Instinet operated crossing sessions after the NYSE close.[18] ITG (1997) reports that POSIT matched 3.3 billion shares in 1996, which is comparable to the market shares of the traditional regional exchanges.

Instinet, however, has been less successful in obtaining market share in NYSE-listed stocks. The *NYSE Fact Book* (1997) reports that Instinet's share of trading volume in NYSE-listed stocks in 1992 was 0.03%. Although Instinet does not release more recent data, Instinet officials privately admit that their volume in Nasdaq-listed stocks dwarfs their volume in NYSE listed stocks.

Systems such as POSIT and Instinet have allowed institutions to lower their trading costs in the largest Nasdaq stocks to levels comparable to those for listed stocks on exchanges, and may

explain the findings of Keim and Madhavan (1995), Chan and Lakonishok (1997), and Jones and Lipson (1997) that institutional trading costs are comparable between NYSE- and Nasdaq-listed stocks.

To demonstrate that these systems may serve as a partial substitute for NYSE listing, we examine trading on the POSIT system from May 16 through May 31, 1996 and find that POSIT has a much higher market share in NYSE-eligible Nasdaq stocks than it does in either NYSE-listed stocks or in Nasdaq stocks that are not NYSE-eligible. Although ITG does not identify which trades are POSIT trades, all POSIT trades take place at the midpoint of the consolidated bid-ask quotes during fairly short, seven-minute trading windows. They are printed on the consolidated tape with the exchange symbol of "T" as Nasdaq trades and thus can be readily identified in the NYSE Trades and Quotes (TAQ) database. The only difficulty in identifying POSIT trades occurs when there is more than one trade at the midpoint of the bid-ask spread during the match window. In such cases, we experiment with several rules to identify the POSIT trade: picking the smallest trade, the largest trade, the median trade, or an average of trade sizes. All of the methods give qualitatively similar results.

Please insert Table V approximately here.

Table V shows that POSIT's market share of total trading volume is almost three times higher for firms that are eligible to list on the NYSE but choose to remain on Nasdaq than it is for NYSE-listed stocks or other Nasdaq stocks. This is evidence that systems such as POSIT provide a partial substitute for the low-cost auction market of the NYSE: Traders are more likely to bypass the dealer market in a NYSE-eligible Nasdaq stock than they are to bypass the exchanges in a

NYSE-listed stock.

This result is understated due to the effect of Nasdaq's higher rate of dealer participation on reported volume. If trading volumes were adjusted to reflect the higher rate of dealer participation on Nasdaq, POSIT's market share would undoubtedly be even higher for the Nasdaq-traded stocks.

This ability of institutions to bypass the wide spreads of Nasdaq dealers means that firms considering their listing policy should take into account the two-tier nature of the Nasdaq market: Retail investors have little choice but to trade with the dealer market, and thus face relatively higher transaction costs. Institutional investors can bypass the high-cost dealer market and trade directly with each other through electronic communication networks, at extremely low cost. Thus, the effective bid-ask spreads faced by institutional investors in large Nasdaq stocks are much lower than the spreads that dealers quote to the retail market.

This bypass potential may explain why many large firms that meet the NYSE listing requirements nonetheless do not list on the NYSE. Whereas in previous years they would have done so to have lower transaction costs, they now can get the best of both worlds on Nasdaq: Broker-dealer firms market the stock to retail investors, while institutional investors incur transaction costs not much different from those for exchange-listed stocks.

