



September 18, 2019

Via Electronic Mail (rule-comments@sec.gov)

Ms. Vanessa Countryman
Acting Secretary
U.S. Securities and Exchange Commission
100 F Street NE., Washington, DC 20549

Re: ***File No. 4-729: SIFMA Comment Letter on Improvements to the Market Data Structure***

Dear Ms. Countryman:

The Securities Industry and Financial Markets Association (“SIFMA”)¹ submits this letter to provide recommendations for the U.S. Securities and Exchange Commission (“Commission”) to improve the current market data system. SIFMA has been extremely active in market data issues for more than a decade by advocating for market data reforms to ensure greater transparency in operations and more reasonable fees. In this area, we have advocated mainly on two fronts: first, the need to reform fees for exchanges’ market data products; and second, the need to address the quality and operation of the Securities Information Processors (“SIPs”). Our recommendations below focus on improving the infrastructure and governance of market data products and fees. In addition, we provide comment rebutting the use of platform theory to demonstrate competitive forces in the sale of market data. Separately, and along with ICI, MFA and CII, we have petitioned the Commission to improve the transparency of market data products and fees.²

I. SIFMA’s Recommendations for Content and Infrastructure Changes to the SIPs

SIFMA recommends that the Commission mandate SIP infrastructure improvements to enhance content and reduce latency. These changes should be made with a view toward making

¹ SIFMA is the leading trade association for broker-dealers, investment banks and asset managers operating in the U.S. and global capital markets. On behalf of our industry’s nearly 1 million employees, we advocate for legislation, regulation and business policy, affecting retail and institutional investors, equity and fixed income markets and related products and services. We serve as an industry coordinating body to promote fair and orderly markets, informed regulatory compliance, and efficient market operations and resiliency. We also provide a forum for industry policy and professional development. SIFMA, with offices in New York and Washington, D.C., is the U.S. regional member of the Global Financial Markets Association (GFMA). For more information, visit <http://www.sifma.org>.

² Petition for Transparency of Funding of Consolidated Market Data from T.R. Lazo, SIFMA; Susan M. Olson, ICI; Jennifer Han, MFA; and Ken Bertsch, CII dated September 17, 2019.

the SIP feeds more useful for a broader spectrum of users, while understanding that, for many users, the SIPs may never be a complete alternative to the exchanges' proprietary feeds. In our view, these recommendations to address latency and include additional core information would allow a larger subset of market participants to use the SIP for certain of their businesses where they currently see no alternative to using exchange proprietary data.

a. *Content: Additional Information on the SIP*

The Commission should amend the definition of core data to include auction imbalance information and depth-of-book data in the SIPs. The additions would alleviate some of the discrepancies in content between the SIP and proprietary feeds. Our members generally have indicated that adding auction imbalance information³ to the SIP should not materially increase the operating costs of the SIPs. On the other hand, adding depth-of-book information to the SIPs would put a substantial amount of additional data into the processors and could materially increase the operating costs of the SIPs. We recommend adding at least five levels of depth to the SIPs.⁴ In adding any depth of book data to the SIPs, the Commission should balance the need for more comprehensive information with the additional cost and potential increase in latency from including additional quotes, as well as adjust the SIP subscriber fee model to account for firms that do not need depth of book data.

b. *Content: Changes to Odd Lots*

The Commission should consider re-defining protected round lots for select high-priced stocks (*e.g., Apple, Google, Berkshire-Hathaway*). High-priced stocks typically trade in odd-lots and redefining the round-lot for these few high-priced securities may reduce the immediate need of including odd-lots on the SIP. For example, as of July 15, 2019, there are 21 securities priced above \$400, and five above \$1,000, that have three-month average trading volumes above 50,000 shares per day. We recommend that the Commission engage in proposed rulemaking subject to notice and comment, in which it could gather data and determine whether adjusting the round-lot size would minimize trading costs and maximize the experience for retail investors trading these high-priced stocks. The Commission also should consider whether adjusting the round-lot size for penny stocks provides similar benefits. The listing exchanges have their own authority to change the round lot size for individual securities,⁵ and we recommend that the Commission work with the listing exchanges to create a second level of round lot sizes for these

³ At minimum, auction imbalance information shall include matched quantity, imbalance size, near price, far price, paired shares and imbalance shares.

⁴ SIFMA members that are retail firms generally use one level of depth for order routing. SIFMA members that are institutional firms generally use up to five levels of depth, and sometimes as much as ten.

⁵ See *e.g.*, NYSE Rule 55 and Nasdaq Listing Rule 5005(a)(38).

relatively few high-priced securities, either through the exchanges' existing authority or through another means.

In addition, the Commission should consider adjusting the definition of core data to include odd-lot information, following a rulemaking proposal that is published for notice and comment, in which the Commission could gather data and determine whether odd-lots are valuable for price discovery for all securities. If the Commission determines that odd-lots should be published by the SIPs, the Commission should take into account that odd-lots are not protected quotations under the order protection rule and provide guidance on applicable regulatory requirements, including best execution and calculation of the NBBO.

c. Reduce the Latency Between the SIP and Proprietary Feeds

The Commission should direct the SIPs to continue narrowing the latency gap with proprietary feeds. To help reduce the latency gap between the SIP and proprietary feeds for the least cost, the Commission could work with the exchanges to create a single SIP (tapes A, B, and C or single tape) operated and administrated by one processor that is not an exchange or market participant, and that would provide the best consolidated feed possible at the lowest cost. Geographical latency could also be addressed through distributed SIPs (*i.e.*, SIPs located in each of the three main data centers).

Ultimately, latency issues would be best addressed through competing consolidators for the SIPs, creating a competitive market will incentivize improvements to the consolidated feeds. The Commission could promote competition by allowing a third party to create a competing consolidator or requiring NYSE and Nasdaq to run both the UTP and CTA in competition with one another. Introducing competition between SIPs would benefit investors by narrowing the performance gap with proprietary feeds, encouraging resilience by having alternate sources of consolidated sources, and reducing the cost of market data through competition. SIFMA has previously submitted a proposal for competing market data aggregators.⁶

II. SIFMA's Recommendations for Governance Changes

The Commission should direct the Self-Regulatory Organizations ("SROs") to make governance changes to the SIP NMS Plans to include voting representation by non-SRO industry participants, including both sell-side and buy-side representatives. The current governance of the SIPs by the SROs creates irreconcilable conflicts of interest with the SROs exclusively controlling the SIPs while selling their own proprietary data products. Not only does this structure prevent market participants whose businesses heavily rely on the SIP from providing

⁶ Letter from Melissa MacGregor and T.R. Lazo, SIFMA to Brent J. Fields, dated Oct. 24, 2018 *available at* <https://www.sec.gov/comments/4-729/4729-4559181-176197.pdf>.

meaningful input, but it also impedes the SIP from competing with the exchanges' proprietary data feeds.

a. *Providing Industry with Voting Representatives*

Industry representatives should collectively have 50% of the total voting power on the SIP NMS Plans with the SROs collectively controlling the other 50%. The SIP Operating Committees should provide equal voting rights to industry representatives from the following groups: (1) institutional broker-dealers; (2) retail broker-dealers; (3) buy-side firms; (4) data vendors; (5) alternative trading systems; and (6) an individual with significant and reputable regulatory expertise. Industry members on the SIP Operating Committees should be true industry representatives selected and appointed by committees, or relevant trade organizations, of industry segment members. Industry representatives would be responsible for coordinating with the constituents they represent and would be permitted to share relevant information with their constituent groups. Every two to four years, the current SIP committee would nominate persons to replace the industry representatives who will be elected by the firms eligible to vote for that market participant category.

In the same way that Section 6(b)(3) of the Exchange Act requires the rules of an exchange to "assure a fair representation of its members in the selection of its directors and administration of its affairs," the Commission should require industry participation in the governance of NMS Plans as proposed above. FINRA is subject to a similar requirement under 15A(b)(4). The "fair representation" board members serve without subjecting their firms to additional regulatory liability. For purposes of the Exchange Act, industry representatives on NMS Plans could be deemed "directors of exchanges." As such, the industry representatives would be subject to the jurisdiction of the Commission on the same terms as the exchange representatives. In particular, industry representatives would be subject to Section 19(h) of the Exchange Act, which provides that the Commission may, for example, "remove from office or censure any person who is, or at the time of the alleged misconduct was, an officer or director of such self-regulatory organization." These types of provisions in NMS Plans would address the concerns that industry representatives on NMS Plans could use their position to manipulate board decisions or otherwise impede the operation of the NMS Plans.

b. *The SROs' Voting Power*

We recommend that the SROs collectively have 50% of the voting power on the SIP NMS Plans. The SRO group's 50% voting control should be allocated evenly among FINRA and each exchange parent group rather than a vote per exchange license. The Commission could allocate a larger than equal proportion to exchange parent groups with consolidated market share over 10%. Unlike the industry representatives group, the number of SROs fluctuates with new entrants, departures or consolidation. To prevent any one SRO parent group from accumulating outsized influence, the Commission could cap the voting control permissible for any single SRO

parent group. We recommend each exchange parent group only nominate one representative, but if the SRO parent group nominates more representatives, each industry representative group should be permitted to nominate the same number. Like the industry representatives, the exchange groups' representative should change every two to four years.

III. Use of Platform Theory

Exchanges have argued at times that the platform theory of competition can be used to show a competitive market for market data services, insisting that competition for order flow constrains the *overall* return they earn from trading and market data. However, as demonstrated by our previous academic study, which is attached to this letter,⁷ multi-product firms typically charge more for products with inelastic demand—as a result of having fewer substitutes and less competition—and recover more of their fixed and common costs from products with inelastic demand. In addition, regulatory and business considerations constrain traders' ability to shift order flow based on market-data fees, and directing orders to a different exchange does not save the trader the costs of purchasing market data from the first exchange if the trader needs that exchange's market data to optimize trading decisions.

