An Economic Study of
Securities Market Data Pricing by the Exchanges

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Executive Summary

This study conducts an economic analysis of the supply and demand of securities market data sold by exchanges in the United States and finds that two exchanges each have dominant positions in distinct portions of the market with the opportunity to exert monopoly pricing power. Quantitative analysis of available economic data, including measured market shares and concentrations well in excess of standards set by the United States Department of Justice ("DOJ"), shows that the New York Stock Exchange (NYSE) enjoys a dominant market in individual NYSE-listed securities and the NASDAQ Stock Market (NASDAQ) enjoys a dominant market in NASDAQ-listed securities, and provides strong empirical support for the assertion that the two dominant exchanges are exploiting the opportunity to exert monopoly pricing power in a manner predicted by economic theory. The presence of strong network externalities, public statements and financial disclosures by the exchanges, and other factors provide additional support. The two dominant exchanges are exercising monopoly pricing power by charging broker dealers and the investing public fees for depth-of-book data that are significantly higher than the relevant costs associated with distributing the data. Therefore, the United States Securities and Exchange Commission ("SEC" or "Commission"), which is required by Congressional statute to assure that securities market data distributed by exchanges is made available on "fair and reasonable terms," cannot reasonably rely on competitive forces to result in competitive prices for exchange market data sold by the two dominant exchanges.

I. Introduction

The primary objective of this study is to provide an economic analysis of the pricing of securities market data by exchanges in the United States. Broker dealers provide exchanges with market information (e.g., bids, offers, and limit orders) produced in conjunction with their clients, the investing public. Broker dealers are required by law to grant the exchanges a broad license to use this valuable liquidity data and are not permitted to recover any fee in return. Driven by competitive pressures to provide the best possible customer service, broker dealers must have the option to be able to buy this data back at reasonable prices when they so choose. This pressure, when coupled with a lack of comparable substitutes and the other factors set forth below, results in a relatively inelastic demand for the exclusive liquidity data products sold by the dominant exchanges.

The study conducts empirical analyses of available public data within a qualitative and quantitative economic assessment of the supply and demand conditions for securities market data. During the period in which this study was developed, the U.S. Securities and Exchange Commission ("SEC" or "Commission") published a "Notice of Proposed Order Approving Proposal by NYSE Arca, Inc. to Establish Fees for Certain Market Data and Request for Comment" ("Draft Order").[1] Relevant conclusions in the SEC Draft Order are analyzed and critiqued throughout the study.

The study proceeds as follows. Section II provides an analysis of the supply-side conditions. It explains why the competition for order flow among exchanges does not preclude highly concentrated markets dominated by two exchanges and, therefore, provides no assurance of competitive pricing for market data by those exchanges. Section III provides an analysis of

[1] SEC Release 34-57917, June 4, 2008, available at http://www.sec.gov/rules/other/2008/34-57917.pdf.

the demand-side conditions. It lists and describes the factors that led to a relatively inelastic demand for depth-of-book data, such as the impact of decimalization in reducing the value of NBBO data for both institutional and retail investors. Section IV explains how the supply-side and demand-side conditions for market data combine to form a market in which two dominant exchanges exploit the opportunity to assert monopoly pricing power. Section V concludes that the relevant quantitative and qualitative evidence demonstrates that the SEC cannot reasonably rely on competitive forces to ensure that the exclusive market data sold by the two dominant exchanges is made available on "fair and reasonable" terms.

II. Supply-Side Conditions

The competition for order flow among exchanges provides no assurance of competitive pricing for data of which an exchange has exclusive possession. This simple statement is the most important, and perhaps the most misunderstood, fact when it comes to understanding the underlying economics of securities market data pricing by exchanges. Thus, we begin explaining why fierce competition among exchanges is not likely to result in competitively priced exclusive data when significant "network externalities" are present in the market for order flow.[2]

A. Network externalities

Competition does not preclude an outcome in which a dominant firm emerges, particularly in the presence of network externalities. A network externality arises when the value of a system increases as the number of individuals who use the system increases.

[2] Our use of the term "exclusive" data fits within the SEC's notion of "non-core" data. See, for example, SEC Draft Order, Page 3.

Network externalities arise in a number of markets, such as the computer software market. For example, the success of Microsoft's Windows operating system is widely attributed to network externalities. Hardware manufacturers and software providers make their products compatible with Windows to ensure that they have access to the large existing market of Windows users. In turn, Microsoft continues to be successful by publicizing that its operating system is supported by the ever-growing number of Windows-compatible computers and programs. Similarly, Microsoft's success in its office suite product, Microsoft Office, is also largely attributable to network externalities. Many individuals choose to use Microsoft Office not necessarily because it offers the best features, but because it offers the benefit of being able to easily share documents with the large existing market of Microsoft Office users.

In the securities markets, the competition for order flow among market centers, including exchanges, involves a network externality. An order flow externality arises because exchanges are essentially networks that link potential buyers and sellers. The more orders for a particular security that traders submit to a particular exchange, the more liquidity increases. The more liquidity increases, the more valuable the exchange is to everyone who uses it. At the individual security level, the order flow externality makes it highly likely that a dominant liquidity-providing market center will emerge.

Two exchanges, NYSE and NASDAQ, account for the vast majority of all equity trading in the United States. For individual securities, each exchange enjoys a dominant market share in most of the securities that are listed on that exchange. NYSE enjoys a dominant market share in NYSE-listed securities and NASDAQ enjoys a dominant market share in NASDAQ-listed securities.

Figure 1 shows NASDAQ's annual market share of reported trading activity for NASDAQ-listed stocks from 2002 through 2007, as reported in NASDAQ's 10-K filings. From 2002 to 2004, NASDAQ lost market share to alternative trading systems (ATSs), such as the Island, Instinet, and BRUT electronic communication networks (ECNs). In 2003, Instinet ECN and Island ECN merged their books to take advantage of the order flow (network) externality and became INET. Facing increasing competitive pressure, NASDAQ responded by buying up its competitors. In 2004, NASDAQ acquired BRUT. In 2005, NASDAQ acquired INET. Figure 1 shows that, as a result of these takeovers, NASDAQ successfully defended its dominant market share position for NASDAQ-listed securities.

Numerous news articles in professional business publications confirm the success of NASDAQ's strategy for defending its dominant position. The SEC's Draft Order specifically states, "A notable example of the close connection between a trading venue's distribution of order data and its ability to attract order flow was provided by the Island ECN 2002." Curiously, however, the Draft Order does not mention NASDAQ's subsequent takeover of INET.

Thus, history suggests that as long as the exchanges continue to respond to new competitors in a similar manner, their continued dominance is virtually assured. Published academic research supports this view. For example, Goldstein et al. (2008) state, "The subsequent consolidation by NASDAQ to reclaim market share provides some indication that such fragmentation was, in the long run, untenable."[3] Because exchanges are able to easily maintain (or defend, if necessary) dominant market shares in their own listed securities over the long-run, supply-side substitution is limited now and for the foreseeable future.

[3] Michael Goldstein, Andriy Shkilko, Bonnie Van Ness, Robert Van Ness, 2008, "Competition in the Market for NASDAQ Securities," *Journal of Financial Markets* 11, 113-143.

B. No supply-side substitution

Economics textbooks typically provide three general examples of possible supply-side substitution for various markets. First, competitors currently producing the product may have the ability to increase output from existing facilities. In the context of securities markets, however, no exchange or non-exchange market participant[4] can produce depth-of-book data comparable to that of an exchange with a dominant position in a particular security.

Second, new competitors can enter the market. However, in the context of securities markets, the network externalities provide a high barrier to entry that makes it extremely difficult for new competitors to gain increases in market shares that are significant enough to have a material impact on the dominance of the listing exchanges. Plus, the dominant exchanges have adopted a strategy of acquiring successful challengers to eliminate any long-term threat.

Third, producers of products not considered comparable substitutes in consumption may be able to easily convert to production of relevant products. For example, commercial construction firms can easily convert to residential construction, and vice versa. In the context of the securities markets, however, each exchange has exclusive possession of its own depth-of-book data and, as predicted by economic theory and further addressed below in Section IV, the dominant exchanges maximize their exclusive data revenues.[5]

It is impossible for NASDAQ to convert to produce NYSE depth-of-book data on a scale approaching NYSE's own depth-of-book data product for NYSE-listed stocks. Likewise, it is impossible for the NYSE to produce NASDAQ depth-of-book data on a scale approaching NASDAQ's own depth-of-book data product for NASDAQ-listed stocks. Consumers of depth-

[4] Non-exchange market participants include those that choose to display their own books (e.g., ECNs) as well as those that do not (e.g., "dark pools").

[5] Consider, for example, this excerpt from the NYSE's 2007 10-K filing: "These products are proprietary to us, and we do not share the revenues that they generate with other markets. Revenues for our proprietary data products have grown significantly over the last few years…" See also Sections III and IV, below.

of-book data, therefore, must purchase exclusive data from each dominant exchange to obtain accurate information about the true nature of liquidity regarding the individual stocks listed on those exchanges.

Furthermore, NBBO ("top-of-book") data is not an adequate substitute for depth-of-book data. After the 2001 change to decimal pricing, NBBO quote sizes declined dramatically.[6] In fact, the SEC's Draft Order points out that NBBO quote sizes declined so dramatically that "the size displayed at the various one-cent price points away from the inside quotes became a more useful tool to assess market depth."[7] An accurate assessment of market depth beyond the inside quote is important to both institutional investors and retail investors. In Section III below, we show that more than one-third of retail orders encounter insufficient NBBO size when they are submitted. Thus, there is no comparable substitute for an exchange's exclusive depth-of-book data.

C. Reported Trading Activity is Highly Concentrated

It is important to remember that trading venues, including exchanges (i.e., the "firms"), compete for listings and order flow on a security-by-security basis. The order flow externality arises for each security separately. From the broker dealers' perspectives, customer service concerns and best execution considerations are security-specific. Consequently, in the context of securities market data pricing, the relevant units of economic analysis are individual securities. [8]

[6] See, for example, Hendrik Bessembinder, 2003, "Trade Execution Costs and Market Quality after Decimalization," *Journal of Financial and Quantitative Analysis* 38, 747-777.
[7] SEC Draft Order, Page 38.
[8] The academic market microstructure literature uses individual securities as the relevant unit for many different analyses, including Herfindahl Index analyses of trading activity. See, for example, Paul Shultz, 2003, "Who makes markets," *Journal of Financial Markets* 6, 49-72, and Kee Chung, Chairat Chuwonganant and D. Timothy McCormick, 2004, "Order Preferencing and Market Quality on NASDAQ Before and After Decimalization,," *Journal of Financial Economics* 71, 581-612.

We calculate the market shares of the trading activity of several different securities on the two dominant exchanges from a recent time period. Table 1 presents the market share results for the ten most active NASDAQ-listed securities and the ten most active NYSE-listed securities during the week of March 10-14, 2008. We use three common measures of trading activity – dollar volume, share volume, and number of trades. Trade data is obtained from the Transaction and Quotation (TAQ) database.[9] We include trades reported to NYSE Arca in the calculation of the NYSE's market shares – both of which are under the common control of NYSE Euronext – for reasons explained below.

Panel A of Table 1 shows that the dominant share of trading in NASDAQ-listed stocks occurs on NASDAQ. Similarly, Panel B shows that the dominant share of trading in NYSE-listed stocks occurs on the NYSE. Overall, for all three measures of trading activity, the listing exchange is the dominant firm.

In addition to the market share of the dominant firm, economists are also interested in the number of firms competing in the market and the distribution of market shares across those firms. Antitrust economists summarize the distribution of market shares in aggregate indices, called market concentration indices, for use in quantitative antitrust analysis. Accordingly, we investigate the concentration of reported trading activity for a sample of securities.