B. Modeling the Bypass of the Dealer Network

In the context of our model, let the proportion of investors who can bypass the dealer market and face an effective spread equal to that in the auction market, S_a, be denoted by β. Effectively, these are the institutional investors.[19] Thus, the average bid-ask spread $\hat{S}$ faced by investors in the

hybrid dealer-auction market becomes:

$$\hat{S}_d = \beta S_a + (1 - \beta)S_d = S_d - \beta(S_d - S_a) \quad \textbf{(6)}$$

By substituting this into Proposition 1, we come to Proposition 2:

Proposition 2 (Hybrid Market):

In a hybrid auction-dealer market in which a fraction of investors β *can bypass the dealer network, a firm will prefer the hybrid market to the pure auction market if the benefits from greater exposure in the dealer market are greater than the benefits of reduced bid-ask spread in the auction market for the investors who cannot bypass the dealer market, less annualized listing fees:*

$$\frac{(q_d - q_a)}{q_a q_d} x\delta\sigma^2 > \alpha(1 - \beta)(S_d - S_a) - C_a \quad \textbf{(7)}$$

C. Listing Policy and Firm Size

One of the shortcomings of the original Merton model on which this model is based is that the partial derivative with respect to size leads to a counter-intuitive result: the larger the firm, the higher the penalty on the rate of return due to market segmentation. The problem can be ameliorated by looking at the total derivative, since firm size (x) and the fraction of investors who know about the firm (q) are undoubtedly related. Furthermore, the degree to which investors can

bypass the dealer market is undoubtedly connected with firm size. For simplicity and tractability, we model the fraction of investors who can bypass the dealer market as a linear function of firm size:

$$\beta = \beta_1 x \quad \textbf{(8)}$$

Furthermore, we also decompose the fraction of investors who would "know about" the firm into those who would know about the firm regardless of market mechanism (q_0), and the increment added by the market mechanism. For the auction market (q_{0a}):

$$q_a = q_0 + q_{0a} \quad \textbf{(9)}$$

Again, for simplicity and tractability, we model the fraction of investors who would know about the firm regardless of the market mechanism q_0 as a linear function of firm size x with coefficient q_{01}:

$$q_0 = q_{01} x \quad \textbf{(10)}$$

Thus,

$$q_a = q_{01} x + q_{0a} \quad \textbf{(11)}$$

Substituting these expressions into Proposition 2 yields:

$$\frac{((q_{01} x + q_{od}) - (q_{01} x + q_{oa}))}{(q_{01} x + q_{0a})(q_{01} x + q_{0d})} x\delta\sigma^2 > \alpha(1 - \beta_1 x)(S_d - S_a) - C_a \quad \textbf{(12)}$$

Simplifying brings us to the next proposition:

Proposition 3 (Optimal Listing Policy as a Function of Firm Size):

If the fraction of investors who know about a firm and the fraction of investors who can bypass the dealer market are both linear functions of firm size x, then the firm will prefer the dealer market if

the benefits of expanded visibility in the dealer market as a function of size are greater than the benefits of reduced bid-ask spreads in the auction market, less annualized listing fees:

$$\frac{(q_{od} - q_{oa})}{(q_{01}x + q_{0a})(q_{01}x + q_{0d})} x\delta\sigma^2 > \alpha(1 - \beta_1 x)(S_d - S_a) - C_a \qquad \textbf{(13)}$$

This proposition leads directly to:

Corollary 3.1. Conditions exist under which some firms choose to list on the auction market, and otherwise identical, but larger as well as smaller firms choose to list on the dealer market.

Figure 2 demonstrates just such a set of conditions. Smaller firms prefer the Nasdaq market because they are not naturally well known, and thus they find the marketing benefits of the high-cost dealer market worthwhile. The largest firms have enough shareholders who can bypass the high-cost dealer market so that they too prefer the dealer market.

Please insert Figure 2 approximately here.

V. Other Evidence

The three propositions lead directly to two additional corollaries:

Corollary 3.2: If bid-ask spreads are the same in the auction and the dealer markets, firms prefer the dealer market.

Because the primary advantage of the auction market in this model is a lower bid-ask spread, if the spread is the same, there is no reason for the firm to pay the fees to list on an exchange.