Even if the Commission decides to evaluate exchanges' market data products in connection with its trading services under the platform theory,⁸ then exchanges should be required to demonstrate that the aggregate return remains reasonable. Of course, exchanges also must always show that their prices for market data, especially if they are disproportionately high, satisfy the applicable standards under the Exchange Act of being reasonable and equitably allocated.

III. Conclusion

As demonstrated above, the existing market data structure has led to less reliable SIPs. To address these concerns, we recommend the Commission adopt changes to the infrastructure, governance and transparency of market data. In addition, we disagree with the use of platform theory to show competitive forces in the market for market data services.

* * *

⁷ Expert Report of Dr. David S. Evans, In the Matter of the Application of SIFMA For Review of Actions Taken by SROs, Administrative Proceeding File 3-15350, 8 – 9 (Mar. 6, 2015).

⁸ See Commission's Division of Trading and Markets, *Staff Guidance on SRO Rule Filings Relating to Fees* ("Staff Guidance") (May 21, 2019).

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SIFMA greatly appreciates the Commission's consideration of the issues raised above and would be pleased to discuss these comments in greater detail. If you have any questions or need any additional information, please contact me at 202-962-7383 or tlazo@sifma.org.

Sincerely,



Theodore R. Lazo
Managing Director and
Associate General Counsel

cc: The Honorable Jay Clayton, Chairman
The Honorable Robert J. Jackson, Jr., Commissioner
The Honorable Hester M. Peirce, Commissioner
The Honorable Elad L. Roisman, Commissioner
The Honorable Allison Herren Lee, Commissioner

Brett Redfearn, Director, Division of Trading & Markets
David S. Shillman, Associate Director, Division of Trading & Markets

REDACTED VERSION

**Before the
Securities and Exchange Commission**

**In the Matter of the Application of
Securities Industry and Financial Markets Association
For Review of Actions Taken by Self-Regulatory Organizations
Administrative Proceeding File No. 3-15350**

Expert Report of Dr. David S. Evans

March 6, 2015

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I. Introduction and Summary

1. My name is David S. Evans. I am the Chairman of the Global Economics Group. I have a Ph.D. degree in economics from the University of Chicago. I have taught antitrust economics for more than 25 years and have authored 5 major books and more than 100 professional articles. My curriculum vitae, which sets forth my qualifications, is included in Attachment 2.¹ I have previously submitted reports to the SEC related to the pricing of depth-of-book data.² I continue to stand by those reports.

2. Counsel for SIFMA asked me to evaluate whether the two stock exchanges—NYSE Arca and NASDAQ (“Exchanges”)—are subject to significant competitive forces in setting their fees for depth-of-book data products and to analyze and respond to the economic opinions and analyses of Professors Hendershott and Nevo on behalf of NYSE Arca and Professor Ordover on behalf of NASDAQ set forth in their January 26, 2015 reports (“Exchanges’ Reports”).

3. Based on my economic analysis and review of the evidence I find that NYSE Arca and NASDAQ are not subject to significant competitive constraints in setting their fees for depth-of-book data products. I further find that the data that Professors Hendershott, Nevo, and Ordover present is consistent with the Exchanges’ setting fees for their depth-of-book data products at levels that reflect their exercise of significant market power.³

A. Background

4. This matter involves rule changes by the Exchanges that impose fees for certain of their proprietary market data products. The rule change by NYSE Arca, which originally took effect in January 2009 and was re-filed in November 2010, imposed fees for its ArcaBook product. NYSE

¹ Also included in Attachment 2 are a list of all cases in which I have testified as an expert since 2002, a list of documents relied on for my report, and my prior reports regarding depth-of-book data pricing.

² David S. Evans, “An Economic Assessment of Whether ‘Significant Competitive Forces’ Constrain an Exchange’s Pricing of Its Depth-of-Book Market Data,” July 10, 2008 (“Evans Report I”); David S. Evans, “Response to Ordover And Bamberger’s Statement Regarding The SEC’s Proposed Order Concerning The Pricing of Depth-of-Book Market Data,” October 10, 2008 (“Evans Report II”); David S. Evans, “Response to Ordover and Bamberger’s Statement Regarding NASDAQ’s Proposed Rule Change Concerning The Pricing of Depth-of-Book Market Data,” March 21, 2011 (“Evans Report III”).

³ I reserve the right to supplement this report, as permitted by the Chief ALJ, to respond to any additional economic analysis and evidence presented by NYSE Arca and NASDAQ, including evidence presented at the hearing.

Arca and its predecessor, Archipelago Holdings, Inc., previously did not charge users for ArcaBook. The rule change increased the monthly fee for “professional users” from \$0 to \$30, for “non-professional users” from \$0 to \$10, and the monthly access fee from \$0 to \$750. The rule change by NASDAQ imposed distribution and access fees for its TotalView, OpenView, and Level 2 products—\$2,000 per month for the access fee, \$1,000 per month for the internal distributor fee, and \$2,500 per month for the external distributor fee.

5. Each Exchange offering includes depth-of-book data, a major type of “non-core data,”⁴ that show the limit orders placed on that Exchange to buy stocks at prices lower than, or to sell stocks at prices higher than, the best prices on an exchange. Depth-of-book data provide information on the liquidity available at prices inferior to the national best bid and offer (“NBBO”) price that is available through the consolidated feed. The ArcaBook and TotalView products also provide order-imbalance information, which is real-time data for auctions at the open and close. Finally, users can obtain the data (top-of-book or depth-of-book) through the Exchanges’ direct feeds faster than through the consolidated data feed.

B. Summary of Opinions

6. Based on my economic analysis and research, and review of the data presented by the Exchanges, I conclude that NYSE Arca and NASDAQ are not subject to significant competitive forces in setting their fees for depth-of-book data. Each has significant market power over its depth-of-book data products because each has exclusive control over the only source of information on the liquidity available on its exchange below the top of the book.⁵

7. Depth-of-book data reflecting limit orders on an exchange are available only from the exchange on which the orders are placed. One exchange’s depth-of-book data are not a substitute for another’s. For example, a trader who wants to buy more than the amount reflected in the top of book of an equity traded on either NYSE Arca or NASDAQ cannot determine whether that

⁴ “Non-core” data are data other than national best bid and offer and last sale data, which are known as “core” data.

⁵ Significant market power refers to the ability of a firm to charge prices significantly above the competitive level for a sustained period of time. Phillip E. Areeda and Herbert Hovenkamp, *Antitrust Law: An Analysis of Antitrust Principles and Their Application*, September 2014 Update, Wolters Kluwer (“Areeda-Hovenkamp (2014)”), ¶ 501.

quantity is available below the top of book, and at what price, on those exchanges without paying for and obtaining the particular exchange's depth-of-book data. Such traders comprise a significant portion of the demand for depth-of-book data.

8. The conclusion that exchanges' depth-of-book products are not substitutes for one another is confirmed by the material submitted by the Exchanges that shows the lack of substitution in fact. Professors Hendershott and Nevo report that the substantial price increase for ArcaBook in January 2009 resulted in [REDACTED] decrease in professional subscribers.⁶ Likewise, when NASDAQ evaluated the impact of its price increases for the five years prior to 2012, it concluded that customer attrition for TotalView was [REDACTED]. And my analysis of the customer dataset used by Professor Ordover shows that the proportion of revenue accounted for by customers who they claim can be viewed as switching between NASDAQ and NYSE Arca, following a massive price increase, was [REDACTED] from 2008 to 2014.

9. The economic analysis and data cited in the Exchanges' Reports do not show that the Exchanges are subject to significant competitive forces in setting their depth-of-book data fees. The D.C. Circuit correctly emphasized the importance of the "elasticity of demand" in determining whether buyers can substitute alternative products in the face of a price increase.⁷ The elasticity of demand measures the sensitivity of demand to prices, i.e., the extent to which consumers' purchasing decisions change in response to a change in price. A higher elasticity of demand generally reflects the availability of alternative products that consumers can substitute in response to a price increase.⁸

⁶ They conclude demand is "inelastic," which as I describe below shows the lack of substitutes. Terrence Hendershott and Aviv Nevo, "Statement Regarding the SEC's Proposed Order Concerning the Pricing of Depth-of-Book Market Data," January 26, 2015 ("Hendershott-Nevo Report"), ¶ 74.

⁷ *NetCoalition v. SEC*, 615 F.3d 525, 542 (D.C. Cir. 2010) ("*NetCoalition I*"). The elasticity of demand measures the percent change in purchases of a product as a result of a 1 percent change in its price (typically economists treat this as a positive number even though it is negative). A product that has more substitutes at a given price will have a higher elasticity of demand. See, e.g., Robert S. Pindyck and Daniel L. Rubinfeld (2012), *Microeconomics* 8th Edition, Prentice Hall ("*Pindyck and Rubinfeld (2012)*"), pp.126-127. I discuss this in more detail below.

⁸ The elasticity of demand is equal to the percent decrease in sales that would follow a 1 percent increase in price. An elasticity of demand of 0.5 indicates that a 1 percent increase in price would result in a 0.5 percent decrease in sales; an elasticity of demand of 2 indicates that a 1 percent increase in price would result in a 2 percent decrease in sales. The elasticity of demand in the sense I have defined here, and as used by the D.C. Circuit, is measured from

10. Other anecdotal material submitted by the Exchanges' economists also confirms that

[REDACTED]

. The fact that some buyers dropped depth-of-book data following price increases, or threatened to do so, is exactly what we would expect when a firm exercises market power. In fact, it is the hallmark of monopoly that a firm chooses to sacrifice sales to customers that place a low value on its product in order to charge higher prices to, and collect greater profits from, customers that place a high value on its product.⁹

11. The economists for the Exchanges claim incorrectly that competition between the exchanges for order flow will “constrain” the prices the exchanges charge for depth-of-book data.¹⁰ In fact, their economic analysis is consistent with the Exchanges' setting higher prices for depth-of-book data to compensate for lower profits on transactions precisely because they do face intense competition for order flow. A standard economic result is firms that sell multiple products will set higher prices on products that face competition from fewer substitutes and lower prices on products that face competition from more substitutes.