To investigate the concentration of reported trading activity, we use one of the most widely used market concentration indices by antitrust economists – the Herfindahl Index.[10] It simultaneously takes into account the number of firms in a particular market and the distribution of market shares across those firms. The Herfindahl Index is low for markets that consist of a

[9] TAQ trade data lists the venue (e.g., exchange, trade reporting facility) where the trade was reported. TAQ trade data does not identify whether an ECN such as BATS and Direct Edge are involved in the trade execution.
[10] The Herfindahl Index is also known as the Herfindahl-Hirschman-Index (HHI).

large number of firms with relatively equal market shares. It is higher for markets that consist of a smaller number of firms and greater disparities in the market shares among those firms.

The Herfindahl Index is calculated by summing the squared market shares of each firm competing in the market. For example, suppose we have three markets consisting of ten (10) firms with the market shares listed in Table 2 Panel A.

While all three market examples have the same number of firms (ten), the distribution of market shares varies greatly. In the competitive market example (the first two columns of Table 2 Panel A), the market shares are equal. In the duopoly market example (the middle two columns), two dominant firms account for 90% of the total market share. In the monopoly market example (the last two columns), 95% of the total market share is concentrated within one firm.

The DOJ has established specific guidelines for evaluating the Herfindahl Index. [11] The DOJ uses the Herfindahl Index to divide markets into three broad categories. [12] Table 2 Panel B shows the DOJ's breakdown of Herfindahl Index values across the three categories. The DOJ considers an industry with a Herfindahl Index of less than 1,000 to be "unconcentrated," an industry with a Herfindahl Index between 1,000 and 1,800 to be "moderately concentrated," and an industry with a Herfindahl Index greater than 1,800 to be "highly concentrated."

We calculate Herfindahl Indices for the trading activity of several different securities on the two dominant exchanges from a recent time period. Tables 3, 4, and 5 present the Herfindahl results for the ten most active NASDAQ-listed securities and the ten most active NYSE-listed securities during the week of March 10-14, 2008. Each table presents results based on three different measures of trading activity – dollar volume, share volume, and number of trades.

[11] See, for example, http://www.usdoj.gov/atr/public/testimony/hhi.htm.
[12] See, for example, "Horizontal Merger Guidelines" issued by the U.S. Department of Justice and the Federal Trade Commission, available at http://www.usdoj.gov/atr/public/guidelines/horiz_book/hmg1.html.

Table 3 presents the Herfindahl results for all reported trades. Panel A shows that the trading activity of NASDAQ-listed stocks is highly concentrated on NASDAQ. The Herfindahl Indices for all three measures of trading activity range from about 3,500 to 5,100. Panel B shows that the trading activity of NYSE-listed stocks is highly concentrated on the NYSE. The trading activity of NYSE-listed stocks is slightly less concentrated than NASDAQ-listed stocks, ranging from about 2,700 to 4,100, still consistently well above the 1,800 DOJ threshold for a highly concentrated market. Both panels show that the volume (dollar and share) measures of trading activity are associated with higher concentration than the number of trades.

Table 4 presents the Herfindahl results for block-size (10,000 shares or more) reported trades. Panel A shows that the block trading activity of NASDAQ-listed stocks is extremely concentrated. The Herfindahl Indices for all three measures of trading activity range from about 4,300 to 9,300. In fact, if we exclude QQQQ (NASDAQ-100 ETF) and focus on the volume (dollar and share) measures, the Herfindahl Indices range from about 8,300 to 9,300. Panel B shows that the block trading activity of NYSE-listed stocks is slightly less concentrated than NASDAQ-listed stocks, ranging from about 3,000 to 6,300, but still consistently well above the 1,800 DOJ threshold for a highly concentrated market. For both exchanges, block trading activity (Table 4) is more concentrated than overall trading activity (Table 3).

Table 5 presents the Herfindahl results for non-block-size (< 10,000 shares) reported trades. Panel A shows that the non-block trading activity of NASDAQ-listed stocks is highly concentrated. The Herfindahl Indices for all three measures of trading activity range from about 3,500 to 5,000. Panel B shows that the trading activity of NYSE-listed stocks is slightly less concentrated than NASDAQ-listed stocks, ranging from about 2,800 to 4,000, but still consistently well above the 1,800 DOJ threshold for a highly concentrated market. For both

exchanges, non-block trading activity (Table 5) and overall trading activity (Table 3) are roughly the same.

To summarize, the trading activity in all of the ten most active NASDAQ-listed securities and the ten most active NYSE-listed securities during the week of March 10-14, 2008 is highly concentrated. The volume (dollar and share) measures of trading activity show higher levels of concentration than the number of trades, but all measures are consistently well above the 1,800 DOJ threshold for a highly concentrated market for all securities on both exchanges. Finally, block trading is more concentrated than non-block trading for both NASDAQ-listed securities and NYSE-listed securities.

The results of our analysis of reported trading activity across exchanges are consistent with the results reported in a recent academic working paper.[13] Davies (2008) reports the share of trading in NYSE-listed and NASDAQ-listed securities across five different trading venues (NYSE, NYSE Arca, NASDAQ, BATS, and Other/Internalized) for the first week of October 2007. While the share of trading measures are not exactly the same, our study (reported trading activity by exchange) and the Davies study (share of trading by trading venue) provide three important complementary results. First, both studies find that trading is highly concentrated and that the listing exchange is the dominant firm. Second, both studies suggest that trading is slightly more concentrated for NASDAQ-listed securities than for NYSE-listed securities. [14] Finally, both studies find that the concentration of trading is consistently well above the 1,800 DOJ threshold for a highly concentrated market for all securities on both exchanges.

Methodological Flaws in the SEC Draft Order

[13] Ryan Davies, 2008, "MiFID and a Changing Competitive Landscape," Babson College working paper.
[14] Calculation using the results reported in Table 1 of Davies (2008) yields a Herfindahl Index of 2,961 for NYSE-listed securities and a Herfindahl Index of 3,366 for NASDAQ-listed securities.

The results of our trading activity analysis, as well as the results of Davies (2008), appear to contradict the results reported in the SEC Draft Order. In its examination of the competition for order flow, the Draft Order includes summary statistics on the reported share volume in U.S.-listed equities during December 2007.[15] The SEC Draft Order presents these statistics as "a useful recent snapshot of the state of the competition in the U.S. equity markets…"[16] However, a casual inspection of these statistics reveals four major flaws that are consistent with an analysis that lacks a sufficient economic basis, either in theory or empirical evidence, to reasonably support the Commission's conclusions.

First, the share volume market shares are averages across all U.S.-listed equities. Unlike our analysis, the Draft Order does not examine market share statistics for NYSE-listed stocks and NASDAQ-listed stocks separately. Thus, the 29.1% market share for NASDAQ presented in the SEC Draft Order obfuscates the fact that NASDAQ holds market shares closer to 80% for some NASDAQ-listed securities and market shares closer to 10% for some NYSE-listed securities. Thus, the 29.1% market share figure presented in the SEC Draft Order is misleading because it reveals nothing about the nature of competition for the trading of specific securities.

As an example of internal inconsistency, the SEC Draft Order acknowledges that "Nasdaq has a substantial trading share *in Nasdaq-listed stocks*."[17] Also, the SEC Draft Order does not make this same mistake when it attempts to point out an example of the nature of competition over time. The Draft Order states, "For example, the NYSE's reported market share of trading *in NYSE-listed stocks* declined from 79.1% in January 2005 to 41.1% in December 2007."[18] This excerpt also provides an example of the second flaw.

[15] Draft Order, Table 1,Page 49.
[16] Draft Order, Page 48.
[17] SEC Draft Order, Page 58. Emphasis added.
[18] SEC Draft Order, Page 47. Emphasis added.

The second flaw is that the SEC Draft Order incorrectly treats NYSE and NYSE Arca as separate economic units. In 2006, the NYSE and ArcaEx merged to form the NYSE Group, Inc.[19] In 2007, the NYSE Group, Inc. subsequently merged with Euronext N.V. to form NYSE Euronext.[20] When analyzing the behavior of various economic agents, particularly those that are public corporations, it is critical to make distinctions along lines of ownership and control. In an important antitrust case, *Copperweld Corp. v. Independence Tube Corp. (1984)*, the U.S. Supreme Court held that a parent corporation and a wholly-owned subsidiary must be viewed as a single economic unit.[21] This holding is consistent with the basic financial economic theory that incentive-aligned managers seek to maximize the value of the entire corporation, including its parent and all of its subsidiaries.

According to the NYSE Group's May 4, 2006 prospectus, "[T]he trading platforms of the NYSE and NYSE Arca currently operate separately."[22] One may ask the following question: Does the degree of operational independence matter? The Court specifically addressed this issue in *Copperweld*. The U.S. Supreme Court specifically stated that "separateness" factors (e.g., whether the subsidiary has separate control of its day-to-day operations, separate officers, separate corporate headquarters, etc.) cannot overcome the basic fact that the ultimate interests of the subsidiary and the parent are identical.[23] Thus, NYSE and NYSE Arca must be viewed as a single economic unit.

Indeed, the SEC's Division of Corporate Finance correctly requires NYSE Euronext to provide material information to the investing public about the true nature of its competition by combining the results of operations of NYSE and NYSE Arca, while the Commission and the

[19] Source: http://www.nyse.com/about/history/timeline_2000_Today_index.html.
[20] Ibid.
[21] *Copperweld Corporation v. Independence Tube Corporation*, 467 U.S. 752 (1984).
[22] NYSE Group Prospectus (Form 424B3), May 4, 2006.
[23] *Copperweld Corporation v. Independence Tube Corporation*, 467 U.S. 752 (1984).

Division of Trading and Markets chose to separate the two wholly-owned subsidiaries, without any stated reason, in select parts of its analysis for the Draft Order.

Third, the statistics on "the state of competition in the U.S. equity markets" aggregate all non-exchange trading venues into one category. This allows the SEC to point out that "Perhaps the most notable item of information from Table 1 [in the Draft Order] is that non-exchange trading venues collectively have a larger share of trading than any single exchange." However, by combining the market shares, the aggregate number tells us nothing about how many trading venues account for the subtotal, nor does it tell us anything about the dispersion of market shares across these trading venues. Both of these pieces of information are crucial to understanding the nature of competition and concentration within an industry.

Fortunately, the SEC Draft Order provides the original source of its market share data.[24] We were able to locate the original source, replicate the results reported in the Draft Order Table 1, and uncover the identities and associated market shares for the individual non-exchange trading venues. This information is provided in Table 6. The left side of the table presents the share volume statistics, as reported in the Table 1 of the SEC Draft Order. The right side of the table separates the share volume statistics for the individual non-exchange trading venues and combines the share volume statistics for NYSE and NYSE Arca.

Table 6 shows that the SEC's total "all non-exchange" statistic of 30.2% is constructed by aggregating across four individual non-exchange trading venues – NASD ADF, NASDAQ TRF, NYSE TRF, and National Stock Exchange TRF. Individually, however, none of these trading venues accounts for more than 18% of the reported share volume. NYSE (including NYSE Arca) accounts for about 38% the reported share volume and NASDAQ accounts for more than 29%. Thus, by the SEC's own measure of the nature of competition in the U.S. equity

[24] http://www.arcavision.com.

markets, the two dominant trading venues are in fact exchanges. The two dominant exchanges, NYSE and NASDAQ, accounted for almost 70% of the reported share volume across all stocks in December 2007.

We note that the recent exchange consolidation trend is likely to result in continued dominance by NASDAQ and the NYSE. NASDAQ announced acquisitions of the Boston Stock Exchange (BSE) and Philadelphia Stock Exchange (PHLX) in October 2007 and November 2007, respectively. In January 2008, the NYSE announced the acquisition of the American Stock Exchange (AMEX). Market share statistics from a more recent time period that take into account completed, as well as soon-to-be-completed, acquisitions would provide a much more useful snapshot of the state of competition in the U.S. equity markets.

Finally, the SEC Draft Order contains flawed logic in drawing the conclusion that "[t]he fact that 95% of the professional users of core data choose not to purchase depth-of-book order data of a major exchange strongly suggests that no exchange has monopoly pricing power for its depth-of-book order data."[25] On the contrary, we show in Section IV that the exchanges are able to exert monopoly pricing power for their exclusive depth-of-book data.