Corollary 3.3: If there is no idiosyncratic risk, firms prefer the auction market if the benefits from a reduced bid-ask spread are greater than the annualized listing fees :

$$\alpha(1 - \beta_1 x)(S_d - S_a) > C_a \qquad \textbf{(14)}$$

This corollary may explain why closed-end funds almost unanimously choose to list on an exchange such as the NYSE or AMEX. Table VI displays the 1996 listing status of closed-end funds in the United States. Over 97% of the 501 funds chose to list on an auction market. The majority are listed on the NYSE; smaller funds that did not meet the NYSE listing requirements generally listed on the AMEX.[20] Of the 11 funds that do trade on Nasdaq, the majority are tiny funds that did not meet either NYSE or AMEX exchange listing requirements at the time of offering. One fund, Royce OTC Micro-Cap Fund, purposely chose Nasdaq to be consistent with its investment theme of investing in small OTC stocks.

Please insert Table VI approximately here.

This behavior is consistent with our model, for the following reasons. First, the funds consist of portfolios of assets, so that the idiosyncratic risk of their constituent portfolios is mostly

diversified away. Second, these funds primarily target retail investors, who have difficulty bypassing the Nasdaq dealer network, so the bypass factor β is likely to be low. Finally, the managers of the funds are not likely to benefit from the dealers' marketing activities to sell the fund in the secondary market because the managers are well entrenched and their compensation is a function of the assets under management and not the stock price.[21]

VII. Summary and Conclusions

Firms deciding whether to stay on the Nasdaq Stock Market or to list on the NYSE or the AMEX face a tradeoff: The auction market mechanism provides lower bid-ask spreads, but the higher spreads on Nasdaq give broker-dealers more incentive to generate order flow. The best market for a particular firm's stock will depend on factors specific to the firm. Firms that are already well known and that do not need the marketing services provided by Nasdaq broker-dealers will prefer the low-cost auction market mechanism.

In recent years, institutional investors have developed mechanisms for bypassing the dealer market in Nasdaq stocks, and have thereby achieved transaction costs for institutional trades comparable to those for trades in NYSE-listed stocks. Thus, larger Nasdaq firms have the best of both worlds: The institutional investors who own the majority of their stocks bear transaction costs comparable to those for exchange listed stocks, while the high-cost dealer network markets the stock to retail investors. This explains why many recently successful firms, such as Intel, have rationally chosen not to list on the NYSE: They do not have to pay higher listing fees for access to a low-cost market when most of their shareholders already have access to a low-cost trading mechanism. Intel, in particular, has examined this decision many times over the years and has surveyed its

shareholders about their preferences. In the words of Intel investor relations executive James Jarrett, "In general, our institutional investors couldn't care less about the market in which our stock trades."[22] Microsoft is so comfortable with its status as a Nasdaq-listed firm that CEO Bill Gates has been featured in Nasdaq commercials and its CFO, Michael W. Brown, is Chairman of the Nasdaq Stock Market Board of Directors.

Although some may point out that such an allegedly "two-tier" market entails price discrimination between retail and institutional investors, there is nothing inherently wrong with such discrimination. Charging different prices to customers with different demand characteristics is a practice well established in other fields. Examples include off-peak pricing for telephone and electricity services, air fares, and hotels. It is well known in economics that some markets might not exist at all without this type of price discrimination.

Nasdaq National Market firms that do not qualify for the NYSE usually qualify for the AMEX or the regional exchanges, which also offer low-cost auction markets. The fact that hundreds of large and presumably sophisticated firms freely choose the hybrid dealer-auction market of Nasdaq is evidence that they believe this mechanism provides a better market for their stocks. Forcing Nasdaq to provide a single auction-like mechanism to all investors might actually increase the cost of capital for these firms.

Our model also provides a possible explanation for the curious case of the AMEX, in which firms experience positive stock price reactions when they announce that they are switching from Nasdaq to AMEX, and also when they announce that they are switching from the AMEX to Nasdaq. Since our model predicts that small firms prefer the dealer market because of the marketing advantage, but mid-size firms prefer the auction market, a switch from Nasdaq to AMEX signals

that the firm has grown larger. Similarly, an AMEX firm that grows large enough that a significant portion of its institutional investors can bypass the dealer market will benefit from a switch to Nasdaq: Marketing by the dealer network can bring in more retail investors while institutional investors need not pay much higher transaction costs.