12. The economics of the exchange business indicate that it is likely that profits from high depth-of-book data fees are used to cross-subsidize other products and services, such as trade execution. To assess whether that is the case, it would be necessary to examine revenue and cost data for the exchanges, which the Exchanges' economists notably fail to analyze. Likewise, the

small deviations from a given price. The elasticity of demand will typically differ at different prices. Demand is said to be “inelastic” when the elasticity of demand is less than one, and “elastic” when it is greater than one. It is said to be more “elastic” the larger the elasticity of demand is. See Louis Kaplow and Carl Shapiro (2007), “Antitrust” in A. Mitchell Polinsky and Steven Shavell (eds.), *Handbook of Law and Economics*, Vol. 2, North-Holland (“Kaplow-Shapiro (2007)”), pp. 1090-1093.

⁹ Richard A. Posner (2001), *Antitrust Law*, 2nd edition, University of Chicago Press, p. 9; Areeda-Hovenkamp (2014), ¶ 501; *NetCoalition I*, 615 F.3d at 543.

¹⁰ As I discuss in more detail below, the Exchange economists use the term “constrain” in a technical mathematical sense which means “depends upon,” in the sense of a functional relationship, rather than “reduces” or “forces down,” which is how the term is typically used in antitrust analysis and how it otherwise is generally understood. Thus when Professors Hendershott and Nevo say that order-flow competition “constrains” depth-of-book data prices they apparently mean that depth-of-book data prices have a mathematical relationship to the demand for order flow; but as I show below that “constraint” could create profit incentives to make depth-of-book data fees higher.

economic literature on multi-product and multi-sided firms relies on the differences between prices and incremental costs to identify the contribution of various products to profits and to cover fixed costs and to determine the flow of cross-subsidies,¹¹ and it does so even if the firms and platforms have joint and fixed costs.¹² The Exchanges' economists are therefore wrong that it is inappropriate to examine cost data for assessing whether depth-of-book data are subject to significant competitive constraints. That is particularly so given that they have advanced a theory of competition in which depth-of-book data could subsidize other Exchange products. The available evidence from NASDAQ indicates that [REDACTED] and that NASDAQ believes it has relatively strong pricing power over market data products.¹³

II. Background for Economic Analysis

13. I now present the background on the economics of the issues in this matter that provides the foundation for my subsequent analysis. Section A summarizes my understanding of the statutory framework for assessing pricing for market data, describes the Congressional policy underlying that framework to ensure the wide availability of market data, and sets forth the sound economic reasons why exchanges should not be allowed to restrict the availability of depth-of-book data by exercising market power over it. In Section B, I describe the economics of exchanges and how the pricing of depth-of-book data relates to the pricing of other products provided by the exchanges. In Section C, I summarize my understanding of the "market-based" approach adopted by the SEC and its interpretation in light of the D.C. Circuit opinion in *NetCoalition I*. In Section D, I show that the Exchanges have economic incentives to price depth-of-book data higher in order to price other products lower and that they have those incentives regardless of the degree of competition they face as exchanges overall.

¹¹ See, e.g., Jean Tirole (1988), *The Theory of Industrial Organization*, MIT Press ("Tirole (1988)"), Chapter 1.

¹² Alfred E. Kahn (1988), *The Economics of Regulation*, MIT Press, pp. 77-83; William J. Baumol, John C. Panzar, and Robert D. Willig (1982), *Contestable Markets and the Theory of Industry Structure*, Harcourt Brace Jovanovich, pp. 351-356.

¹³ I understand that NYSE Arca did not provide cost data. [REDACTED]

A. Data and Financial Markets

14. Economists have long recognized that information is critical for markets to function efficiently and that government policies are necessary to promote the optimal provision of information.¹⁴ Public policy needs to balance two considerations. On the one hand, once information is created, it is in the public interest to make it widely and inexpensively available. That is because the cost of distributing information is typically low, sometimes minimal, and making information available to one user does not diminish the amount available to another user. On the other hand, there may need to be incentives to create information in the first place.¹⁵

15. Financial market efficiency is predicated on the provision and disclosure of information.¹⁶ Greater, more accurate, and more readily available information makes it easier for willing buyers and sellers to find each other and engage in mutually advantageous trades and to establish and reveal the market-clearing price. Making information widely and inexpensively available increases transparency and thereby increases the trust in financial markets and reduces the opportunity for fraud. At least since the Securities Act of 1933, and the Securities Exchange Act of 1934 (“Exchange Act”), government policy as set by both Congress and the SEC has promoted making financial information more widely and inexpensively available. Generally, making information more widely available as an economic matter involves limiting the extent to which holders of information can exercise market power over it and charge high prices.

16. In the 1975 amendments to the Exchange Act, Congress addressed explicitly the exchanges’ provision of market data. Congress identified the “availability of market data” as a primary objective in establishing the national market system for securities in the 1975 amendments to the Exchange Act. As noted by the D.C. Circuit, “*To ensure the wide availability and equitable dissemination of market data*, section 11A [of the Exchange Act] requires

¹⁴ William M. Landes and Richard A. Posner (2003), *The Economic Structure of Intellectual Property Law*, Harvard University Press, Chapter 2.

¹⁵ See, e.g., Sanford J. Grossman and Joseph E. Stiglitz (1980), “On the Impossibility of Informationally Efficient Markets,” *American Economic Review*, Vol. 70, No. 3, pp. 393-408.

¹⁶ Zvi Bodie, Alex Kane and Alan J. Marcus (1998), *Investment*, 8th Edition, McGraw-Hill, pp. 344-349.

exclusive processors of proprietary market data ... to distribute the data on terms that are ‘fair and reasonable’ and ‘not unreasonably discriminatory.’”¹⁷

17. There are sound economic policy reasons why there is a compelling public interest in ensuring that depth-of-book data are priced reasonably to make them widely available. First, by making these data widely and inexpensively available, the public benefits from more efficient and transparent financial markets because these data make it easier for buyers and sellers to obtain the best prices. Second, depth-of-book data are generated as a byproduct of trading and therefore, unlike many other information goods, the producer does not require incentives to create the information. In fact, the underlying data are the result of broker-dealers’ and others’ placing limit orders on behalf of their customers; and those broker-dealers are many of the purchasers of depth-of-book data.¹⁸ Third, depth-of-book data are more valuable when they are available from more exchanges; exchanges will tend to provide too little depth-of-book data because they do not take into account the benefit of combining it with the data of others.¹⁹

18. These principles are critical to considering the depth-of-book data fees at issue here. Consistent with them, the Exchange Act seeks to ensure that data are widely disseminated to increase market efficiency and transparency. Increasing depth-of-book data prices significantly above cost to cross-subsidize other exchange products is not consistent with this policy.

B. Economics of Exchange Pricing

19. Equity exchanges generally offer separate services including listing, market data, and trade execution. A core part of any equity exchange is its order platform for trade execution. There are two sides to the platform. “Liquidity providers” indicate the quantity of an equity they

¹⁷ *NetCoalition v. SEC*, 715 F.3d 342, 345 (D.C. Cir. 2013) (“*NetCoalition II*”) (emphasis added).

¹⁸ Depth-of-book data are therefore unlike many other information goods such as patents, which are often the result of significant research and development expenditures to create the invention, and copyrights, which are often the result of writers’ and composers’ expending time and effort on creation.

¹⁹ Producers could sell more collectively if they lowered their prices because each of their products would become more valuable if the prices of complementary products were also lower. There is a collective action problem because no individual producer considers the increased value that would arise from all producers having lower prices. See, e.g., Mancur Olson (1971), *The Logic of Collective Action: Public Goods and the Theory of Groups*, 2nd edition, Harvard University Press, pp. 9-16.

are willing to buy or sell at specific prices through limit orders. “Liquidity takers” then purchase or sell some or all of that liquidity. These limit orders placed by broker-dealers and others necessarily generate data on the limit prices and quantities and on actual transaction prices. They are a byproduct of operating an exchange and its trade execution functions.

20. Equity exchanges recover their fixed and variable costs and earn profits by charging for the products and services they offer. Modern equity exchanges typically subsidize liquidity providers—they pay for providing liquidity—and charge liquidity takers. This is the so-called “maker-taker” model.²⁰ Their net revenue on trading is the difference between what they charge liquidity takers and what they pay liquidity providers. They also charge for listing services. Some exchanges, particularly larger ones, charge for data products.

21. Equity exchanges have two economic characteristics relevant to the discussion below.²¹ First, they produce multiple related products. Economists have studied pricing for such “multi-product” firms. The economic literature shows that multi-product firms will tend to charge more for products that have more inelastic demand as a result of having fewer substitutes and less competition.²² In particular, they will tend to recover more of their fixed and common costs from products with more inelastic demand (which results from having fewer substitutes available). The economic literature also shows that firms may charge low, and possibly negative, prices for certain products whose sale tends to increase the demand for other products. The classic example involves “razors or blades”: a manufacturer gives away the razor to help sell more blades.²³

22. Second, equity exchanges act as intermediaries between buyers and sellers of equity or, more technically, between liquidity providers and liquidity takers, and are therefore multi-sided platforms.²⁴ A multi-sided platform facilitates interaction, and serves as an intermediary,

²⁰ Both NASDAQ and NYSE Arca are “maker-taker” exchanges.

²¹ The Exchanges’ Reports have mentioned both; there is no disagreement over the presence of these characteristics.

²² Tirole (1988), pp. 69-70.

²³ See, e.g., R. G. D. Allen (1938), *Mathematical Analysis for Economists*, Macmillan, p. 381.