The fact that 19,000 professional users purchased the data as of April 30, 2007[26] suggests that, for a large number of users, demand is relatively inelastic. We explore the demand inelasticity and how it is likely to continue to intensify in more detail in Section III, but at this point it is useful to note that the number of users of exclusive depth-of-book data has been growing significantly since April 2007, even in the presence of price increases and tying arrangements. At least up to current prices, exchanges are able to exert monopoly pricing power for their exclusive depth-of-book data over a large, and growing, group of customers.

[25] SEC Draft Order, Page 58.
[26] SEC Draft Order, Page 25.

If the flaws in the analysis in the SEC Draft Order were to be corrected, it would undoubtedly show that the SEC cannot rely on competitive forces to ensure that securities market data distributed by the exchanges was made available on "fair and reasonable terms." Even if the SEC Draft Order were to correct the two easiest flaws – treating NYSE and NYSE Arca as one economic agent, and including the market shares of each of the non-exchange trading venues separately for the purpose of measuring market concentration – and ignore the flaw from averaging across stocks, the SEC would find that trading activity is highly concentrated.[27] Additionally, if the SEC Draft Order were to use a measure of the concentration of trading on an individual-security basis (or even partition according to listing exchange) consistent with established DOJ guidelines (i.e., the Herfindahl Index), the SEC would find trading activity concentration levels that are consistent with our analysis.

D. An Exchange's Reported Trading Activity is Related to its Provision of Liquidity

We complete the picture of the nature of competition for order flow, and the resulting concentration in reported trading activity, by examining how an exchange's reported trading activity is related to its provision of liquidity. Reported trading activity is the *ex post* result of a completed trade. Liquidity provision is the *ex ante* ability to complete a trade of sufficient size at a reasonable price within a reasonable amount of time with minimal market impact. To examine the link between an exchange's reported trading activity and its provision of liquidity, we adopt a three-pronged approach. First, in this Section we conduct a historical analysis of two overall market share measures for NASDAQ. Second, in this Section we conduct a market microstructure analysis of depth-of-book data for individual securities. Finally, in the next

[27] After making these two corrections, the Herfindahl Index would be 2,687.

Section ("Demand Side Conditions"), we provide specific examples that show how NASDAQ's strategic initiatives reveal the competitive link.

Historical Analysis

First, we show that the monthly trading activity that an exchange reports to the Consolidated Tape has been historically related to its provision of liquidity. The trading activity that an exchange reports to the Consolidated Tape does not include all orders that are submitted to an exchange's book. Some of these orders are subsequently routed to other market centers for execution and reporting. Conversely, some trades that an exchange reports to the Consolidated Tape include orders that were routed from other market centers.

To examine the historical link between an exchange's liquidity provision and its reported trading activity, we examine two monthly market share measures provided by NASDAQTrader.com.[28] Figure 2 plots two different market share measures for each month from February 2005 through March 2008 (38 months).[29] Reported Market Share represents the percentage of consolidated share volume reported to the consolidated tape using NASDAQ-operated systems. Handled Market Share represents the percentage of consolidated share volume reported to the consolidated tape using NASDAQ-operated systems plus shares routed from the NASDAQ book to other market centers for execution.

The difference between Reported Market Share and Handled Market Share is attributable to orders that are routed from the NASDAQ book to other market centers. In other words, a portion of the trading activity reported by NASDAQ may not reflect the liquidity available on the NASDAQ book. Figure 2 shows that the difference is very small throughout the entire time period. Before drawing any preliminary conclusions about the relation between the two

[28] http://www.NASDAQtrader.com/Trader.aspx?id=MarketShare
[29] Market share definitions are taken from http://www.NASDAQtrader.com/content/MarketStatistics/MarketShare/terms.pdf.

measures, we examine the intertemporal nature of the relation between the two measures. If the trading activity that NASDAQ reports to the Consolidated Tape were unrelated to the liquidity available on the NASDAQ book, these two market share measures would be unrelated. Figure 2, however, shows that these two market share measures are very closely related. A statistical analysis of the association (or co-movement) between these two measures over time shows that they are almost perfectly correlated. The correlation coefficient for these two monthly measures is 0.98.[30]

In other words, the overall market share of trading activity that NASDAQ reports to the Consolidated Tape appears to accurately correspond to the overall liquidity on NASDAQ's book. But, this correlation analysis relies on very coarse measures – overall market-level data reported on a monthly basis. For a more granular analysis, we directly examine intraday depth-of-book data for a sample of individual securities.

Microstructure Analysis

Depth-of-book data allows economists to view the demand and supply curves of all active market participants. We obtained depth-of book data from three sources – NYSE (OpenBook), ARCA (ArcaBook), and NASDAQ (ITCH) – for a sample of three NYSE-listed securities (C, GE, and XOM) from the week of March 10-14, 2008. We also obtained depth-of book data from two sources – NASDAQ (ITCH) and ARCA (ArcaBook) – for a sample of three NASDAQ-listed securities (AAPL, GOOG, and MSFT) from the week of March 10-14, 2008. The analysis focuses on three separate snapshots of data during one day, March 10, 2008. We examine one snapshot in the morning (9:40:00 AM), one at mid-day (12:00:00 PM), and one in

[30] Correlation coefficients range between -1 (perfect negative correlation) and +1 (perfect positive correlation).

the afternoon (3:40:00 PM) to take into account the well-known fact that liquidity provision can change throughout the day. Thus, we analyze 45 snapshots of depth-of-book data.[31]

Table 7 presents the results of the depth-of-book microstructure analysis. Panel A shows the concentration of liquidity on the bid side, Panel B shows the concentration of liquidity on the ask (offer) side, and Panel C shows the concentration of liquidity on both sides. The percentages reported in Panels A, B, and C, reflect the concentration of liquidity for each stock among our three sources of depth-of-book data only and, therefore, do not necessarily reflect the overall concentration of liquidity among all books.

The results across the first three panels of Table 7 are very similar. Liquidity, like trading activity, is highly concentrated on the listing exchange. The liquidity for NYSE-listed securities is highly concentrated on the NYSE (OpenBook and ArcaBook) and the liquidity for NASDAQ-listed securities is highly concentrated on NASDAQ (ITCH). Comparing the results from Table 7 to Tables 3 through 5, we can see that the concentration in reported trading activity across exchanges is indeed related to the concentration of liquidity on a particular exchange.

Panel D of Table 7 provides estimates of liquidity concentration, taking into account BATS ECN and Direct Edge ECN, the two non-exchange trading venues specifically mentioned in the SEC Draft Order.[32] Panel D shows that, even after accounting for the two most successful non-exchange trading venues, liquidity is highly concentrated on the listing exchange. If we assume that the addition of BATS ECN and Direct Edge ECN accounts for virtually all of the relevant market for the distribution of depth-of-book market data for NASDAQ-listed stocks and NYSE-listed stocks, we can construct Herfindahl Indices of liquidity concentration. For

[31] 45 depth-of-book snapshots = 27 snapshots for NYSE-listed securities (3 securities * 3 books * 3 snapshots per book) + 18 snapshots for NASDAQ-listed securities (3 securities * 2 books * 3 snapshots per book).
[32] SEC Draft Order, Pages 47-48. Unlike BATS ECN and Direct Edge ECN which display and distribute their depth-of-book market data products, non-quoting dark pools that do not display their data cannot be considered part of the definition of the relevant market for distribution of depth-of-book market data.

NASDAQ-listed stocks, the Herfindahl Index measuring the liquidity concentration is 4,845. For NYSE-listed stocks, the Herfindahl Index is 5,235. Both of these measures are well above the 1,800 DOJ threshold for a highly concentrated market.

Thus, the depth-of-book analysis completes the picture. Even in the presence of fierce competition for order flow among market centers, network externalities (explained in Section II) are such powerful forces that listing exchanges are able to survive as natural monopolies. The results of the depth-of-book analysis, combined with the results of the trading activity analysis, confirm the link between the concentration of liquidity and the concentration of trading activity. The order flow externality is so strong that the concentration of trading in the most active securities (and many others) is well-above the DOJ's established threshold for a highly concentrated industry. Finally, to address the concern that our microstructure analysis only focuses on the largest, most liquid stocks, we examined random snapshots of depth-of-book data on a small sample of mid-cap and small-cap stocks. Across all capitalization categories, liquidity is highly concentrated on the listing exchanges.

III. Demand-Side Conditions

The demand for depth-of-book data is driven by several factors. Broker dealers must have the ability to obtain depth-of-book at reasonable prices when they so choose for a particular client in order to provide that client with the customer service they expect. Retail and institutional investors alike need access to market data in order to value their portfolios, inform their trading decisions by reviewing the price they may receive for a buy or sell order, and to monitor and compare the executed price they have received. Accordingly, many broker dealers and other market data vendors seek to meet these demands by making market data available to their customers directly on their websites as well as via inputs to their trading engines. While

retail investors generally do not pay directly for this access, their broker dealers pay fees to the exchanges to cover such access. These fees raise the costs of doing business, and are ultimately borne by investors. As long as at least one broker dealer uses depth-of-book data, for whatever reason, then all others will be subject to significant increased pressure to have the ability to access to such data as well when needed.

NBBO data, for example, may not be sufficient for institutional investors because decimalization has led to smaller depth at the NBBO.[33] In fact, the NYSE acknowledges that "[t]he advent of trading in penny increments and the accelerated use of 'black box' trading tools accelerated the success of NYSE OpenBook."[34] Retail investors as well may wish to have access to depth-of-book data. Therefore, we examine how often retail order sizes exceed the NBBO size and whether retail investors adjust their order submission strategies based on market conditions.

Table 8 compares the sizes of market orders and marketable limit orders from a leading online retail broker to NBBO sizes. Panel A shows that there were 27,167 market orders and 7,353 marketable limit orders submitted between 9:30 AM and 4:00 PM during one trading day in May 2008. The overall average (median) order size was 974 (500) shares. Marketable limit order sizes are, on average, larger than market order sizes. This result is consistent with Peterson and Sirri (2002) who find that marketable limit orders are used proportionally more often for larger orders.[35]

Panel B shows that about 36% of retail orders (market and marketable limit) encounter insufficient NBBO size when they are submitted. While many of the orders in this sample data

[33] NBBO data fits within the SEC's notion of "core" data. See, for example, SEC Draft Order, Page 3.
[34] NYSE Euronext 2007 10K, filed on March 25, 2008.
[35] Mark Peterson and Erik Sirri, 2002, "Order Submission Strategy and the Curious Case of Marketable Limit Orders," *Journal of Financial and Quantitative Analysis* 37, 221-241.

were, not surprisingly, submitted for shares in well-known large-cap companies, retail investors consistently encountered insufficient NBBO size in mid-cap and small-cap companies.

Panel B also shows that marketable limit orders encounter insufficient NBBO size more often (46%) than market orders (34%). This result is also consistent with Peterson and Sirri (2002) who find that marketable limit orders are used more often when the order size exceeds the quoted depth. In other words, some retail customers are actively monitoring market conditions to optimize their order submission strategies.

Even those retail customers who are not actively monitoring market conditions submit orders larger than the quoted size in the NBBO and, therefore, are not receiving a quoted price for their entire order. Typically, these retail customers receive multiple trade confirmations for their original order, reflecting the executing broker's need to divide up retail orders to execute against the smaller and changing NBBO. For retail investors who choose to monitor for best execution, depth-of-book data is necessary to see the price they are likely to receive for almost 40% of their orders. Consequently, access to depth-of-book data is a necessity for any retail broker-dealer who chooses to provide full quotes to a customer.

Market data for one security cannot adequately substitute for market data in another security. Customer service considerations are security-specific. While the SEC Draft Order emphatically states that, as far as the Commission is concerned, "broker dealers are not required to purchase depth-of-book data because of their best execution obligations,"[36] it also points out the importance of the customer service considerations. For example, the SEC Draft Order indicates that it would be helpful for broker-dealers to purchase liquidity data from the two dominant exchanges: "A market participant is likely to be more interested in other exchange and ECN products when the exchange selling its data has a small share of trading volume, because

[36] SEC Draft Order, Page 5.

the depth-of-book order data provided by other exchanges and ECNs will be proportionally more important in assessing market depth."[37]

Combining all of the factors yields a situation in which the demand for the exclusive depth-of-book data sold by the two dominant exchanges is "inelastic." The price elasticity of demand is an economic measure of how much the quantity demanded responds to a change in price. Economists say that demand is "inelastic" when the quantity demanded responds only slightly to changes in the price. Inelastic demand is common in markets with no comparable substitutes under the conditions described in Section II above.