Furthermore, the listing behavior of brokerage firms is consistent with this model. Since these firms have their own distribution channel for securities, and are likely to already be well-known in the investment community, they do not need to pay extra (through higher transaction costs) for the dealers' marketing services.

Clearly, changes in the market structures of the Nasdaq, AMEX, and the NYSE could affect a firm's listing decision. For example, the new order handling rules have reduced the bid-ask spreads on Nasdaq and turned it into more of an auction market. By reducing the spread, the new rules reduce the financial incentives available to broker-dealers to market Nasdaq stocks. However, these reduced spreads have also reduced the transaction cost advantage of the NYSE over Nasdaq. This, along with the newly relaxed Rule 500, could tip the balance between spreads and sponsorship for many firms.

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Notes

1. In the past, some firms started trading on the regional U.S. exchanges and then moved to a national exchange such as the AMEX or NYSE, but now there are very few firms that trade exclusively on a regional exchange.

2. However, reported share volumes in the different markets are not necessarily comparable. On the NYSE, the majority of trades involve the buyer transacting directly with the seller, and are reported only once. On Nasdaq, the participation of the dealer results in duplicate reporting for many trades.

3. Some of the literature in this area includes Ule (1937), Van Horne (1970), Blume and Husic (1973), Ying, Lewellen, Schlarbaum, and Lease (1977), Neal (1992), Baker and Edelman (1992), Christie and Huang (1994), Kadlec and McConnell (1994), and LaPlante (1996). For surveys of the literature, see Baker and Meeks (1991), and McConnell, Dybevik, Haushaulter, and Lie (1996).

4. At the time of the writing of this article, the NASD has proposed to replace the SOES system with the NAqcess system, which would provide better handling of customer limit orders. The proposal is awaiting action by the SEC.

5. Listing fees comprised over 41% of the NYSE's 1996 annual revenue of $533 million. The lower listing fees on Nasdaq and the AMEX make up much smaller portions of their revenues.

6. This can be an important competitive advantage for a market. In India, the National Stock Exchange has overtaken the Bombay Stock Exchange, in part because it has a reputation for better settlement.

7. See the "Rudman Report" (1996) for more on the structure of the NASD. The various investigations have led to reforms in which the NASD's regulatory duties have been placed into a separate subsidiary, NASD Regulation, from the Nasdaq Stock Market.

8. The Cincinnati Stock Exchange makes it easier to internalize orders because it allows firms to direct order flow to the firm of their choosing. See Battalio, Greene, and Jennings (1996) for a study of Cincinnati's procedures.

9. In order to become a Nasdaq market maker, a self-clearing firm need only pay a $5,000 application fee to join the NASD and file an application as a market maker. There are also miscellaneous charges to register personnel, and annual assessments. In contrast, a NYSE seat alone costs over $1 million, and that does not include a specialist franchise. (Regional exchange seats are much less expensive, but they also do not include specialist franchises.) The net capital requirements for NYSE specialists are also much higher than for NASD market makers. Once registered as a Nasdaq market maker, any NASD member may become a market maker in additional stocks merely by entering their symbols into a terminal. In contrast, the NYSE allocates each stock to only one specialist firm.

10. Taylor (1996) provides additional information about this practice.

11. For more on analysts' financial incentives, see Dugar and Nathan (1996).

12. We also investigated alternative specifications with industries classified at the one digit SIC code level as well as additional explanatory variables such as proxies for growth. Results for all of the specifications we tested yielded a significantly positive coefficient for the Nasdaq dummy.