²⁴ See, e.g., Estelle Cantillon and Pai-Ling Yin (2011), “Competition between Exchanges: A Research Agenda,” *International Journal of Industrial Organization*, Vol. 29 No. 3, pp. 329-336; and David S. Evans (2003), “Some Empirical Aspects of Multi-sided Platform Industries,” *Review of Network Economics*, Vol. 2, No. 3, pp. 191-209.

between two distinct groups of customers who need each other in some way.²⁵ Multi-sided platforms include a wide range of businesses such as payment card networks, ad-supported media, and shopping malls.

23. Economists have also studied pricing for multi-sided platforms.²⁶ To maximize their profits, platforms may charge low, and possibly negative, prices to one group of customers. Credit card companies, for example, do not charge credit card users for individual transactions and give those users rewards; newspapers and magazines are usually offered for prices that do not recover the cost of printing and distributing them; and shopping malls do not charge shoppers, charge low rents to anchor stores, and earn profits from the small stores. The customers who are more sensitive to price and whose participation is more valued than the other group of customers will be charged less.²⁷

24. The elasticity of demand for a product plays a significant role in determining prices that multi-product and multi-sided platform businesses charge. All else equal, multi-sided platforms and multi-product firms tend to impose lower prices on products that have more elastic demand and higher prices on products that have more inelastic demand.²⁸

C. Multi-Product Firms and Pricing

25. Competition between multi-product firms, or between multi-sided platforms, may reduce the overall profits these firms make. However, each firm still has an incentive to keep prices high on products that have less elastic demand and low on products that have more elastic demand. In fact, competition for one product can lead firms to increase the prices on some

²⁵ Jean-Charles Rochet and Jean Tirole (2003), "Platform Competition in Two-Sided Markets," *Journal of The European Economic Association*, Vol. 1, No. 4 ("Rochet-Tirole (2003)"), pp. 990-1029; and David S. Evans and Richard Schmalensee (2015), "The Antitrust Analysis of Multi-Sided Platform Businesses," in Roger D. Blair and D. Daniel Sokol (eds.), *Oxford Handbook on International Antitrust Economics*, Vol. 1, The Oxford University Press ("Evans-Schmalensee (2015)").

²⁶ Rochet-Tirole (2003); Evans-Schmalensee (2015).

²⁷ Thomas R. Eisenmann, Geoffrey Parker, and Marshall W. Van Alstyne (2006), "Strategies for Two-Sided Markets," *Harvard Business Review*, October Issue.

²⁸ Jean-Charles Rochet and Jean Tirole (2006), "Two-Sided Markets: A Progress Report," *The RAND Journal of Economics*, Vol. 37, No. 3, pp. 645-67, at pp. 658-659. See also Malte Krueger (2009), "The Elasticity Pricing Rule for Two-Sided Markets: A Note," *Review of Network Economics*, Vol. 8, No. 3, pp. 271-278.

products and use the resulting profits to subsidize other products. Economists have argued, for example, that competition between credit card networks tends to increase the fees charged to merchants while increasing the rewards paid to consumers.²⁹

26. In the case of exchanges, competition for trade execution could encourage exchanges to increase depth-of-book data prices. Suppose that (as shown herein) there are relatively few if any substitutes for depth-of-book data products for an exchange but there are many alternative venues for executing transactions. In this case the demand for order flow would likely be more elastic than the demand for depth-of-book data. The exchange would tend to price depth-of-book data products high and use the profits from the data to enable it to charge low transaction execution prices. Even if competition fully dissipated the profits of the exchange overall—which the Exchanges’ Reports have not shown—this result would be inconsistent with public policy designed to ensure the wide availability of market data.

III. Significant Competitive Forces Do Not Prevent NYSE Arca and NASDAQ from Exercising Significant Market Power Over Depth-of-Book Data Fees

27. In this section I show that the evidence in the Exchanges’ Reports does not support their claim that the Exchanges are subject to significant competitive forces in setting their depth-of-book data fees. I show that there are no available substitutes that significantly constrain the price of depth-of-book data products. I also show that order-flow and platform competition do not encourage the Exchanges to price depth-of-book data products low and in fact may encourage the Exchanges to price depth-of-book data products high so as to subsidize trade execution. I will also show that the evidence presented by the Exchanges’ economists is entirely consistent with the Exchanges having significant market power over depth-of-book data prices.

²⁹ Robin A. Prager, Mark D. Manuszak, Elizabeth K. Kiser, and Ron Borzekowski (2009), “Interchange Fees and Payment Card Networks: Economics, Industry Developments, and Policy Issues,” Finance and Economics Discussion Series 2009-23, Board of Governors of the Federal Reserve System, available at <http://www.federalreserve.gov/pubs/feds/2009/200923/200923pap.pdf>.

A. Depth-of-Book Data from Other Exchanges Do Not Significantly Constrain the Pricing of the Exchanges' Depth-of-Book Data

1. The Exchanges Have Significant Market Power over Depth-of-Book Data

28. Professor Donefer explains depth-of-book data in his report and attaches to that report various examples of these data. I use one example here. Suppose a trader wants to purchase 1,000 shares of Boston Beer Co., the maker of Sam Adams beer, at the best possible price and is strategizing how to trade the order. As reflected in Donefer Appendix A (Exhibit 5, p. 25), 300 shares are available at the top of the book of one exchange at an ask price of \$279.00. Boston Beer is listed on the NYSE, but is traded on ATSS, NASDAQ, NYSE, EdgeX, NYSE Arca, and other exchanges. The trader must therefore look at other markets and below the top of the books for the remaining 700 shares. A comparison of the depth-of-book data from NYSE, NASDAQ, and NYSE Arca shows that the data are very different. The trader can see that there are 707 shares available on NASDAQ at prices of \$281.76 or less. But if the trader does not have ArcaBook, she cannot see that there are 700 shares available on NYSE Arca at better prices of \$281.24 or less. Likewise, NYSE and BATS both show limit orders not reflected in the NASDAQ or NYSE Arca data.

29. The NASDAQ depth-of-book data are not a substitute for—and are not interchangeable with—the NYSE Arca depth-of-book data. The NASDAQ depth-of-book data do not reveal what Boston Beer liquidity is available on NYSE Arca and at what price, and vice-versa. In fact, the NASDAQ and NYSE Arca depth-of-book data are complements in the sense that both sources of depth-of-book data are more valuable together.³⁰

30. Traders and investors that account for a substantial volume of trades on the equity exchanges are frequently in the situation described in this example.^{31,32} They need the depth-of-

³⁰ In economics, two goods are substitutes if the quantity demanded of one good increases when the price of the other good increases; two goods are complements if the quantity demanded of one good decreases when the price of the other good decreases. Cheerios and Wheaties are substitutes while Wheaties and milk are complements.

³¹ I understand that institutions that buy and sell large tranches of equities constitute a large portion of the overall volume of the exchanges. They include firms such as Fidelity, Vanguard, and TIAA-CREF, to name just a few.

³² Hendershott and Nevo claim that economic theory shows that prices are correlated across exchanges. See Hendershott-Nevo Report, ¶ 92. That point proves nothing. All prices are “correlated” to some extent, but prices and

book data for all of the exchanges because that is the only way they can determine where they can get the liquidity they need at the best prices and analyze pending limit orders for supply and demand for an equity. They stand to pay too much by not knowing where the largest quantities of the lowest priced tranches of liquidity are. They may also fail to find as much liquidity as they need. And each exchange has the exclusive right to sell its own depth-of-book data. There is no alternative source of data that would tell traders and investors how much liquidity is available on that exchange and at what prices.

31. These economic features of depth-of-book data show that at least large exchanges (like NYSE Arca and Nasdaq) have significant market power over their depth-of-book data products.

2. That Some Customers Stopped Purchasing Depth-of-Book Data Following Massive Price Increases Is Consistent with the Exchanges Having Significant Market Power

32. The Exchanges' economists have presented evidence that following the increases in prices for depth-of-book data products some customers stopped purchasing those products. That result is exactly what one would expect to happen when a firm with significant market power increases its price from zero or from the competitive level. In fact, the limited loss of customers shown in the data presented in the Exchanges' Reports confirms my finding that the Exchanges have significant market power and are not significantly constrained by competitive forces.

33. Before considering the evidence on this point, it is useful to show the basic economic principles behind price setting with market power and competition. As I will explain below, the basic economics of monopoly pricing demonstrates that the evidence put forward by the Exchanges' economists is consistent with monopoly pricing.³³

quantities at those prices differ across exchanges. The correlation is of no practical help for someone who wants to trade a particular stock at a particular price at a particular time and wants to find the best prices available. In the example above, the trader needs to know which exchanges have 700 shares of Boston Beer available at what prices and in what volume. Whether prices are "correlated" across exchanges has no practical significance for her.

³³ More sophisticated models of firm behavior confirm this. I am using a basic model to illustrate the essential points even though the basic model does not strictly apply to a multi-product firm or a multi-sided platform.

34. Exhibit 1 presents the standard diagram used by economists to show how firms with monopoly power price. “DD” shows a hypothetical demand schedule for a product. The vertical axis shows price and the horizontal axis shows the quantity of the product purchased.

35. I compare two situations, competitive pricing versus monopoly³⁴ pricing:

- a. The situation in which a firm is constrained to provide the product at a competitive level reflected by the marginal cost including a competitive return. A firm that lacked market power would be forced to set price at the point where marginal cost (including a normal profit) intersected the demand schedule.³⁵ I assume, for illustration, that the marginal cost inclusive of a competitive return, is given by MC. In this case the price is equal to MC and the quantity purchased equal to Q_C . That is the competitive outcome.
- b. The situation in which the firm is able to exercise significant market power over the product. Economists have shown that a firm with significant market power will determine how its “marginal revenue”—the additional revenue it receives from an additional sale—varies given demand, determine whether marginal revenue equals marginal cost, and then set price at the point on the demand schedule corresponding to the quantity at which those two curves intersect.³⁶ In the diagram, MR shows the marginal revenue schedule for the firm with demand curve DD. A firm exercising market power would set the quantity of the product at the point where marginal revenue MR and marginal cost MC intersect. That corresponds to Q_M . That firm would then, according to basic economics, refer to the demand schedule for the profit-maximizing price for that quantity; this price is given by P_M . Relative to the competitive level, price increases to P_M from P_C reflecting the exercise of market power and purchases decline to Q_M from Q_C . The exercise of significant market power has the classic result of consumers getting less output at higher prices.