If producers know the demand elasticities of their customers, producers can engage in monopoly pricing power that allows them to charge customers prices equal to their "willingness to pay." In the case of depth-of-book data, many broker-dealers face the same inelastic demand curve. Consequently, a large number of customers have the same "willingness" to pay for the data.

The inelastic demand for depth-of-book data, combined with the lack of comparable substitutes, suggests that exchanges have the ability to engage in monopoly pricing. In the next section, we investigate the exchanges' perceptions of this ability by examining their marketing strategies. In the subsequent section, we establish that exchanges, indeed, have the ***ability*** and the ***willingness*** to engage in monopolistic pricing behavior.

A. The NYSE and NASDAQ Emphasize Inelastic Demand for Exclusive Depth-of-Book Data in Their Marketing Materials

The NYSE's pricing strategy for its flagship exclusive depth-of-book data product, later augmented with top-of-book data, reveals just how much monopoly pricing power the NYSE believes it enjoys for each product. In an April 4, 2006 press release, the NYSE announced that

[37] SEC Draft Order, Page 55.

they had received approval from the SEC to introduce a new exclusive depth-of-book data product called OpenBook Real-Time.[38] Ron Jordan, Senior Vice President for Market Data, stated that the product was created in response to "customer demand for depth-of-book data" and proclaimed that the new exclusive depth-of-book product was "a new standard" and that it was "what investors want and need in today's marketplace."[39] In a follow-up press release on May 1, 2006, the NYSE announced the launch of OpenBook Real-Time.[40] The NYSE reiterated the fact that there was strong "customer demand for depth-of-book data."[41] This is supported by a more recent statement by the NYSE in its 10K SEC filing for the year ended December 31, 2007 which stated, "Revenues for our proprietary data products have grown significantly over the last few years, driven in large part by the success of NYSE OpenBook…"[42] These statements reveal that, not surprisingly, the NYSE recognizes the inelasticity of demand and the lack of substitutability for its exclusive depth-of-book data.

Similarly, NASDAQ has consistently touted the strong demand for its exclusive depth-of-book data. During a September 8, 2006 presentation, Adena Friedman, Executive Vice President for Data Products and Corporate Strategy, stated, "NASDAQ continues to grow the Data business at a significant rate with Proprietary Data products becoming an increasingly critical element to success."[43] She explicitly linked NASDAQ's "Data Products" with "the sizable market share in NASDAQ execution systems" and stated that for "NASDAQ listed stocks, NASDAQ's market share is more than twice the nearest competitor…" In particular, she pointed

[38] NYSE Press Release, April 4, 2006, "The New York Stock Exchange Receives SEC Approval for NYSE OpenBook Real-Time," http://www.nyse.com/press/1144146242211.html.
[39] Ibid. Emphasis added.
[40] NYSE Press Release, May 1, 2006, "The New York Stock Exchanges Launches OpenBook Real-Time," http://www.nyse.com/press/1146478242995.html.
[41] Ibid.
[42] NYSE Euronext 2007 10K, filed on March 25, 2008.
[43] "NASDAQ's 2006 Analyst/Investor Day: Leveraging a Solid Foundation for Growth." Presentation materials are available at http://ir.nasdaqomx.com.

out that their "[f]lagship depth product, TotalView, continues to be more widely adopted throughout the industry."[44]

NASDAQ also reported that "During 2007, our TotalView professional subscribers increased by over 34%"[45] and, more recently, NASDAQ officials have been highlighting the fact that "Market data proprietary revenues [in Q108] rose 25% from Q107."[46]

The next section will provide examples of how the NYSE and NASDAQ are willing and able to extract monopoly rents by charging extremely high markups on their own exclusive depth-of-book data products and by tying other products. In contrast, consider the example of the NYSE's pricing of its top-of-book data. On October 11, 2006, the NYSE announced the addition of top-of-book quotes for NYSE-listed stocks to its already "popular" OpenBook Real-Time data product.[47] How much more was the NYSE able to charge its OpenBook subscribers for its top-of-book data? The NYSE made the best bid and offer information available "at no additional cost."[48]

The fact that the NYSE subsequently bundled its top-of-book data with its depth-of-book data without increasing the price reveals a few important points. First, the NYSE enjoys much more monopoly pricing power for its depth-of-book data than for its top-of-book data. Second, either the marginal cost of producing and disseminating its top-of-book data is close to zero and/or the NYSE is subsidizing the production of top-of-book data with large markups that it is charging on its depth-of-book data. Without adequate cost information it is impossible to directly prove or disprove each explanation individually, but the simple fact that either or both

[44] Ibid.
[45] NASDAQ's 2007 10-K filing.
[46] Fox-Pitt Kelton and Cochran Caronia Waller at the Global Market Structure Conference, May 21, 2008 and Sandler O'Neill at the Global Exchange Conference, June 4, 2008. Materials for both presentations are available at http://ir.nasdaqomx.com.
[47] NYSE Press Release, October 11, 2006, "Real-Time Quotes Added to NYSE OpenBook Products," http://www.nyse.com/press/1160561782848.html.
[48] Ibid.

must be true, provides important insights into the underlying economics of securities market data.

NASDAQ also acknowledges that it enjoys monopoly pricing power for its own exclusive depth-of-book data. Exhibits 1 and 2 contain NASDAQ's TotalView product support fact sheets for professional traders and non-professional traders, respectively. While both fact sheets contain the same example, the marketing language differs slightly.

The fact sheets include a comparison of a Level 2 display of liquidity for a sample stock to a TotalView display of the same stock. The Level 2 display shows that the top-of-book data does not contain sufficient information for traders to make informed decisions. The TotalView display contains even more depth-of-book data than the Level 2 display. TotalView, which NASDAQ bundles with Level 2, displays the full order book depth. NASDAQ points out that the sample TotalView display shows "more than 20 times the liquidity of Level 2 and three times the liquidity within five cents of the inside market." More revealingly, NASDAQ refers to this exclusive product as "the standard NASDAQ data feed for serious traders."[49]

IV. Monopoly Pricing Power

Economists looking for real-world examples of firms with considerable monopoly pricing power find they are not typical. Because few goods are truly unique and the demand for most goods is somewhat elastic, at least in the long-run, it is usually quite difficult to find evidence of substantial monopoly power. However, the previous two sections have shown that there are no comparable substitutes for the exclusive depth-of-book data of a dominant exchange and that the demand for this data is relatively inelastic.

[49] Emphasis added.

Taken together, these conditions provide an excellent opportunity for exchanges to exploit their monopoly pricing power. The exchanges' marketing strategies are consistent with the belief that they can exert pricing power. In this section, we appeal to economic theory to establish the exchanges' ability to exert this power, and then we provide direct evidence of their monopoly pricing behavior.

A. Monopoly Pricing Power Behavior by the Dominant Exchanges — Economic Theory

Do the exchanges have the ability to exert monopoly power by setting the price of market data above the marginal cost of producing and distributing the data? To answer this question, we first turn to economic theory. A simple definition of monopoly power is the ability to set price above marginal cost. One well-known measure of monopoly power is the Lerner Index, *L*, which measures the difference between the price of a good or service and its marginal cost, expressed as a proportion of the price:[50]

$$L = \frac{P - MC}{P}$$

where *P* is price and *MC* is marginal cost. The Lerner Index ranges in value from 0 to 1. A high value of the Lerner Index indicates a high degree of monopoly power.

In practice, obtaining accurate and precise data on the marginal costs of producing a particular good or service (e.g., securities market data) is extremely difficult. However, there are reasonable alternatives for assessing levels and trends of marginal costs, such as average variable costs or long-run incremental costs, yet the SEC Draft Order failed to consider any cost data to support the Commission's finding of no significant market power. A couple of trends ignored by the Commission are noteworthy. First, NASDAQ reports that its ongoing technology expenses

[50] Abba Lerner, 1934, "The Concept of Monopoly and the Measurement of Monopoly Power," *Review of Economic Studies* 1, 157-175.

were reduced by 50% between 2001 and 2006.[51] Second, NASDAQ also reports that its cash flows from operations have been increasing while its capital spending has been decreasing. Therefore, it is clear that the exchanges' costs of producing and distributing data, no matter how one chooses to measure them (e.g., short-run vs. long-run costs, average vs. marginal costs, operating expenses vs. capital expenditures), are continuing to dramatically decline.

Under the assumption that a firm (e.g., an exchange) is a profit-maximizer, it can be shown that the Lerner Index yields the following useful relationship:

$$L = \frac{P - MC}{P} = \frac{1}{\eta}$$

where η is the absolute value of the elasticity of demand. Markets characterized by large demand elasticities result in a low value for the Lerner Index, which implies little monopoly power.[52] Relatively inelastic demand results in a high value for the Lerner Index, which implies large monopoly power.[53]

In the previous section, we established the fact that there is inelastic demand for depth-of-book data. Thus, exchanges can, in theory, exert monopoly power over the price of their exclusive market data by charging a high mark-up in price over marginal cost. We now move from theory to evidence. Are exchanges, in fact, exerting monopoly pricing power for their exclusive depth-of-book data?

B. Monopoly Pricing Power Behavior by the Dominant Exchanges — Evidence

We take a two-pronged approach to look for evidence that the dominant exchanges are exerting monopoly pricing power in two ways. First, we offer an historical perspective by

[51] "NASDAQ's 2006 Analyst/Investor Day: Leveraging a Solid Foundation for Growth."
[52] The larger the value of η, the smaller the value 1/η, and therefore the lower the value of *L*.
[53] The smaller the value of η, the larger the value 1/η, and therefore the higher the value of *L*.

providing and analyzing excerpts from two hearings that the SEC held in 2002. Second, we examine the extent to which exchanges are currently engaging in the practice of monopolistic pricing behavior.

Historical Evidence from the 2002 SEC Market Structure Hearings

In 2002, the SEC held two hearings to discuss key issues relating to the structure of the U.S. equity securities markets, including the collection and dissemination of market data through intermarket plans.[54] The hearings consisted of a series of moderated roundtable discussions by SEC Commissioners and staff, distinguished market professionals, and academic experts.

Annette Nazareth, Director of the SEC's Division of Market Regulation, introduced the opening session by asking a series of questions that included, "How should we reconcile the investor's need to obtain current information about market activity with each market center's desire to exploit the commercial value of the data it generates?"[55]

Richard Bernard, executive vice president and general counsel of the New York Stock Exchange (NYSE), produced an eye-popping statistic. When he looked at the historical contribution of the market data revenue to the NYSE's total annual revenue, he found that it was remarkably consistently between 17% and 18% since 1975. Robert Murphy, NYSE specialist from La Branche & Co., expressed his surprise when he found out how constant that percentage remained over a long period of time.

SEC Chairman Harvey Pitt asked, "What conclusion should we draw from that?" He then went on to express his doubts that the pricing was being set in any way related to the costs of producing and disseminating the data. A participant expressed his dismay that the market data

[54] The first hearing was held on October 29, 2002, at the SEC's headquarters in Washington, D.C. The second hearing was held on November 12, 2002, at the NYU Stern School of Business New York, NY.
[55] All quotes and references from the SEC market structure hearings are taken from the transcripts posted on the SEC's website: http://www.sec.gov/spotlight/marketstructure/mkts102902-hrg.txt and http://www.sec.gov/spotlight/marketstructure/mkts111202-hrg.txt.

fees have not reflected that technological developments have led to a significant decrease in the cost of processing market data over time.

Thus, it is clear that the exchanges had the power to maintain a price that was substantially above its marginal cost. In fact, Gary Gastineau of ETF Advisors (and former senior vice president at the American Stock Exchange) said, "The only SRO revenue that has any monopoly elements of it in it at all that I can see…is tape revenue." Richard Bernard of the NYSE conceded "The value of this data is…very high."