13. See Benveniste, Marcus, and Wilhelm (1992) for more on the role of the specialist.

14. Many papers also look at the trading in NYSE-listed stocks in the context of the competition for order flow in NYSE-listed securities. The reader may be interested in the works of Lee (1993), Petersen and Fialkowski (1994), Hasbrouck (1995), and Blume and Goldstein (1997), as well as Battalio, Hatch, and Jennings (1996). Other works of interest include Hasbrouck and Schwartz (1986), and Marsh and Rock (1986).

15. The research spawned by this paper includes Godek (1996) and a number of other papers. For more on the impact, see also the Competitive Impact Statement ("Tunney Act") report that was filed by the Department of Justice as part of its settlement with Nasdaq, along with the Rudman et al. (1995) report on the governance of the NASD.

16.See Burdett and O'Hara (1987) for more on block trading.

17. Although the NYSE's annual maintenance fee cap of $500,000 would affect the linearity of this relation, an analysis of the Compustat data reveals that this cap affects less than 2% of the NYSE-listed firms. Incorporating a cap into the model only adds to its complexity without adding to its utility.

18. In 1997 POSIT added an additional cross at 12:30.

19. Even if institutional investors cannot achieve exactly the same level of transaction costs as in the auction market, the model still holds with only slight alterations.

20. The exchanges' effective listing requirements are slightly different for closed-end funds. Because new funds obviously have no previous history, they do not meet the income tests of the exchanges. The NYSE assumes that a fund with gross proceeds of $100 million or more will be able to meet the requirements in the future; below that size, the exchange asks the fund to provide projections that show that it can meet the listing requirements. Similarly, the AMEX generally assumes that a fund larger than $20 million will meet its requirements for pretax income and examines projections for smaller funds.

21. Closed-end funds typically have numerous takeover defenses against hostile takeovers or open-endings, including staggered boards of directors and supermajority provisions.

22. This quote comes from a private interview with Mr. Jarrett.

Table I
AMEX, NYSE, and Nasdaq Comparative Listing Requirements in 1997

This table contains representative initial listing standards for the Nasdaq, AMEX, and NYSE, obtained from the individual markets. All the markets also have lower standards for continued inclusion on their lists. Some alternative standards exist.

	Nasdaq	**Nasdaq National Market**	**AMEX**	**NYSE**
Total Assets	$4 million	---	---	---
Stockholder's Equity	$2 million	---	$4 million	---
Net Tangible Assets	---	$4 million	---	$40 million
Net Income	---	$400,000[1]	---	---
Pretax Income	---	$750,000[1]	$750,000[1]	$2.5 million[3]
Public Float (shares)	100,000	500,000	500,000	1,100,000
Market Value of Public Float	$1 million	$3 million	---	$40 million
Market Value	---	---	$3.0 million	---
Market Makers	2	2	---	---
Minimum price	$3	$5	$3	---
Public Shareholders	300	400-800[2]	400-800[2]	2,000[4]

1. In last fiscal year, or two of last three fiscal years.
2. Based on number of shares publicly held and average daily trading volume.
3. In addition, the firm is required to have $2.0 million in pretax income for each of the preceding two years, or a total of $6.5 million for the sum of the last three years with $4.5 million in the preceding fiscal year. All three years must be profitable.
4. Round lot holders. Alternatively, a firm may have 2,200 total shareholders together with average monthly trading volume of 100,000 shares.

Table II
AMEX, Nasdaq, and NYSE Initial and Continuing Fees
1997

The AMEX, NYSE, and NASD charge listing firms a fee for initial listing in addition to an annual maintenance fee. The fees are usually based on the number of shares outstanding. This table compares the fees across exchanges. The original table was obtained from the AMEX and has been updated to reflect current fee schedules of the stock markets.