36. Notably, as shown in Exhibit 1, when a firm exercises its monopoly power it raises its price above the competitive level so much that it sacrifices a significant amount of sales relative to the competitive level. This result is standard in basic economics: a monopoly chooses not to serve customers that place a low value on its product in order to raise its prices and earn much greater profits from customers that place a high value on its product. The hallmark of monopoly is the decision to forgo sales at lower prices to earn higher profits from customers who are willing to pay more.³⁷

³⁴ This same diagram works with any firm that has significant market power regardless of whether it is literally the monopoly source of a product.

³⁵ Pindyck and Rubinfeld (2012), pp. 287-288, 378.

³⁶ Pindyck and Rubinfeld (2012), p. 361.

³⁷ See *supra*, note 9.

37. This framework can also be used to assess how substitutes affect the ability of a firm with significant market power to charge supracompetitive prices. Generally, if there are more substitutes, and the product is needed less, the demand schedule DD will be flatter, as shown in Exhibit 2a. If there are few substitutes, and the product is needed more, the demand schedule DD will be steeper, as shown in Exhibit 2b. When the demand schedule is steeper, a monopoly can raise prices significantly more than when the demand schedule is flatter. Informally, economists refer to steeper demand schedules, where there are relatively few substitutes, as “inelastic” and flatter demand schedules, where there are relatively many substitutes, as “elastic.”³⁸

3. Hendershott and Nevo’s Data Show that Demand is Highly Inelastic and that NYSE Arca Lost Few Customers Following a Massive Price Increase

38. NYSE Arca increased the monthly price of its ArcaBook device fee for professional users from \$0 to \$30, for non-professional users from \$0 to \$10, and its access fee from \$0 to \$750.³⁹ That is a massive price increase and well outside the bounds typically considered in antitrust analysis. It is not possible to calculate the percentage increase because the previous price was \$0.⁴⁰ To understand the magnitude in percentage terms, if the previous monthly device fee had been \$1 (rather than \$0), then the increase would have been a 2900 percent increase for professional users and a 900 percent increase for non-professional users.⁴¹ Antitrust analysis ordinarily focuses on price increases of 5-10 percent to assess market power.⁴²

39. According to data presented by Professors Hendershott and Nevo, the number of accounts decreased [REDACTED], and the number of professional subscribers decreased [REDACTED].⁴³ That indicates that [REDACTED] of the

³⁸ The use of these terms is descriptive and is different from the technical definition of the elasticity of demand, which is always measured based on small deviations from a specified price. The steep “inelastic” demand schedule in Exhibit 2b will have points at which demand is elastic (greater than 1) in the technical sense.

³⁹ In 2014, NYSE Arca further increased the professional device fee to \$40 and the access fee to \$2,000. Professors Hendershott and Nevo did not analyze this price increase and do not claim it affected NYSE Arca’s order flow.

⁴⁰ Technically the price increase is infinite because the denominator for calculating the price increase is 0.

⁴¹ The percentage change for the access fee is even higher, at 74,900 percent.

⁴² U.S. Department of Justice and the Federal Trade Commission (2010), *Horizontal Merger Guidelines* (“Horizontal Merger Guidelines”), pp. 10-11.

⁴³ Hendershott-Nevo Report, ¶ 74.

subscribers who obtained ArcaBook could not find substitutes in the face of this massive price increase and decided to continue purchasing ArcaBook. Therefore, these data are consistent with the demand for ArcaBook being very steep, and “inelastic”, as shown in Exhibit 2b, and NYSE Arca being able to establish a price for ArcaBook that is much higher than the competitive level. Very steep demand is the result in part of the lack of available substitutes. Hendershott and Nevo agree that this reflects “inelastic” demand.⁴⁴

4. Ordover’s “Churn” Data Show that Demand is Highly Inelastic and that NASDAQ Lost Few Customers Following a Massive Price Increase

40. Professor Ordover presents data on the proportion of NASDAQ’s depth-of-book customers that NASDAQ lost or gained on a yearly basis. He argues that his “churn” analysis, in combination with his claimed findings on customer switching, show that NASDAQ faces significant competitive constraints on its pricing of depth-of-book data.⁴⁵ Professor Ordover’s analysis is flawed and unreliable for several reasons.

41. First, Professor Ordover concedes that he does not even know if a customer he includes as a “loss” for NASDAQ stopped buying NASDAQ depth-of-book data: “[A] customer [who] switches from buying depth-of-book data directly from NASDAQ to purchasing it through a distributor, such as Bloomberg . . . would appear as a ‘loss’ in my analysis.”⁴⁶ Such switches between obtaining depth-of-book data directly from NASDAQ versus through a distributor are common. Therefore, his data cannot provide reliable evidence of the extent to which NASDAQ lost customers. This problem is fatal to his analysis as a matter of statistical inference.

42. Second, Professor Ordover acknowledges he “d[id] not control for changes in the total number of firms trading” [or] “changes in financial markets associated with the recent Great Recession.”⁴⁷ Many financial firms that purchased depth-of-book customers, however, left the

⁴⁴ Hendershott-Nevo Report, ¶ 74 (“we conclude that demand for ArcaBook at 2009 prices is inelastic”).

⁴⁵ Expert Report of Janusz A. Ordover, January 26, 2015 (“Ordover Report”), ¶ 29.

⁴⁶ Ordover Report n. 36.

⁴⁷ Ordover Report, n. 37.

industry after the start of the financial crisis.⁴⁸ As a result, his calculations are not informative on the effect of depth-of-book pricing on usage since he cannot distinguish firms that decided not to buy NASDAQ's depth-of-book data from those that simply closed down. This too is fatal.

43. Third, Professor Ordover fails to assess the importance of the "churn" customers to NASDAQ's depth-of-book business. Exhibit 3 reports, in the second column, his calculations of the proportion of depth-of-book data customers lost by NASDAQ each year.⁴⁹ [REDACTED]

44. The third column of Exhibit 3 shows the proportion of revenue accounted for by the customers lost relative to total revenues. [REDACTED]

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Therefore, Professor Ordover's data, like Professors Hendershott and Nevo's data, are consistent with NASDAQ customers having highly inelastic demand and no substitutes available.

45. Fourth, he focuses on the proportion of customers lost and gained each year as evidence of "substantial" "churn." But he does not analyze whether what he calls customer "churn" is a result of substitution between the products of different exchanges. His findings could reflect customers dropping NASDAQ and not replacing NASDAQ with a depth-of-book

⁴⁸ Expert Report of Bernard S. Donefer, March 6, 2015 ("Donefer Report"), ¶ 79.

⁴⁹ Ordover Report, ¶ 26 and Figure 3. In addition to his claims regarding customers that started or stopped buying NASDAQ depth-of-book data, Professor Ordover also claims to provide evidence on [REDACTED] customers—[REDACTED]—that increased or reduced the number of subscribers to NASDAQ's depth-of-book data. He presents no evidence that the changes in the number of subscribers for these firms was related to changes in competitive constraints that NASDAQ faces in selling its depth-of-book data. He does not address, for example, the extent to which the changes in subscribers were attributable to the financial crisis in 2007-2008. [REDACTED]

[REDACTED] Professor Ordover also fails to consider whether other factors [REDACTED] might account for these changes, [REDACTED]

⁵⁰ Exhibit 4 is the analog of Exhibit 3 for customers gained by NASDAQ in each year. It shows that the analogous figure for customers gained by NASDAQ was [REDACTED].

data product from another exchange. Indeed, he effectively acknowledges that his churn statistics tell us little about whether there is significant substitution by depth-of-book data customers among exchanges, noting that, “In general, it is not possible to determine from the available data why a customer started or stopped purchasing NASDAQ depth-of-book data.”⁵¹

46. Given these defects in the churn data, Professor Ordover’s only evidence on customer switching is [REDACTED] customers that he claims switched between NASDAQ and NYSE Arca from 2006-2014 [REDACTED]. By way of comparison, NASDAQ had [REDACTED] customers in [REDACTED], the lowest year reported in Professor Ordover’s Figure 3. Even assuming these examples involved substitution, [REDACTED].

47. I use his dataset to analyze the extent to which there were customers that bought only NASDAQ depth-of-book data in one year and only NYSE Arca in the following year. The proportion of revenue accounted for by these customers averages [REDACTED] from 2008 to 2014, as shown in the last column of Exhibit 3, and therefore demonstrates lack of substitution.⁵²

48. This evidence is confirmed in NASDAQ’s own documents. [REDACTED]

[REDACTED]

53

[REDACTED]

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49. Professor Ordover’s “churn” analysis therefore includes customers who did not churn at all, includes losses that resulted from the closure of firms and layoffs in the financial industry following the financial crisis, includes customers who did not substitute any other depth-of-book

⁵¹ Ordover Report, ¶ 28. That a customer stops (or starts) buying depth-of-book data is entirely consistent with NASDAQ’s exercising market power and pricing its depth-of-book product at a level at which there are some marginal customers, ones that will stop (or start) buying as the value they get from the product, relative to its price, varies. A customer that, for example, purchases depth-of-book data from both NASDAQ and NYSE Arca in 2013 and purchases only from NYSE Arca in 2014 is not substituting between the products, just dropping one.

⁵² Exhibit 4 shows that the analogous figure for customers gained by NASDAQ that only purchased from NASDAQ after only purchasing from NYSE Arca in the prior year was [REDACTED].

⁵³ [REDACTED], NASDAQ000661-674 at NASDAQ000665.

⁵⁴ NASDAQ, *GDP Review/1.18.11*, NASDAQ000221-251 at NASDAQ000227.

data product, and fails to consider whether the customers that “churned” were of any financial consequence. It provides no reliable economic evidence.