But, if the exchanges have monopoly pricing power, why didn't the exchanges exert this power to set the prices substantially above marginal cost and significantly increase their prices over time? The answer to that question lies in the governance of the exchanges. Until recently, the NYSE was a member-owned exchange. The owners of the exchange were the same constituents who were buying the data. As Richard Bernard of the NYSE put it, "The exchange is a cooperative. And so we can't get very out-of-whack with what our constituents want without hearing about it." Thus, despite collective action hurdles, the members of the exchange were able to provide at least some check on the market data pricing policies of the dominant exchanges.

Profit-maximization as an objective of the market data pricing policy of the dominant member-owned exchanges was checked at least somewhat by the interests of its member-owners. This changed recently as the exchanges have gone public with a new ownership structure and corresponding duties to maximize shareholder wealth for persons other than their former members.

Current Evidence of Monopolistic Pricing Behavior

Another way to determine whether exchanges are exerting monopoly pricing power is to look for direct evidence of monopolistic pricing behavior. Exercising monopoly pricing power is a rational strategy for a profit-maximizing monopolist. Monopoly pricing is not possible in a competitive market with many firms selling the same good or a comparable substitute. If one firm tried to charge a higher price to a customer, then the customer would simply buy from another firm. For a firm to be able to engage in monopolistic pricing behavior, it must have some market power. To that end, we compare prices on data in which an exchange enjoys this market power to prices on data in which it does not. Table 9 presents the monthly subscriber fees for four exchange depth-of-book market data products. Panel A presents the reported fees for NASDAQ's TotalView and OpenView data products and the NYSE's OpenBook data product. Panel B presents the proposed fees for the NYSE's ArcaBook data product.

First, consider the pricing comparison for two of NASDAQ's exclusive data products. TotalView offers NASDAQ depth-of-book data for NASDAQ-listed securities. OpenView offers NASDAQ depth-of-book data for NYSE- and AMEX-listed securities. Recall that NASDAQ is the dominant exchange for the liquidity and trading activity for NASDAQ-listed securities, while the NYSE is the dominant exchange for the liquidity and trading activity for NYSE-listed securities. Accordingly, NASDAQ enjoys market power in pricing its TotalView data product, but it does not enjoy market power in pricing its OpenView product.

Table 9 shows that the monthly professional subscriber fee NASDAQ charges for OpenView is only $6. NASDAQ charges a monthly fee of $70 for TotalView, but because NASDAQ recently started requiring TotalView subscribers to also purchase OpenView, this

tying arrangement leads to a total effective $76 monthly fee for TotalView users. In other words, TotalView fees are now more than ***1,100% higher*** than OpenView fees.

Even in the presence of the effective price increase from NASDAQ's tying arrangement, customer demand for the higher priced TotalView product has continued to increase. At least up to current prices, demand for NASDAQ's exclusive TotalView product is inelastic for a large, and growing, number of customers.

Similarly, the NYSE enjoys very substantial market power in pricing its OpenBook data product, for which it currently charges $60 monthly per professional user. Table 9 shows that the fees that the NYSE charges for OpenBook are more than ***900% higher*** than the fees that NASDAQ charges for OpenView. Thus, for products in which NASDAQ and the NYSE enjoy monopoly pricing power, they are able to charge price markups of about ***1,000%*** more than they charge on the products in which they do not enjoy monopoly pricing power. In addition, NASDAQ is further exploiting its monopoly power through a tying arrangement in which it forces TotalView users to also pay for OpenView, regardless of whether the user wants the OpenView product.

The subject of the SEC Draft Order is NYSE Arca's proposed monthly subscriber fees for purchase of its depth-of-book product ArcaBook. NYSE Arca proposes to establish monthly professional subscriber fees of $15 for CTA Plan and ETF securities and $15 for NASDAQ UTP Plan securities. At first glance, it may be tempting to presume that these fees are set in the presence of significant competitive forces. However, this presumption overlooks two salient points, both of which are related to the NYSE's ownership of NYSE Arca.

First, the Commission does not provide any evidence of how these fees for the two ArcaBook products compare with any relevant measure of the NYSE's costs of collecting and

distributing the data. Without this cost data, it is impossible to accurately assess the extent of the NYSE's market power in setting the prices for the ArcaBook products offered through its NYSE Arca subsidiary.

Under these circumstances, without cost figures to conduct a quantitative (e.g., Lerner Index) review, the Commission cannot reasonably conclude that the NYSE "was subject to significant competitive forces" when setting the terms of the ArcaBook proposal. One cannot reasonably conclude that the NYSE's marginal costs for ArcaBook in 2008 are greater than pre-acquisition Arca's marginal costs when it charged $0 for the data. In fact, the NYSE claims to have achieved cost synergies in its merger with Arca Exchange.[56] Nor can one reasonably conclude that cost differences between the NYSE and NASDAQ justify why the $15 fee the NYSE proposes to charge for each of its ArcaBook data products is ***150% higher*** than the $6 fee that NASDAQ charges for its OpenView data product.

Second, the Commission does not consider the prospect of the NYSE exercising monopoly pricing power through tying arrangements. As NASDAQ has demonstrated with its tying of the TotalView and OpenView products, the NYSE has the clear incentive to force users of a product in which the exchange has monopoly pricing power to also pay for a product in which the exchange does not have monopoly pricing power, regardless of whether the user wants the second product.

The NYSE will possess valuable customer usage patterns for both ArcaBook products. The NYSE can easily raise its market data revenues, without raising the stand-alone fees, by forcing all customers of the more successful ArcaBook data product to also buy the less successful ArcaBook data product. For example, NYSE Arca regularly reports trading volume

[56] The NYSE's 10-K-A for the year-ended December 31, 2006 states "Although the trading platforms of the NYSE and NYSE Arca currently operate separately, we are actively integrating some of their activities to achieve revenue and cost synergies."

market shares in excess of 50% for many ETFs.[57] For all of the supply-side and demand-side reasons discussed in Sections II and III, it is likely that the ArcaBook product for CTA Plan and ETF securities will soon, if not already, become the new "standard" for depth-of-book data for Arca-listed ETFs, and the NYSE will enjoy monopoly pricing power over this product. Similarly, the NYSE could effectively raise the OpenBook monthly professional user fees from $60 to $75 by tying one of the ArcaBook products, or to $90 by tying both ArcaBook products. In its Draft Order, the Commission has not even acknowledged any concerns about the NYSE's ability to exercise monopoly pricing power through product tying.

As a final comparison, consider FINRA's (formerly NASD's) pricing of its TRACE (corporate bond) data product. As noted in SIFMA's January 17, 2007 comment letter for *In the Matter of NetCoalition*, equity market top-of-book data revenues for 2003 were $424 million and network expenses were $38 million, yielding a more than ***1,000%*** markup.[58] As a contemporaneous comparison, consider that FINRA's (formerly NASD's) reported <u>total</u> TRACE (corporate bond) revenues for its first twelve months of operation were $12.4 million ($2 million in system fees, $8.9 million in transaction reporting fees, and $1.5 million in market data fees) and its total expenses were also approximately $12.4 million.[59]

In addition, the $2,000 enterprise fee for FINRA's historical TRACE (corporate bond) data product is less than 3% of the cost of the $90,000 enterprise fee for NYSE's historical data product and less than 4% of the cost of the $60,000 enterprise fee for NASDAQ's historical data product. [60] Although the bond and stock price data products differ somewhat, the nature of the technology required to collect and distribute historical securities data is not so dissimilar that it

[57] See http://www.nysearca.com/issuers/etfs.aspx.
[58] SEC Release No. 34-49325; File No. S7-10-04.
[59] SEC Release No. 34-49086; File No. SR–NASD–2003–157.
[60] Ibid.

should account for such a drastic price differential, especially when taking into account the fact that the NYSE and NASDAQ each have a much broader market data revenue base over which to spread their market data distribution costs.[61]

Taken together, all of these simple comparisons provide concrete examples of how the NYSE's pricing of its exclusive depth-of-book data product and NASDAQ's pricing of its exclusive depth-of-book data product are consistent with monopolistic pricing behavior.

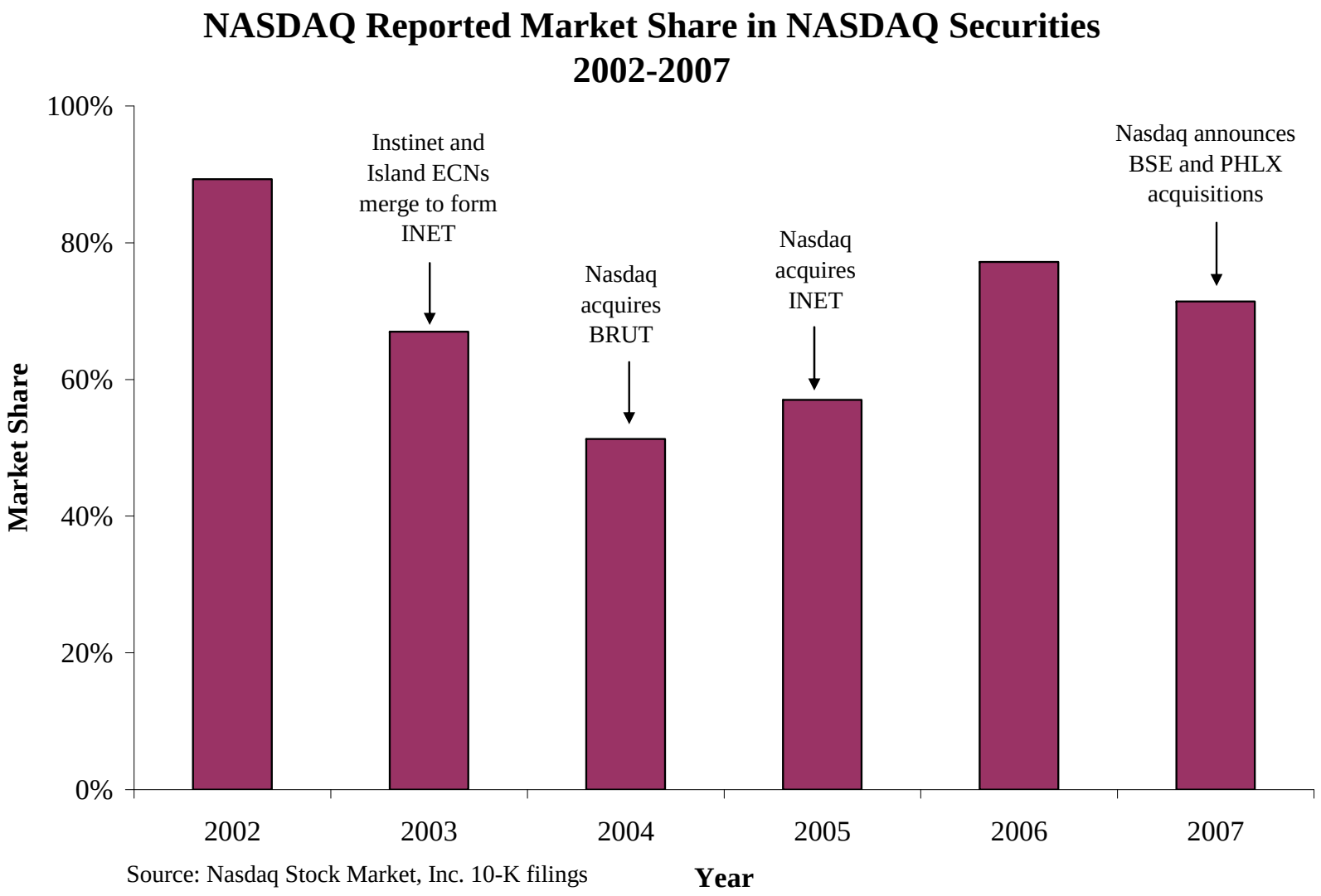
V. Conclusions

The SEC is required by Congressional statute to assure that securities market data provided by broker dealers and then distributed by exchanges is made available on "fair and reasonable terms." In the recent Draft Order, the SEC has made it clear that it believes that the most appropriate and effective means by which to fulfill this Congressional mandate is a "reliance on competitive forces," when appropriate.[62]

This study shows, however, that a reliance on competitive forces is inappropriate for the pricing of securities market data by the NYSE (with which NYSE Arca must be viewed as a single combined entity under the control of NYSE Euronext as discussed above) and NASDAQ, the two dominant U.S. securities market centers in terms of trading, liquidity, and displayed depth-of-book market data, particularly with respect to their own listed securities. Qualitative and quantitative analyses show that NASDAQ and the NYSE each have the ability to exert monopoly pricing power and that they are using this power. The exchanges are charging broker dealers and the investing public fees that are well above the cost of consolidating and distributing data, and therefore, not determined by competitive forces.