Shares Outstanding (millions)				**Annual Maintenance Fees**		
	Nasdaq National Market[1]	AMEX	NYSE	Nasdaq National Market System	AMEX	NYSE[2]
1	$10,000	$10,000	$51,550	$5,250	$5,500	$16,170
5	$30,000	$25,000	$84,600	$7,250	$7,500	$16,170
10	$42,500	$37,500	$102,100	$9,750	$10,000	$16,170
25	$50,000	$50,000	$154,600	$13,250	$13,000	$32,340
50	$50,000	$50,000	$242,100	$20,000	$13,500	$48.410
100	$50,000	$50,000	$417,100	$20,000	$13,500	$84,640
200	$50,000	$50,000	$504,600	$20,000	$13,500	$167,640
Maximum	$50,000	$50,000	$504,600	$20,000	$13,500	$500,000

[1] The Nasdaq Small Cap Market has a maximum original listing fee of $10,000 and a continuing fee of $4,000.

[2] The NYSE does not charge maintenance fees on shares on which fees have been paid for 15 or more years, in which case certain minimums apply. For example, if a firm with 200 million shares outstanding has all 200 million excluded under the 15 year rule, then the annual fee would be $80,440.

Table III
Analysts' Recommendations By Market
July 1996

This table presents recommendation by security analysts for stocks that trade on the AMEX, Nasdaq, and NYSE in July 1996 for Standard and Poors' Analysts' Consensus Estimates (ACE) database. The average quality of opinion is a weighted average of recommendations in which a buy is +2, buy/hold is +1, hold is 0.5, no recommendation is 0, sell/hold is -1 and sell is -2. The percentages reflect the percentage of the total number of recommendations in the respective category. Totals may not add to 100% due to rounding. Standard errors are in parentheses.

Market	**Average Quality of Opinion**	**Percentage Buy**	**Percentage Buy/Hold**	**Percentage Hold**	**Percentage Sell/Hold**	**Percentage Sell**	**Total Number of Recommendations**
AMEX	.93 (.068)	34.3 (3.45)	24.5 (2.83)	34.0 (3.46)	5.1 (1.74)	2.1 (1.02)	121
Nasdaq	1.04 (.017)	38.3 (1.04)	25.4 (.867)	33.9 (1.04)	1.5 (.245)	1.0 (.216)	1,265
NYSE	.88 (.013)	26.8 (.687)	26.3 (.627)	43.3 (.814)	2.1 (.232)	1.6 (.215)	1,250

Table IV
Regression Results
Analyst Recommendations and Exchange Listing

This table presents results of the following OLS regressions examining the impact of listing status on analysts' recommendations. Data are obtained from the July 1996 Analysts' Consensus Estimates (ACE) for firms trading on the AMEX, Nasdaq, and NYSE with information on analyst recommendations, SIC code (at the two digit level), and market capitalization. AMEX is a dummy variable for an AMEX-listed stock, NASDAQ is a dummy variable set to one for a Nasdaq-listed stock, LnCapt is the natural logarithm of market capitalization, and SP500 is a dummy set to one for firms that are members of the S&P500 Index. The SIC codes represent dummy variables for industries at the two digit SIC code level. The dependent variable for the first regression is the Average Analyst's Recommendation level as described in the previous table. The dependent variable for the second variable is the percentage of the total number of recommendations for a stock that are buy recommendations.

Dependent Variable	**Average Analysts' Recommendation**		**Percentage of Buy Recommendations**	
Independent Variable	**Coefficient**	**T-statistic**	**Coefficient**	**T-statistic**
Intercept	0.227	2.70	6.581	1.31
AMEX	0.058	1.12	7.292	2.36
Nasdaq	0.160	5.78	9.596	5.83
LnCapt	0.058	6.56	1.947	3.69
SP500	-0.197	-5.47	-9.041	-4.21
SIC 700 - 799	0.194	0.38	22.790	0.74
SIC 800 - 899	-1.599	-3.09	-19.046	-0.62
SIC 1200 - 1299	0.572	0.37	1.023	0.05
SIC 1300 - 1399	0.519	5.39	17.947	3.13
SIC 1400 - 1499	0.084	0.16	-7.212	-0.23
SIC 1500 - 1599	0.335	2.30	6.770	0.78
SIC 1600 - 1699	0.509	2.14	13.673	0.97
SIC 1700 - 1799	0.672	1.82	60.727	2.76
SIC 2100 - 2199	0.573	1.89	29.553	1.64
SIC 2200 - 2299	0.091	0.70	-1.151	-0.15
SIC 2300 - 2399	0.219	1.70	-2.685	-0.35
SIC 2400 - 2499	0.510	3.19	21.243	2.23