5. The Exchanges’ Data on Purchasing Patterns Do Not Show Lack of Significant Market Power

50. Both Exchange Reports also claim that a significant proportion of depth-of-book data customers purchase depth-of-book data from one exchange but not the other(s).⁵⁵ Both reports claim such overlap evidence is suggestive of substitution between the exchanges but, notably, neither report ascribes much weight to it. The most that Professors Hendershott and Nevo are willing to state is that subscribers switched products “*possibly* in response to price changes.”⁵⁶ And Professor Ordover states only that, “for these participants, there is *some* degree of *potential* substitution across different sources of depth-of-book data.”⁵⁷ Thus, the Exchanges’ economists do not even claim the evidence they provide actually allows them to reach a conclusion that the availability of depth-of-book data from other exchanges constrains NYSE Arca’s or NASDAQ’s pricing of its depth-of-book data significantly, let alone to competitive levels.

51. As their tentative statements indicate, this evidence would demonstrate nothing about substitution even if it were reliable.⁵⁸ An outcome where consumers buy one depth-of-book data product from one of the Exchanges is consistent with the Exchanges exercising market power and setting their depth-of-book data prices at a level at which some potential customers choose not to purchase it. That a given customer chooses to purchase, for example, depth-of-book data

⁵⁵ Ordover Report, ¶ 30 (fourth bullet); Hendershott-Nevo Report, ¶ 83.

⁵⁶ Hendershott-Nevo Report, ¶ 87 (emphasis added).

⁵⁷ Ordover Report, ¶ 30 (emphasis added).

⁵⁸ These overlap analyses are not, in fact, reliable. They ignore that users obtain ArcaBook or NASDAQ’s depth-of-book products from distributors, such as Bloomberg. Moreover, the Exchanges’ economists fail to consider the relative importance of the customers who they claim buy only one Exchange’s depth-of-book data. If such customers were disproportionately small [REDACTED], then their existence would not demonstrate significant substitution. The overlap analyses are therefore subject to many of the same problems that made Professor Ordover’s churn analysis unreliable. Notably, both reports rely on customer lists for both ArcaBook and NASDAQ’s depth-of-book products, [REDACTED]

[REDACTED]. Professor Ordover “finds” that “approximately [REDACTED] percent of NASDAQ depth-of-book customers do not purchase ArcaBook data.” See Ordover Report, ¶ 30. But this comparison is meaningless, as he includes NASDAQ’s less complete OpenView and Level 2 products in his analysis. The appropriate comparison is TotalView with ArcaBook.

from NASDAQ but not from NYSE Arca says nothing about whether that customer is willing to substitute NYSE Arca's data for NASDAQ's data in response to a small but significant increase in the price of NASDAQ's data, which is the test used in antitrust economic analysis.

6. Ordover's "Switching" Examples Do Not Show Lack of Significant Market Power

52. Lastly, Professor Ordover concludes from two claimed anecdotes that "traders' ability to switch among depth-of-book data suppliers has exerted downward pressure on NASDAQ's prices."⁵⁹ The first anecdote he cites is NASDAQ's adoption of a fee cap of \$30,000 per month "for internal distributors of TotalView data in response to a competitive threat."⁶⁰ But even a firm with significant market power does not have unlimited ability to raise prices; it eventually reaches a point where further price increases would be unprofitable because a significant number of consumers would stop purchasing its product. Professor Ordover's other claimed anecdote is of a threat by a customer to move users off of NASDAQ's depth-of-book data products because its users did not need the data.⁶¹ Professor Ordover does not provide any evidence that this threat was carried out or constrained NASDAQ's pricing in any way.^{62, 63}

7. The Exchanges Have Submitted Economic Evidence That Shows the Existence of Significant Market Power and Have Not Submitted Any Traditional Antitrust Evidence to Support the Lack of Market Power

53. My analysis of depth-of-book data and the evidence presented above support a finding that NYSE Arca and NASDAQ do not face significant competitive forces in setting their depth-of-book data fees. The analyses of the Exchanges' economists demonstrates that depth-of-book

⁵⁹ Ordover Report, ¶ 23.

⁶⁰ Ordover Report, ¶ 23.

⁶¹ Ordover Report, ¶ 24.

⁶² If depth-of-book data products from different exchanges were close substitutes, we would expect to see consumers purchasing only from the lowest-priced provider. Professor Ordover cites BATS as a low-priced provider of depth-of-book data—indeed, until recently BATS's data were available for free—yet we did not see significant numbers of consumers abandon NASDAQ and NYSE Arca.

⁶³ Professor Ordover claims that there has been innovation in the provision of depth-of-book data. He says that "[t]hese innovations and product enhancements are consistent with the behavior of a firm in a competitive marketplace." Ordover Report, ¶ 16. However, even firms with monopoly power have incentives to innovate in order to increase demand and profits. Therefore, the existence of innovation is just as consistent with competition as it is with monopoly.

data customers lack good substitutes for NYSE Arca's and NASDAQ's depth-of-book data and that the Exchanges face highly inelastic demand similar to that shown in Exhibit 2b.

54. The only evidence they have presented on the demand elasticity, as noted above, demonstrates the lack of substitutes that would constrain market power. Beyond that, the Exchanges' Reports do not provide any other economic evidence normally considered to evaluate substitution, such as diversion ratios which would show the extent to which price increases result in customers switching to substitute products or other estimates of the cross-price elasticity of demand.⁶⁴ They also do not include any evidence concerning the marginal cost of producing and distributing depth-of-book data that would enable the determination of whether the prices of depth-of-book data are near the competitive level versus the monopoly level as described.⁶⁵

B. Competition for Order Flow Does Not Significantly Constrain the Pricing of Depth-of-Book Data

1. Order-Flow Competition Leads to Higher Depth-of-Book Data Prices

55. The Exchanges' economists also claim that order-flow competition "constrains" the prices of depth-of-book data. Their economic theory and analysis, however, indicate that order-flow competition tends to increase, rather than decrease, depth-of-book data prices and therefore tends to reduce, rather than increase, the widespread dissemination of depth-of-book data.

56. Depth-of-book data and order flow are interdependent. Liquidity providers submit limit orders that indicate the amount of liquidity available at certain prices. They are more likely to provide liquidity to exchanges that have more liquidity takers and, like NASDAQ and NYSE Arca, pay rebates to "makers" of liquidity. By attracting order flow, an exchange obtains more liquidity below the top of the book, which in turn makes its depth-of-book data more valuable. In

⁶⁴ A diversion ratio shows the percent of sales that are lost when the price of a product goes up. A higher diversion ratio shows that the alternative product is a closer substitute. The cross-price elasticity of demand, which is related, shows the percent increase in the sales of one product as a result of a one percent increase in another product. A large positive cross-price elasticity of demand shows a higher degree of substitution. See Horizontal Merger Guidelines, p. 21.

⁶⁵ Horizontal Merger Guidelines, pp. 4, 11-12.

addition, by making depth-of-book data available an exchange may encourage liquidity takers to come to it to find liquidity.

57. A profit-maximizing exchange will take account of the interdependent relationship between depth-of-book data, liquidity provision, and liquidity in setting prices. There is no basis in economics, however, for concluding that the relationship will lead the exchange to offer relatively low prices for depth-of-book data. The exchange could lower the price of liquidity provision (by increasing rebates) since that makes depth-of-book data more valuable (it provides information on more liquidity) and raise the price of depth-of-book data to offset the revenue and profit it is losing on liquidity provision. In fact, as I show next, the material presented by the Exchanges' economists indicates that order-flow competition tends to *raise* the price of depth-of-book data; they have provided no evidence that it tends to *lower* the price of depth-of-book data.

58. The Exchanges' economists have submitted data that purports to show that the Exchanges have faced increasingly severe competition for order flow over the last decade. From January 2006 to December 2014, NASDAQ's share of trading has declined from 41 to 17 percent, NYSE Arca's share has remained roughly flat at about 11 percent, and NYSE's share has declined from 36 to 13 percent.⁶⁶ The share of trading on non-exchange trading venues has increased over this period from 11 to 41 percent.⁶⁷

59. Yet, during that period, NYSE Arca shifted from providing its data for free to charging \$30 per professional subscriber and \$750 for the access fee in January 2009, and then \$40 per professional subscriber and \$2,000 for the access fee in February 2014.⁶⁸ In April 2012, NASDAQ raised its monthly fee for non-display subscribers from \$70 to \$300 and raised the enterprise cap on such fees from \$30,000 to \$75,000.⁶⁹ The increase in order-flow competition

⁶⁶ Hendershott-Nevo Report Backup Material, HENDERSHOTT_NEVO_000004.xlsx.

⁶⁷ Hendershott-Nevo Report Backup Material, HENDERSHOTT_NEVO_000004.xlsx.

⁶⁸ Notice of Filing of Proposed Rule Change Relating to Approval of Market Data Fees for NYSE Arca Data, File No. SR-NYSEArca-2006-21, Release No. 34-53952, October 12, 2006; Notice of Filing and Immediate Effectiveness of Proposed Rule Change Amending the Fees for NYSE ArcaBook, File No. SR-NYSEArca-2014-72, Release No. 34-72560, July 8, 2014.

⁶⁹ Notice of Filing and Immediate Effectiveness of Proposed Rule Change to Modify Rule 7019, File No. SR-NASDAQ-2010-110, Release No. 34-62907, September 14, 2010; Notice of Filing and Immediate Effectiveness of

was therefore positively correlated with an increase in depth-of-book data prices—just the opposite of the proposition these economists claimed.