[61] Ibid.
[62] See, for example, SEC Draft Order, Page 4.

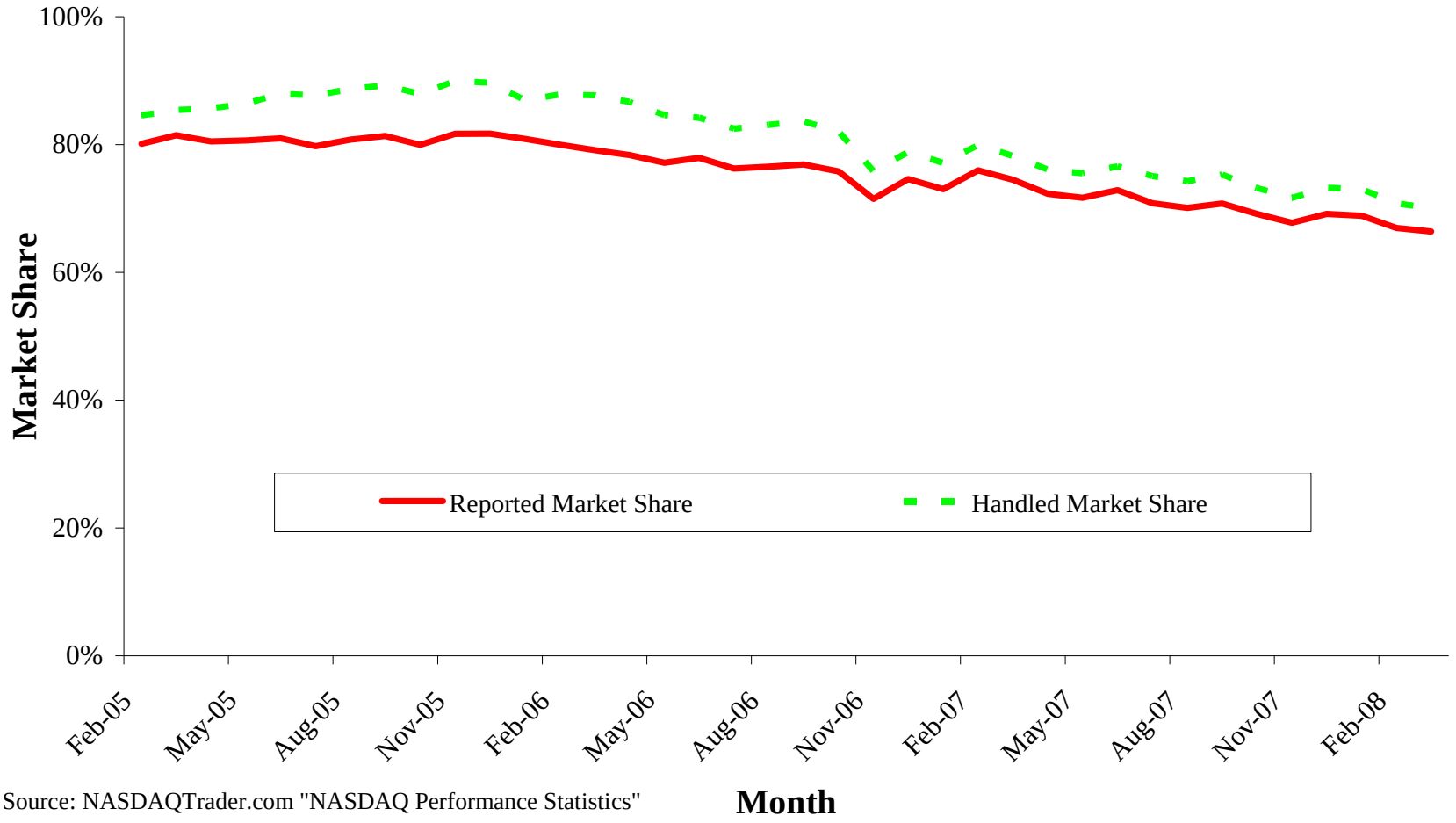
Figure 1



Source: Nasdaq Stock Market, Inc. 10-K filings

Figure 2

NASDAQ Market Shares in NASDAQ-Listed Securities
February 2005 to March 2008



Source: NASDAQTrader.com "NASDAQ Performance Statistics"

Table 1

Market Share of Trading Activity

March 10-14, 2008

Panel A: Top 10 NASDAQ-Listed Stocks by Dollar Volume Traded

Symbol	Number of Different Trading Venues	Market Share of Listing Exchange (%)		
		Dollar Volume	Share Volume	Number of Trades
QQQQ	10	59.1	59.1	60.3
AAPL	9	62.1	62.1	51.7
GOOG	9	61.5	61.6	55.9
MSFT	9	67.0	67.0	56.9
RIMM	8	61.7	61.7	54.2
BIDU	8	69.4	69.4	63.6
CSCO	9	66.5	66.5	54.6
INTC	9	66.5	66.5	55.0
FSLR	8	63.2	63.1	59.7
YHOO	9	68.6	68.6	58.6

Panel B: Top 10 NYSE-Listed Stocks by Dollar Volume Traded

Symbol	Number of Different Trading Venues	Market Share of Listing Exchange (%)		
		Dollar Volume	Share Volume	Number of Trades
IWM	9	51.1	51.1	46.9
EEM	9	62.0	62.0	65.2
BSC	9	52.0	51.3	56.5
GS	8	52.6	52.6	57.4
C	9	48.4	48.4	48.7
XOM	9	55.4	55.3	52.8
GE	9	57.1	57.1	47.3
JPM	8	53.2	53.2	49.7
BAC	9	51.7	51.7	47.3
LEH	9	52.0	51.9	51.6

Source: TAQ database, Consolidated Trade file.
NYSE includes NYSE Arca.

Table 2

The Herfindahl Index

Panel A: Example of Herfindahl Calculations

Competitive		Duopoly		Monopoly	
Firms	Market Share (%)	Firms	Market Share (%)	Firms	Market Share (%)
Firm 1	10	Firm 1	50	Firm 1	95
Firm 2	10	Firm 2	40	Firm 2	5
Firm 3	10	Firm 3	5	Firm 3	<1
Firm 4	10	Firm 4	5	Firm 4	<1
Firms 5-10	10	Firms 5-10	<1	Firms 5-10	<1
Herfindahl	1,000	Herfindahl	4,150	Herfindahl	9,050

Panel B: U.S. Department of Justices (DOJ) Categories

Herfindahl Index	DOJ Category
< 1,000	Unconcentrated
1,000 to 1,800	Moderately Concentrated
>1,800	Highly Concentrated

Source: "Horizontal Merger Guidelines" issued by the U.S. Department of Justice and the Federal Trade Commission, available at http://www.usdoj.gov/atr/public/guidelines/horiz_book/hmg1.html

Table 3

Herfindahl Index of Trading Activity – All Trades

March 10-14, 2008

Panel A: Top 10 NASDAQ-Listed Stocks by Dollar Volume Traded

Symbol	Number of Different Trading Venues	Herfindahl		
		Dollar Volume	Share Volume	Number of Trades
QQQQ	10	4,412	4,412	4,336
AAPL	9	4,346	4,347	3,556
GOOG	9	4,309	4,311	3,848
MSFT	9	4,849	4,850	3,918
RIMM	8	4,333	4,334	3,743
BIDU	8	5,118	5,123	4,496
CSCO	9	4,796	4,799	3,731
INTC	9	4,799	4,798	3,787
FSLR	8	4,415	4,405	4,089
YHOO	9	5,059	5,054	4,074

Panel B: Top 10 NYSE-Listed Stocks by Dollar Volume Traded

Symbol	Number of Different Trading Venues	Herfindahl		
		Dollar Volume	Share Volume	Number of Trades
IWM	9	4,111	4,111	3,992
EEM	9	3,721	3,720	3,286
BSC	9	2,959	2,965	2,919
GS	8	3,009	3,009	2,777
C	9	3,147	3,149	3,042
XOM	9	3,619	3,618	3,269
GE	9	3,461	3,462	3,208
JPM	8	3,573	3,574	3,385
BAC	9	3,501	3,501	3,416
LEH	9	3,207	3,205	3,089

Source: TAQ database, Consolidated Trade file.
NYSE includes NYSE Arca.

Table 4

Herfindahl Index of Trading Activity – Block Trades (10,000 shares or more)

March 10-14, 2008

Panel A: Top 10 NASDAQ-Listed Stocks by Dollar Volume Traded

Symbol	Number of Different Trading Venues	Herfindahl		
		Dollar Volume	Share Volume	Number of Trades
QQQQ	8	6,130	6,129	4,317
AAPL	4	8,637	8,631	6,462
GOOG	3	9,328	9,320	8,481
MSFT	8	9,044	9,041	7,120
RIMM	4	9,171	9,159	8,121
BIDU	2	8,947	8,971	9,050
CSCO	7	8,656	8,658	7,002
INTC	7	8,713	8,707	7,132
FSLR	3	8,627	8,592	7,970
YHOO	8	8,396	8,384	5,318

Panel B: Top 10 NYSE-Listed Stocks by Dollar Volume Traded

Symbol	Number of Different Trading Venues	Herfindahl		
		Dollar Volume	Share Volume	Number of Trades
IWM	8	4,719	4,721	4,509
EEM	8	4,574	4,571	4,267
BSC	8	3,744	3,566	2,998
GS	6	4,517	4,527	5,033
C	9	4,159	4,156	4,069
XOM	5	4,861	4,868	4,160
GE	9	6,383	6,377	5,151
JPM	7	4,671	4,668	4,072
BAC	7	4,563	4,560	4,632
LEH	8	3,924	3,880	3,386

Source: TAQ database, Consolidated Trade file.
NYSE includes NYSE Arca.

Table 5

Herfindahl Index of Trading Activity – Non-Block Trades (<10,000 shares)

March 10-14, 2008

Panel A: Top 10 NASDAQ-Listed Stocks by Dollar Volume Traded

Symbol	Number of Different Trading Venues	Herfindahl		
		Dollar Volume	Share Volume	Number of Trades
QQQQ	9	4,203	4,203	4,336
AAPL	4	4,205	4,206	3,555
GOOG	3	4,154	4,157	3,847
MSFT	8	4,318	4,320	3,915
RIMM	4	4,242	4,244	3,742
BIDU	2	5,074	5,079	4,495
CSCO	7	4,253	4,257	3,728
INTC	7	4,294	4,293	3,784
FSLR	3	4,345	4,336	4,088
YHOO	8	4,137	4,136	4,073

Panel B: Top 10 NYSE-Listed Stocks by Dollar Volume Traded

Symbol	Number of Different Trading Venues	Herfindahl		
		Dollar Volume	Share Volume	Number of Trades
IWM	9	3,983	3,983	3,992
EEM	8	3,740	3,737	3,286
BSC	8	2,941	2,951	2,919
GS	6	2,976	2,976	2,776
C	9	3,055	3,057	3,042
XOM	5	3,499	3,499	3,269
GE	9	3,235	3,235	3,208
JPM	7	3,476	3,478	3,385
BAC	7	3,394	3,395	3,416
LEH	8	3,169	3,170	3,089

Source: TAQ database, Consolidated Trade file.
NYSE includes NYSE Arca.