SIC 2500 - 2599	0.448	3.95	14.808	2.19
SIC 2600 - 2699	0.175	0.10	-3.112	-0.52
SIC 2700 - 2799	0.111	0.96	-0.021	-0.00
SIC 2800 - 2899	0.407	5.60	12.969	2.99
SIC 2900 - 2999	0.142	1.31	-0.811	-0.13
SIC 3000 - 3099	0.340	3.21	12.450	1.97
SIC 3100 - 3199	0.286	1.49	18.607	1.63
SIC 3200 - 3299	0.375	2.26	25.291	2.56
SIC 3300 - 3399	0.342	3.53	12.032	2.08
SIC 3400 - 3499	0.477	4.88	21.264	3.64
SIC 3500 - 3599	0.337	4.89	6.768	1.65
SIC 3600 - 3699	0.477	6.72	22.091	5.22
SIC 3700 - 3799	0.389	4.63	11.754	2.35
SIC 3800 - 3899	0.451	6.11	15.309	4.48
SIC 3900 - 3999	0.303	2.39	10.369	1.37
SIC 4000 - 4099	0.354	1.85	9.954	0.87
SIC 4100 - 4199	1.440	2.78	78.003	2.52
SIC 4200 - 4299	0.253	1.74	9.097	1.05
SIC 4400 - 4499	0.603	2.54	25.389	1.79
SIC 4500 - 4599	0.474	3.27	13.574	1.57
SIC 4600 - 4699	0.362	0.98	3.827	0.17
SIC 4700 - 4799	0.288	0.56	14.862	0.48
SIC 4800 - 4899	0.481	5.61	14.457	2.82
SIC 4900 - 4999	0.100	1.43	-2.883	-0.69
SIC 5000 - 5099	0.425	4.98	18.266	3.59
SIC 5100 - 5199	0.388	3.96	17.772	3.04
SIC 5200 - 5299	0.072	0.47	0.438	0.05
SIC 5300 - 5399	0.096	0.89	2.692	0.42

SIC 5400 - 5499	0.045	0.38	-2.189	-0.29
SIC 5500 - 5599	0.660	3.25	16.104	1.33
SIC 5600 - 5699	0.342	3.44	9.541	1.61
SIC 5700 - 5799	0.233	1.94	0.493	0.07
SIC 5800 - 5899	0.430	4.18	18.487	3.01
SIC 5900 - 5999	0.392	4.63	11.415	2.26
SIC 6000 - 6099	0.121	1.75	1.862	0.45
SIC 6100 - 6199	0.656	5.56	29.753	4.22
SIC 6200 - 6299	0.066	0.49	-2.938	-0.37
SIC 6300 - 6399	0.227	3.03	10.960	2.45
SIC 6400 - 6499	0.163	0.99	-2.180	-0.22
SIC 6500 - 6599	0.649	2.98	20.090	1.54
SIC 6700 - 6799	0.417	5.46	13.024	2.86
SIC 7000 - 7099	0.648	3.39	19.324	1.70
SIC 7200 - 7299	0.491	2.84	17.972	1.74
SIC 7300 - 7399	0.478	6.82	17.917	4.29
SIC 7500 - 7599	0.671	2.55	33.768	2.15
SIC 7600 - 7699	0.809	1.56	23.630	0.77
SIC 7800 - 7899	0.677	4.54	32.780	3.68
SIC 7900 - 7999	0.680	4.56	31.015	3.48
SIC 8000 - 8099	0.529	4.61	22.132	3.23
SIC 8200 - 8299	0.763	3.50	29.958	2.30
SIC 8300 - 8399	0.226	0.75	-4.612	-0.26
SIC 8700 - 8799	0.516	4.92	20.072	3.21
Number of observations	2,636		2,636	
Adjusted R^2	.1092		.0873	