2. Hendershott and Nevo’s Regression Analysis Is Consistent with NYSE Arca Raising Depth-of-Book Prices Given Order-Flow Competition

60. Professors Hendershott and Nevo have submitted an empirical study they claim demonstrates that order-flow competition constrains⁷⁰ depth-of-book data pricing. Even if the study were reliable, which as I show below it is not, it does not show that order-flow competition tends to make depth-of-book prices lower. They claim that NYSE Arca’s share of trading declined as a result of NYSE Arca increasing its ArcaBook fees. They estimate the decline in NYSE Arca’s share at [REDACTED] relative to all other trading venues and [REDACTED] relative to the traditional exchanges using a six-month window.⁷¹ Assuming the net margin on orders remained the same, the study shows that NYSE Arca made a decision to raise the price of ArcaBook so much that traders reduced the volume of orders placed on the exchange. That is consistent with NYSE Arca’s exercising market power over depth-of-book pricing and choosing to sacrifice some revenue from order flow. It is also consistent with customers having few substitutes for depth-of-book data but many substitutes for placing orders.

61. The study has profound flaws that make it unreliable. As a general matter, competition from alternative trading venues was increasing during the period. BATS, which was previously an alternative trading venue, began operations as a national securities exchange on October 24, 2008. Trading activity on non-exchange trading venues is reported through trade reporting facilities (“TRFs”), as was the case for BATS prior to October 24, 2008. After BATS became an exchange, its trading activity was reported as BATS rather than TRF volume. Professors Hendershott and Nevo included BATS as one of the traditional exchanges, which meant that the

Proposed Rule Change to Reorganize NASDAQ’s Rules Governing the Fees Applicable to NASDAQ’s Depth-of-Book Market Data, File No. SR-NASDAQ-2012-042, Release No. 66740, April 5, 2012.

⁷⁰ As I noted earlier, *supra*, note 10, the Exchanges’ economists use the word “constrain” as a mathematical term of art and not in the usual sense of “force down” that is used both colloquially and in antitrust analysis.

⁷¹ Hendershott-Nevo Report, ¶ 68.

NYSE Arca shares they calculated were artificially lowered after October 24, 2008, because BATS volume was being included in the denominator after that date but not before. Removing BATS entirely from the NYSE Arca share of exchange trading reverses the Hendershott-Nevo finding, with the impact of the price change having a positive and statistically significant effect. Taking the Hendershott-Nevo approach, we would conclude that the increase in NYSE Arca's depth-of-book fees caused an *increase* in NYSE Arca's share of trading relative to all exchanges (except for BATS) [REDACTED], which is the opposite of their claim that trading decreased.

62. Their analysis also wrongly attributes the change in NYSE Arca's share over this period entirely to the increase in the depth-of-book data fees. This makes no economic sense in an industry that was undergoing significant changes with the growth in alternative trading venues such as BATS and Direct Edge.⁷² In fact, their analysis leads to the nonsensical conclusion that raising NYSE Arca's depth-of-book data fees *caused* a decrease in order flow for NASDAQ. The appropriate conclusion is that their regression analysis failed to control for other significant factors affecting the industry and that there is no basis for concluding that NYSE Arca's depth-of-book data fee increase had any impact on its order flow. Moreover, the analysis does not control for other factors that might affect NYSE Arca's trading volume other than by calculating NYSE Arca's trading volume as a share of (a) all trading and (b) all trading on exchanges. While this may provide a control for the overall level of trading volume, it does not provide any control for other factors, such as changes in the state of competition among trading venues.

3. Hendershott and Nevo's Evidence of "Inelastic Demand" Shows the Exercise of Significant Market Power

63. Professors Hendershott and Nevo also make a theoretical point which they assert demonstrates that NYSE Arca faces constraints on its pricing of depth-of-book data. They claim

⁷² [REDACTED]

that their evidence shows that the demand for depth-of-book data is inelastic. Recall that when NYSE Arca increased its prices from zero, [REDACTED] customers stopped purchasing its depth-of-book data. They then claim as a matter of economic theory that a monopolist would not set a price at which demand is inelastic because it could do better by continuing to raise the price until it became more elastic. They conclude that because NYSE Arca is pricing in a way that is different than how a monopolist of depth-of-book data would price, it must be that competition for order flow prevents NYSE Arca from exercising significant market power over depth-of-book data pricing.⁷³

64. That conclusion is nonsensical on its face. The fact that [REDACTED] consumers stopped buying NYSE Arca's depth-of-book data product in the face of a massive price increase shows that they could not find effective substitutes for NYSE Arca's depth-of-book data. That could not possibly imply that NYSE Arca lacks significant market power since the very essence of significant market power is control over consumers who lack good substitutes.

65. Professors Hendershott and Nevo reached this nonsensical conclusion because they made a simple theoretical mistake. The theory they have relied on is based on the elasticity of demand at the price being charged, which in this case is \$30, and involves determining, at that precise price, the change in quantity that would result from a small—1 percent—increase in price (e.g., from \$30 to \$30.30). Professors Hendershott and Nevo have not presented any economic evidence on the effect of a small price change, from \$30, on the demand for depth-of-book data. Instead, they presented evidence on the change in quantity as a result of a massive price increase from \$0 to \$30. That is not the measure that is used in the formulas from economic theory that they are relying on. In fact, their data is consistent with Exhibit 2b. The monopolist faces a steep demand schedule, so that the quantity demanded decreases only slightly as price increases.⁷⁴

⁷³ Notably, this is an implicit concession that the ability of customers to substitute alternative depth-of-book products is not a constraint on the pricing of depth-of-book data.

⁷⁴ As a theoretical matter, a monopoly exchange operating as a multi-product, multi-sided platform firm could also choose to set the price for depth-of-book data at a price for which the elasticity of demand is less than 1. See Rochet-

4. Ordover’s Anecdotes Are Consistent with NASDAQ Exercising Significant Market Power over Depth-of-Book Data Prices

66. Professor Ordover presents anecdotes in support of his claim that order-flow competition “constrains” depth-of-book pricing. This evidence is not credible or reliable as an economic matter for two reasons.

67. First, Professor Ordover’s anecdotes do not provide any information on whether order-flow competition “constrains” depth-of-book pricing to be at competitive levels. When a firm exercises monopoly power it raises its price so high that, at that price, it is constrained from profitably raising it further. The fact that customers stop buying at the monopoly price (including switching to an inferior substitute), complain, or make threats is perfectly consistent with the firm exercising significant market power.⁷⁵

68. Second, Professor Ordover’s analysis is not consistent with accepted scientific methods for making inferences. Such methods use a representative sample of consumers that is large enough to draw valid statistical inferences. Instead, he examines [REDACTED] customers who chose to threaten to drop the depth-of-book data products without saying how or even whether he selected them. These customers were not randomly selected, and the anecdotes are entirely consistent with the existence of thousands more customers who did not threaten to drop these products. Moreover, the number of observations—[REDACTED]—is far below the level from which one could draw any valid statistical inferences.⁷⁶ These anecdotes do not demonstrate a significant or lasting constraint on the pricing of depth-of-book data.

Tirole (2003), p. 996 (giving equations for two-sided platform equilibrium prices, which show that the standard condition implying an equilibrium elasticity greater than 1 only applies to the combined elasticity across both sides, and that the elasticity on any one side may be less than 1); E. Glen Weyl (2010), “A Price Theory of Multi-Sided Platforms,” *American Economic Review*, Vol. 100, No. 4, pp. 1642-1672, at p. 1651 (giving equilibrium pricing equations for a more general model of two-sided platform pricing, which also has the property that the elasticity on one side at equilibrium prices can be less than 1).

⁷⁵ Professor Ordover commits what is known as the “cellophane fallacy” in antitrust. The fallacy involves inferring that consumer resistance to a price demonstrates competition when in fact it demonstrates that the firm has succeeded in raising price so high that consumers abandon the use of the product. See Kaplow-Shapiro (2007), p. 1190. In the classic example a monopoly supplier of cellophane sets prices so high that consumers switch to, for example, parchment paper to wrap food.

⁷⁶ I am not suggesting that anecdotal evidence is not worth examining, but in this case it is impossible to draw any reliable inferences from these [REDACTED] particular examples.

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⁷⁷ Ordover Report, ¶ 36.

⁷⁸ Ordover Report, ¶ 37.

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⁸⁰ Ordover Report Backup Material, “nasdaq_dob_transactions.sas7bdat”.

⁸¹ Ordover Report, ¶ 38.

C. The Exchanges’ Other Evidence Is Irrelevant and/or Flawed

1. HHI Analysis

72. Professors Hendershott and Nevo present an analysis of the extent of concentration in trading volume. They rely on a standard measure of concentration, called the Herfindahl-Hirschmann Index (“HHI”). As Professor Donefer has shown, these analyses are irrelevant for determining the need for depth-of-book data because they do not reflect the concentration in liquidity available at an exchange at the time when traders are seeking that liquidity.^{83,84}

2. Evidence on Price Competition

73. Professor Ordover offers two examples of claimed price competition among exchanges in the provision of depth-of-book data.

⁸² Ordover Report Backup Material, “nasdaq_dob_transactions.sas7bdat”. [REDACTED]

⁸³ Donefer Report, ¶ 49. Their calculations are, moreover, significantly flawed and unreliable for two additional reasons. First, in calculating the HHI for trading volume, Professors Hendershott and Nevo assume that all volume that is not traded on an exchange is split evenly among the 50 non-exchange trading venues that they estimate exist. This assumption is implausible and is likely to significantly understate the HHI, especially for the securities-level HHIs. Second, they cite to their HHI calculations as support for their claim that “individual exchanges cannot maintain an exclusive hold on depth-of-book data for a particular stock.” This reliance is flawed because their HHI calculations include trading on non-exchange trading venues, for which depth-of-book data are generally not available. The aggregate HHI they report, based on volume on all trading venues, was 1,362 in November 2014, which would be categorized as “unconcentrated” under the Horizontal Merger Guidelines. If we exclude volume from trade reporting facilities for non-exchange venues, the HHI for the same month is substantially higher, at 3315, which would be categorized as “concentrated.” The securities-level HHIs are likely even higher.