Table 6

Reported Share Volume for All Stocks During December 2007

As Reported in SEC Draft Order[1]		Independent Verification[2]	
Trading Venue	**Market Share**	**Trading Venue**	**Market Share**
All Non-Exchange	30.2	NYSE and NYSE Arca	38.0
NASDAQ	29.1	NASDAQ	29.1
NYSE	22.6	NASD ADF	17.3
NYSE Arca	15.4	NASDAQ TRF	9.4
American Stock Exchange	0.8	NYSE TRF	2.1
International Stock Exchange	0.7	National Stock Exchange TRF	1.4
National Stock Exchange	0.6	American Stock Exchange	0.8
Chicago Stock Exchange	0.5	International Stock Exchange	0.7
CBOE Exchange	0.2	National Stock Exchange	0.6
Philadelphia Stock Exchange	0.1	Chicago Stock Exchange	0.5
		CBOE Exchange	0.2
		Philadelphia Stock Exchange	0.1

Sources:
[1] SEC Draft Order, Table 1, Page 49.
[2] Exchange Volume Summary Query (Dec 01, 2007 - Dec 31, 2007; All Stocks) at http://www.arcavision.com/.

Table 7

Concentration of Liquidity

This table shows the concentration of liquidity for three NASDAQ-listed stocks and three NYSE-listed stocks on March 10, 2008. Liquidity concentration on the bid side is measured as the total cumulative depth down to each stock's low price of the day. Liquidity concentration on the ask side is measured as the total cumulative depth up to each stock's high price of the day. The reported percentages reflect averages across three different snapshots taken throughout the trading day – 9:40:00AM, 12:00:00PM, and 3:40:00PM. The percentages reflect the concentration of liquidity among our three sources of depth-of-book data only and, therefore, do not necessarily reflect the overall concentration of liquidity among all books. Row percentages may not sum to exactly 100.0% due to rounding.

Panel A: Cumulative Depth on the Bid Side

NASDAQ-Listed Securities		
	NASDAQ	**NYSE**
AAPL	79.0%	21.0%
GOOG	75.7%	24.3%
MSFT	72.3%	27.7%
Average	75.6%	24.4%

NYSE-Listed Securities		
	NASDAQ	**NYSE**
C	33.3%	66.70%
GE	28.6%	71.40%
XOM	18.8%	81.10%
Average	26.9%	73.10%

NYSE includes NYSE Arca.

Table 7

Concentration of Liquidity
(continued)

This table shows the concentration of liquidity for three NASDAQ-listed stocks and three NYSE-listed stocks on March 10, 2008. Liquidity concentration on the bid side is measured as the total cumulative depth down to each stock's low price of the day. Liquidity concentration on the ask side is measured as the total cumulative depth up to each stock's high price of the day. The reported percentages reflect averages across three different snapshots taken throughout the trading day – 9:40:00AM, 12:00:00PM, and 3:40:00PM. The percentages reflect the concentration of liquidity among our three sources of depth-of-book data only and, therefore, do not necessarily reflect the overall concentration of liquidity among all books. Row percentages may not sum to exactly 100.0% due to rounding.

Panel B: Cumulative Depth on the Ask Side

NASDAQ-Listed Securities		
	NASDAQ	**NYSE**
AAPL	82.0%	18.0%
GOOG	80.0%	20.0%
MSFT	75.2%	24.8%
Average	79.1%	20.9%

NYSE-Listed Securities		
	NASDAQ	**NYSE**
C	24.0%	76.0%
GE	18.0%	82.0%
XOM	20.5%	79.5%
Average	20.8%	79.2%

NYSE includes NYSE Arca.

Table 7

Concentration of Liquidity
(continued)

This table shows the concentration of liquidity for three NASDAQ-listed stocks and three NYSE-listed stocks on March 10, 2008. Liquidity concentration on the bid side is measured as the total cumulative depth down to each stock's low price of the day. Liquidity concentration on the ask side is measured as the total cumulative depth up to each stock's high price of the day. The reported percentages reflect averages across three different snapshots taken throughout the trading day – 9:40:00AM, 12:00:00PM, and 3:40:00PM. The percentages reflect the concentration of liquidity among our three sources of depth-of-book data only and, therefore, do not necessarily reflect the overall concentration of liquidity among all books. Row percentages may not sum to exactly 100.0% due to rounding.

Panel C: Cumulative Depth on Both Sides

NASDAQ-Listed Securities		
	NASDAQ	**NYSE**
AAPL	81.4%	18.6%
GOOG	77.9%	22.1%
MSFT	73.5%	26.5%
Average	77.6%	22.4%

NYSE-Listed Securities		
	NASDAQ	**NYSE**
C	32.4%	67.6%
GE	25.3%	74.8%
XOM	20.5%	79.5%
Average	26.1%	74.0%

NYSE includes NYSE Arca.

Table 7

Concentration of Liquidity
(continued)

This table shows estimates of average concentration of liquidity for NASDAQ-listed stocks and NYSE-listed stocks. NASDAQ and NYSE estimates reflect the averages of the cumulative depths on both sides (Panel C) proportionally adjusted for BATS ECN and Direct Edge ECN estimates. BATS ECN and Direct Edge ECN estimates are based on statistics reported in the SEC Draft Order, Pages 47-48. Row percentages may not sum to exactly 100.0% due to rounding.

Panel D: Estimated Liquidity Concentration Including BATS ECN and Direct Edge ECN

	NASDAQ	NYSE	BATS	Direct Edge
NASDAQ-Listed Stocks	66.1%	19.1%	7.9%	6.9%
NYSE-Listed Stocks	24.0%	68.0%	5.1%	3.0%

NYSE includes NYSE Arca.

Table 8

Retail Order Sizes

This table presents summary statistics related to retail orders. It also compares retail orders sizes to NBBO sizes. The data was provided by a leading online retail broker for a single trading day in May 2008. The numbers in the table reflect market orders and marketable limit orders submitted between 9:30:00 AM and 4:00:00 PM. The size of a buy order is compared to the size of the NBBO ask (offer) at the time the order was submitted. The size of a sell order is compared to the size of the NBBO bid.

Panel A: Summary Statistics for Retail Orders

Order Type	Number of Orders	Order Size (shares)	
		Median	Average
Market Orders	27,167	250	745
Marketable Limit Orders	7,353	500	1,820
Market and Marketable Limit Orders	34,520	300	974

Panel B: Retail Order Sizes Compared to NBBO Sizes

Order Type	Percent of Orders Encountering:		
	Sufficient NBBO Size		Insufficient NBBO Size
	Order Size < *NBBO Size*	*Order Size* = *NBBO Size*	*Order Size* > *NBBO Size*
Market Orders	59.5%	6.8%	33.7%
Marketable Limit Orders	47.6%	6.5%	45.9%
Market and Marketable Limit Orders	57.0%	6.7%	36.3%

Table 9

Depth-of-Book Data Fees

This table contains reported fees and proposed fees for depth-of market data. The reported fees in Panel A are monthly professional subscriber fees per display device as reported on NYXdata.com and NASDAQTrader.com on May 1, 2008. The reported $76 fee for NASDAQ TotalView is the combined monthly professional subscriber fee for NASDAQ TotalView ($70) and NASDAQ OpenView ($6). NASDAQ TotalView subscribers "must pay both TotalView and OpenView usage fees." (http://www.nasdaqtrader.com/Trader.aspx?id=PriceListData). The proposed fees in Panel B are the proposed monthly professional subscriber fees as reported in the SEC Draft Order.

Panel A: Reported Fees

Provider	Product	Securities Coverage	Fee
NASDAQ	TotalView	NASDAQ	$76
NASDAQ	OpenView	NYSE AMEX	$6
NYSE	OpenBook	NYSE	$60

Panel B: Proposed Fees

Provider	Product	Securities Coverage	Fee
NYSE	ArcaBook	CTA Plan and ETF	$15
		NASDAQ UTP Plan	$15

Exhibit 1

NASDAQ TotalView

Product Support Fact Sheet

For Professional Traders

TOTALVIEW

The Best View of NASDAQ on The Street

A wider window on the market

Upgrade to NASDAQ TotalView®, and see the full depth of the market at every price level in NASDAQ-, NYSE-, Amex- and regional-listed securities on NASDAQ®. With TotalView, you see quotes and orders not visible in the legacy Level 2 display. In fact, TotalView provides you with all of the best bids and offers that you see in Level 2, plus more. More than 20 times more.

That's because TotalView displays more than 20 times the liquidity of Level 2 and three times the liquidity within five cents of the inside market. Can you really afford to trade with anything less than TotalView?

The next level

To take full advantage of trading in NASDAQ, you need more than legacy Level 2 information. TotalView traders have an advantage because they can see the maximum amount of information available. This detailed depth helps traders to:

- Follow pockets of liquidity over time
- Better understand how orders are distributed throughout the market
- Identify new trading opportunities
- Pursue unique trading strategies

SAMPLE LEVEL 2 DISPLAY

SYMBOL	AMAT	Applied Materials (NGS)			
LAST SALE	20.15 q	NASDAQ Bid Tick (+)			
NATIONAL BBO	20.15 q	20.16 q	6900 x 3000		
MPID	**Bid**	**Size**	**MPID**	**Ask**	**Size**
NSDQ	20.15	3000	NSDQ	20.16	2000
ARCX	20.15	2600	ARCX	20.16	1900
BEST	20.15	1500	TDCM	20.16	1000
NITE	20.15	1400	OPCO	20.17	2100
CINN	20.15	1200	BARD	20.17	1000
BOFA	20.15	1000	CLYP	20.18	2000
AUTO	20.14	5000	SCHB	20.18	1500
LEHM	20.14	1000	NITE	20.18	1100
ABLE	20.14	1000	DAIN	20.18	100
SCHB	20.14	500	TEJS	20.18	100
GSCO	20.14	100	GSCO	20.18	100
RAJA	20.12	1200	MSCO	20.19	1500
TDCM	20.12	1000	JPMS	20.19	100
MONR	20.12	1000	BEST	20.20	1200
SWST	20.12	1000	NFSC	20.20	1000
NORT	20.12	400	FBRC	20.20	800
JPMS	20.12	100	FACT	20.20	100
PERT	20.11	800	UBSW	20.21	1100
PIPR	20.11	100	GSCO	20.21	1000
PRUS	20.10	500	FBCO	20.21	100
FBCO	20.09	1400	LEHM	20.21	100
COWN	20.09	800	RHCO	20.21	100
HDSN	20.09	400	WCHV	20.22	1200
UBSW	20.09	400	GLBT	20.22	1000

Data highlighted in black is unique to TotalView.