Table V
POSIT Market Share
May 16-31, 1996

This table displays the POSIT share of total consolidated trading volume for all U.S. common stocks listed on the NYSE TAQ database from May 16, 1996 through May 31, 1996. POSIT trades were identified as those trades marked on the consolidated tape as executing on Nasdaq at the midpoint of the consolidated bid-ask spread during the eight match windows starting at 10:00 AM, 11:30 AM, 1:30 PM, and 3:00 PM. Market shares were calculated individually for each stock and then averaged for each group of stocks. If there is more than one such trade printed during the match window, the Min rule selects the smallest, the Max rule selects the largest, the Median rule selects the median, and the Mean rule takes the average. The standard errors of the means are in parentheses.

	POSIT Market Share (%) For Each Group of Stocks			
POSIT Identification Rule	**NYSE-listed Firms**	**Amex-listed Firms**	**Nasdaq-listed but NYSE-eligible Firms**	**Nasdaq-listed but not NYSE Eligible**
POSIT Market Share - Max Rule	.608(.033)	.353 (.084)	1.87 (.129)	.936 (.033)
POSIT Market Share- Min Rule	.587 (.032)	.348 (.084)	1.57 (.123)	.813 (.037)
POSIT Market Share - Median Rule	.596(033)	.351 (.084)	1.69 (.125)	.858 (.037)
POSIT Market Share - Mean Rule	.597(.033)	.351 (.084)	1.70 (.125)	.866 (.037)
Number of Firms	2,653	786	905	5,231

Table VI
Listing Status of Closed-End Funds
July 1996

This table presents the listing status of 501 closed-end funds, from the *Wall Street Journal* of July 1, 1996. The number in each cell represents the number of closed-end funds of that type listed on the given exchange.

Type of Closed-End Fund	NYSE	AMEX	OTC	Toronto	Chicago	Total
General Equity Funds	15	5	4	0	1	25
Specialized Equity Funds	27	2	2	0	0	31
Convertible Securities Funds	6	3	0	0	0	9
Dual-Purpose Funds	6	0	0	0	0	6
World Equity Funds	79	3	3	6	1	92
U.S. Government Bond Funds	12	0	0	0	0	12
U.S. Mortgage Bond Funds	30	2	0	0	0	32
Investment Grade Bond Funds	14	0	2	0	0	16
Loan Participation Funds	1	0	0	0	0	1
High Yield Bond Funds	24	1	0	0	0	25
Other Domestic Taxable Bond Funds	31	2	0	0	0	33
World Income Funds	21	1	0	0	0	22
National Muni Bond Funds	84	8	0	0	0	94
Single State Muni Bond Funds	77	28	0	0	0	105
Total	427	55	11	6	2	501

Appendix 1: Table of Notation

$_a$	subscript to denote auction market
$_d$	subscript to denote dealer market
C_a	annualized initial and maintenance listing fees for auction market
q	fraction of investors who "know about" a firm
q_0	fraction of investors who "know about" a firm without its being listed in either the dealer or the auction market
q_{0a}	incremental fraction of investors who "know about" a firm as a result of the auction market
q_{0d}	incremental fraction of investors who "know about" a firm as a result of the dealer market
q_{01}	coefficient of the effect of firm size on the fraction of investors who know about the firm, independent of market effects
x	firm size
α	impact of bid-ask spread on required rate of return
β	fraction of investors who can bypass dealer market and obtain auction market spread
β_1	coefficient of the effect of firm size on the fraction of investors who can bypass the dealer market
γ	increase in required rate of return from bid-ask spread
δ	common risk aversion parameter
λ	increase in required rate of return from incomplete information
σ^2	idiosyncratic risk