SAMPLE TOTALVIEW DISPLAY

SYMBOL	AMAT	Applied Materials (NGS)			
LAST SALE	20.15 q	NASDAQ Bid Tick (+)			
NATIONAL BBO	20.15 q	20.16 q	6900 x 3000		
Bid Price	**Total Depth**		**Ask Price**	**Total Depth**	
20.15	10700		20.16	4900	
20.14	56100		20.17	9100	
20.13	26300		20.18	13400	
20.12	9900		20.19	11200	
20.11	1700		20.20	8700	
MPID	**Bid**	**Size**	**MPID**	**Ask**	**Size**
NSDQ	20.15	3000	NSDQ	20.16	2000
ARCX	20.15	2600	ARCX	20.16	1900
BEST	20.15	1500	TDCM	20.16	1000
NITE	20.15	1400	NSDQ	20.17	6000
CINN	20.15	1200	OPCO	20.17	2100
BOFA	20.15	1000	BARD	20.17	1000
NSDQ	20.14	28500	NSDQ	20.18	5000
BEST	20.14	12500	OPCO	20.18	2500
NITE	20.14	7500	CLYP	20.18	2000
AUTO	20.14	5000	SCHB	20.18	1500
LEHM	20.14	1000	NITE	20.18	1100
ABLE	20.14	1000	TDCM	20.18	1000
SCHB	20.14	500	DAIN	20.18	100
GSCO	20.14	100	TEJS	20.18	100
NSDQ	20.13	10000	GSCO	20.18	100
GSCO	20.13	8800	NSDQ	20.19	5500
SCHB	20.13	7500	NITE	20.19	3000
NSDQ	20.12	2200	MSCO	20.19	1500
BEST	20.12	2000	OPCO	20.19	1000
RAJA	20.12	1200	JPMS	20.19	100
LEHM	20.12	1000	SCHB	20.19	100
TDCM	20.12	1000	BARD	20.20	4000
MONR	20.12	1000	BEST	20.20	1200
SWST	20.12	1000	NFSC	20.20	1000
NORT	20.12	400	NSDQ	20.20	1000
JPMS	20.12	100	FBRC	20.20	800
PERT	20.11	800	SCHB	20.20	500
GSCO	20.11	500	NITE	20.20	100
LEHM	20.11	100	FACT	20.20	100
NSDQ	20.11	100	UBSW	20.21	1100
NORT	20.11	100	GSCO	20.21	1000
PIPR	20.11	100	NITE	20.21	1000
NSDQ	20.10	13500	NSDQ	20.21	500
SCHB	20.10	3500	TDCM	20.21	100
TDCM	20.10	2000	FBCO	20.21	100
PRUS	20.10	500	LEHM	20.21	100
GSCO	20.10	100	RHCO	20.21	100
NSDQ	20.09	2500	LEHM	20.22	5000
RAJA	20.09	2200	WCHV	20.22	1200
FBCO	20.09	1400	GLBT	20.22	1000
MONR	20.09	1000	NSDQ	20.22	500
NITE	20.09	1000	FBRC	20.22	500
COWN	20.09	800	DAIN	20.22	100
HDSN	20.09	400	NITE	20.22	100
UBSW	20.09	400	BEST	20.22	100

These displays are only a sample of NASDAQ data displayed by market data distributors. Each distributor has its own proprietary display of NASDAQ market data, which may include detailed depth data, aggregated depth data or both. Please contact NASDAQ or your distributor for more information about the display of NASDAQ data.

TotalView is the best view of NASDAQ

TotalView presents you with:

- All displayed quotes and orders attributed to specific market participants
- Total displayed anonymous interest
- Total size of all displayed quotes and orders
- Net order imbalance information for the NASDAQ Opening and Closing Crosses[SM] as well as for the IPO and Halt Crosses

Opening and closing order imbalance information

TotalView is the only data feed that features Net Order Imbalance information for NASDAQ's Opening and Closing Crosses as well as for the IPO and Halt Crosses. The Net Order Imbalance information provides invaluable details about opening and closing orders and the likely Opening/Closing prices. This insight can help reveal new trading opportunities and also allow traders to maintain their positions by more accurately gauging the true buy and sell interest in securities going into the open, the close, an IPO or in securities coming out of a halt.

Data elements include:

Imbalance Shares and Side: The number of eligible shares that would remain unexecuted at the current reference price and the side of the imbalance. B = buy-side imbalance; S = sell-side imbalance; N = no imbalance; O = no marketable on-open (or on-close) orders in NASDAQ

Current Reference Price: The reference price upon which the paired shares and the imbalance quantity are based. The price is calculated at or within the NASDAQ Inside[SM].

Near Indicative Clearing Price: The clearing price at which the opening (or closing) book would clear against orders in the opening (or closing) book and the NASDAQ continuous market.

Far Indicative Clearing Price: The clearing price at which the opening (or closing) book would clear against orders only in the opening (or closing) book.

How to order NASDAQ TotalView

Contact one of the following market data distributors, or ask your vendor.

3DStockCharts.com, Inc.
ACTIV Financial
ADVFN
AlphaTrade
Assent, LLC
Banc of America Securities
Bear, Stearns & Co.
Biremis [Swifttrade]
Bloomberg
BNY Brokerage
BT Radianz
ComStock
CyberTrader
eSignal
Essex Radez
E*TRADE FINANCIAL
FlexTrade
Genesis Securities
HydraTrade
Instinet, LLC
Interactive Data Real-Time Services, Inc.
Lava Trading
Lehman Brothers
Lightspeed Trading
LowTrades
ML X-TRADE
Money.net
Moneyline Telerate
NeoVest
Nexa Technologies
Quantum5
RealTick
REDIPlus
Reuters-Bridge
Revere Data, LLC
royal**blue** Fidessa
RushTrade Technologies
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* Cost is per terminal, per month. TotalView fees include access to Level 2 data but exclude access to NASDAQ Level 1 data. Level 1 data is billed separately at an additional charge of $20 per month for professional users.

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Inside Market Data | Awards 2007 Winner

NASDAQ OMX[SM]

Exhibit 2

NASDAQ TotalView

Product Support Fact Sheet

For Non-Professional Traders

TOTALVIEW

The Best View of NASDAQ

NASDAQ TotalView® gives you the best view of the NASDAQ® market that's available today — the same view that The Street sees.

A deeper view of the market

NASDAQ TotalView is the standard-setting data feed for serious traders, presenting you with every single quote and order at every price level for all NASDAQ-, NYSE-, Amex- and regional-listed securities in NASDAQ. Now, you can see what The Street sees. With TotalView, you have access to all of the depth available for immediate execution in NASDAQ.

Indispensable information

TotalView provides all the best bids and offers from NASDAQ market participants that you see in Level 2, plus more. More than 20 times more.

TotalView displays more than 20 times the liquidity of Level 2 and three times the liquidity within five cents of the inside market. Can you really afford to trade with anything less than TotalView?

SAMPLE LEVEL 2 DISPLAY

SYMBOL	AMAT	Applied Materials (NGS)	
LAST SALE	20.15 q	NASDAQ Bid Tick (+)	
NATIONAL BBO	20.15 q	20.16 q	6900 x 3000

MPID	Bid	Size	MPID	Ask	Size
NSDQ	20.15	3000	NSDQ	20.16	2000
ARCX	20.15	2600	ARCX	20.16	1900
BEST	20.15	1500	TDCM	20.16	1000
NITE	20.15	1400	OPCO	20.17	2100
CINN	20.15	1200	BARD	20.17	1000
BOFA	20.15	1000	CLYP	20.18	2000
AUTO	20.14	5000	SCHB	20.18	1500
LEHM	20.14	1000	NITE	20.18	1100
ABLE	20.14	1000	DAIN	20.18	100
SCHB	20.14	500	TEJS	20.18	100
GSCO	20.14	100	GSCO	20.18	100
RAJA	20.12	1200	MSCO	20.19	1500
TDCM	20.12	1000	JPMS	20.19	100
MONR	20.12	1000	BEST	20.20	1200
SWST	20.12	1000	NFSC	20.20	1000
NORT	20.12	400	FBRC	20.20	800
JPMS	20.12	100	FACT	20.20	100
PERT	20.11	800	UBSW	20.21	1100
PIPR	20.11	100	GSCO	20.21	1000
PRUS	20.10	500	FBCO	20.21	100
FBCO	20.09	1400	LEHM	20.21	100
COWN	20.09	800	RHCO	20.21	100
HDSN	20.09	400	WCHV	20.22	1200
UBSW	20.09	400	GLBT	20.22	1000

Data highlighted in black is unique to TotalView.

SAMPLE TOTALVIEW DISPLAY

SYMBOL	AMAT	Applied Materials (NGS)	
LAST SALE	20.15 q	NASDAQ Bid Tick (+)	
NATIONAL BBO	20.15 q	20.16 q	6900 x 3000

Bid Price	Total Depth	Ask Price	Total Depth
20.15	10700	20.16	4900
20.14	56100	20.17	9100
20.13	26300	20.18	13400
20.12	9900	20.19	11200
20.11	1700	20.20	8700

MPID	Bid	Size	MPID	Ask	Size
NSDQ	20.15	3000	NSDQ	20.16	2000
ARCX	20.15	2600	ARCX	20.16	1900
BEST	20.15	1500	TDCM	20.16	1000
NITE	20.15	1400	NSDQ	20.17	6000
CINN	20.15	1200	OPCO	20.17	2100
BOFA	20.15	1000	BARD	20.17	1000
NSDQ	20.14	28500	NSDQ	20.18	5000
BEST	20.14	12500	OPCO	20.18	2500
NITE	20.14	7500	CLYP	20.18	2000
AUTO	20.14	5000	SCHB	20.18	1500
LEHM	20.14	1000	NITE	20.18	1100
ABLE	20.14	1000	TDCM	20.18	1000
SCHB	20.14	500	DAIN	20.18	100
GSCO	20.14	100	TEJS	20.18	100
NSDQ	20.13	10000	GSCO	20.18	100
GSCO	20.13	8800	NSDQ	20.19	5500
SCHB	20.13	7500	NITE	20.19	3000
NSDQ	20.12	2200	MSCO	20.19	1500
BEST	20.12	2000	OPCO	20.19	1000
RAJA	20.12	1200	JPMS	20.19	100
LEHM	20.12	1000	SCHB	20.19	100
TDCM	20.12	1000	BARD	20.20	4000
MONR	20.12	1000	BEST	20.20	1200
SWST	20.12	1000	NFSC	20.20	1000
NORT	20.12	400	NSDQ	20.20	1000
JPMS	20.12	100	FBRC	20.20	800
PERT	20.11	800	SCHB	20.20	500
GSCO	20.11	500	NITE	20.20	100
LEHM	20.11	100	FACT	20.20	100
NSDQ	20.11	100	UBSW	20.21	1100
NORT	20.11	100	GSCO	20.21	1000
PIPR	20.11	100	NITE	20.21	1000
NSDQ	20.10	13500	NSDQ	20.21	500
SCHB	20.10	3500	TDCM	20.21	100
TDCM	20.10	2000	FBCO	20.21	100
PRUS	20.10	500	LEHM	20.21	100
GSCO	20.10	100	RHCO	20.21	100
NSDQ	20.09	2500	LEHM	20.22	5000
RAJA	20.09	2200	WCHV	20.22	1200
FBCO	20.09	1400	GLBT	20.22	1000
MONR	20.09	1000	NSDQ	20.22	500
NITE	20.09	1000	FBRC	20.22	500
COWN	20.09	800	DAIN	20.22	100
HDSN	20.09	400	NITE	20.22	100
UBSW	20.09	400	BEST	20.22	100

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Information is power

When you don't know the true depth of the market, you miss the opportunity to see when to get in and out of a stock. The more you know about underlying price pressure on a stock, the more trading strategies become visible to you, and the more confidence you'll have in those strategies. There are many examples of how trading with TotalView reveals more profit opportunities than trading with just Level 2. Here is an example using real data from TotalView:

Two traders — one using Level 2 and one using TotalView — suspect Tellabs, Inc. (TLAB) might be headed up sharply. They are trying to decide whether to go long up to 1,000 shares by looking for buy-side pressure in the market. At 12:06 p.m., Eastern Time (ET), the inside quote for TLAB is:
bid 7.76 **ask** 7.77 **size** 12,400 x 5,900.

The TotalView trader has an advantage over the Level 2 trader — he can see almost four times the liquidity available for immediate execution within three cents of the inside. In particular, he can see large pockets of extra depth at the second, third and fourth price levels that aren't visible in Level 2. Knowing there is significant price pressure on the bid, he buys 800 shares. On the other hand, the Level 2 trader doesn't see the buy-side pressure because Level 2 displays only modest depth at the second, third and fourth price levels. As a result, he doesn't anticipate a run-up in price and doesn't place a buy order.

Over the next several hours, there is a run-up in the TLAB stock price. At 2:54 p.m., ET, the stock is trading at:
bid 8.02 **ask** 8.03 **size** 4,500 x 3,000.

Bottom line: Without the information TotalView provides, the Level 2 trader misses a valuable profit opportunity. The TotalView trader sells his 800 shares for a tidy profit of $200. A profit made possible only with TotalView.

Opening and closing order imbalance information

TotalView is the only data feed that features Net Order Imbalance information for NASDAQ's Opening and Closing Crosses as well as for the IPO and Halt Crosses. The Net Order Imbalance information provides invaluable details about opening and closing orders and the likely Opening/Closing prices. This insight can help reveal new trading oppertunities and also allow traders to maintain their positions by more accurately gauging the true buy and sell interest in securities going into the open, the close or an IPO or in securities coming out of a halt.

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