⁸⁴ Professors Hendershott and Nevo also claim to find “a large overlap in securities traded on different exchanges,” which they assert shows that depth-of-book data products from different exchanges are substitutes. See Hendershott-Nevo Report, ¶¶ 89-91. There are at least two significant flaws in these claims. First, their analysis looks at, for example, the likelihood that a given security trades on NYSE Arca if it trades on NASDAQ. This analysis says nothing economically meaningful about whether the extent of trading—and the extent of liquidity reflected in depth-of-book data—is comparable across exchanges. There are likely to be significant differences in the volume of trading of a given security across different exchanges even if it trades on multiple exchanges. Second, even if there were comparable levels of trading in a given security across exchanges, that would not mean that the depth-of-book data from those exchanges are close substitutes for each other. As I explained above, a trader placing a large order needs the depth-of-book data from all the exchanges that have significant volume.

74. First, he cites NASDAQ's decision to offer an optional enterprise cap of \$30,000 per month for the non-display use of its depth-of-book data, which became effective in April 2010, as evidence of competition with other exchanges.⁸⁵ The imposition of non-linear pricing schemes, such as a cap for the amount paid by large firms, is consistent with the pricing practices of a firm with significant market power that is practicing price discrimination. Moreover, any relief for the customers that may have benefited from the cap was short-lived. The fee cap was replaced by a tiered fee structure in April 2012, with the top fee tier set at \$75,000 per month.⁸⁶

75. Second, Professor Ordover cites advertising by BATS/Direct Edge of its depth-of-book data products "based on price comparisons to its competitors' data products, stating that '[t]he BATS One Feed is 60% less expensive per professional user and more than 85% less expensive for an enterprise license for professional users.'"⁸⁷ The BATS/Direct Edge advertising also notes that its "four exchanges combine to make BATS consistently the #1 exchange operator by market share for U.S. equities trading, excluding opening and closing auction volume. Accordingly, the BATS One Feed will have the most comprehensive content of any exchange-provided market data product with respect to real-time market information."⁸⁸

76. The fact that the BATS/Direct Edge fees for its combined depth-of-book data product are priced so far below that of the other exchanges is not evidence that its depth-of-book data are close substitutes with that of NASDAQ or NYSE Arca. Instead, the much lower price of the BATS/Direct Edge data indicates that its pricing does not constrain that of the other exchanges.⁸⁹

⁸⁵ Ordover Report, ¶ 17; Notice of Filing and Immediate Effectiveness of Proposed Rule Change to Reorganize NASDAQ's Rules Governing the Fees Applicable to NASDAQ's Depth-of-Book Market Data, File No. SR-NASDAQ-2012-042, Exchange Act Release No. 66740, April 5, 2012.

⁸⁶ See *supra*, note 69.

⁸⁷ Ordover Report, ¶ 17 (footnote omitted).

⁸⁸ See "BATS One Feed," available at http://cdn.batstrading.com/resources/market_data/products/bats_bats-one-feed.pdf.

⁸⁹ The BATS One Feed referenced by Professor Ordover consolidates data from the four exchanges owned by BATS Global Markets. Depth-of-book data are available separately from each of the four exchanges. The BZX and BYX exchanges started charging in 2013 and the EDGX and EDGA exchanges started charging in 2012. See Reuters, "BATS exchanges to start charging for market data," April 18, 2013, available at <http://www.reuters.com/article/2013/04/18/batsglobalmarkets-marketdata-fees-idUSL2N0D52AC20130418> and Direct Edge Market Data Notice #12-02: Market Data Fees, February 22, 2012, available at <http://www.thetradingmesh.com/pg/newsfeeds/hftreview/item/38952/direct-edge-market-data-notice-1202-market->

IV. Cost and Margin Data are Relevant to Whether the Exchanges’ Depth-of-Book Data Fees are Significantly Constrained by Competition

77. The profit margins and marginal costs of depth-of-book data for NYSE Arca and NASDAQ are relevant to assessing whether their depth-of-book data fees are at the competitive levels that would promote the widespread availability and dissemination of these data. The marginal cost of collecting and distributing depth-of-book data, inclusive of a competitive return, would provide a proxy for a reasonable price that would be consistent with public policy designed to make non-core data widely available.⁹⁰ Data on profit margins—the difference between prices and marginal costs—for depth-of-book and other exchange products would help determine whether, and to what extent, depth-of-book prices are being used to subsidize other exchange products such as trade executions.

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NASDAQ has publicly characterized its Information Services segment, which primarily consists of its market data products, as “HIGH MARGIN.”⁹² NASDAQ has asserted to its investors that Information Services is its “largest operating profit contributor” and that its proprietary data are “a distinctive *mission-critical* product which imbues this business with *relatively strong pricing power* and has been growing at mid-to-high single-digit rates over the last few years.”⁹³ NASDAQ’s high profit margin and its

[data-fees](#). See also Notice of Filing and Immediate Effectiveness of a Proposed Rule Change to Establish Fees for the BATS One Feed, and Amend Fees for BZX Top and BZX Last Sale, File No. SR-BATS-2015-11, Release No. 34- 74285, February 18, 2015.

⁹⁰ Professor Ordovery argues that exchanges could not earn a normal return if they priced their data at marginal cost. Ordovery Report, ¶ 52. However, he reaches that conclusion because he takes a very narrow definition of marginal cost under which no competitive firm could ever earn a normal return. A more relevant definition of marginal cost would include the incremental costs of providing depth-of-book data, such as the cost of collecting and distributing the data, as well as a normal competitive rate of return. The normal competitive rate of return reflects the risk-adjusted opportunity cost of capital associated with incurring these costs. This is consistent with the D.C. Circuit’s observation that “the costs of collecting and distributing market data can indicate whether an exchange is taking ‘excessive profits’ or subsidizing its service with another source of revenue.” *NetCoalition I*, 615 F.3d at 537.

⁹¹ NASDAQ Supplement to 2nd Discovery Response, Attachment B.

⁹² NASDAQ, Investor Presentation, December, 2014, slide 7, available on NASDAQ Events & Presentations web page at <http://ir.nasdaqomx.com/events.cfm>.

⁹³ Comments of Lee Shavel, NASDAQ CFO, at Credit Suisse 16th Annual Financial Services Forum, p. 3 (emphasis added), available on NASDAQ Events & Presentations web page at <http://ir.nasdaqomx.com/events.cfm>.

executives' view that it has significant pricing power confirm that NASDAQ has significant market power over depth-of-book data. Professor Ordover has not presented any evidence to the contrary.

79. The economists for the Exchanges claim it is inappropriate to examine the profitability of market data products because there are joint costs of producing depth-of-book data and there is no economic basis for allocating these costs across different products.⁹⁴ However, there is no reason from a public policy perspective why any of those joint costs should be allocated to depth-of-book data, which are created as a byproduct of trading. By pricing depth-of-book data at close to their marginal cost of production and distribution, the exchanges would make the data widely available, increase their dissemination, and make it easier to combine depth-of-book data from many exchanges. That would address the market failures identified earlier.



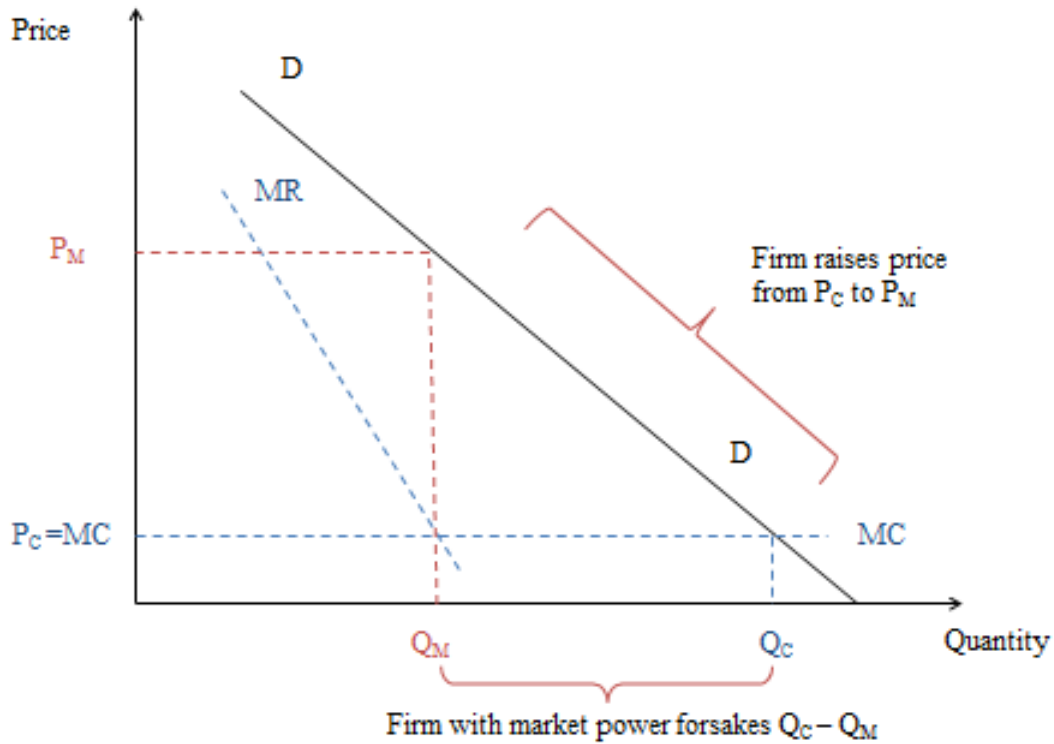
David S. Evans

⁹⁴ Hendershott-Nevo Report, ¶ 42; Ordover Report, ¶¶ 55-56.

REDACTED VERSION

ATTACHMENT 1

Exhibit 1: The Exercise of Significant Market Power Based on Basic Economic Model of Firm Pricing¹



¹ The figures in Exhibits 1, 2a, and 2b are basic textbook illustrations of demand schedules, to illustrate the points about competitive versus monopoly pricing and about demand elasticity that I explain in my report. The figures are not intended to reflect all the complexities of the pricing of depth-of-book data by exchanges, including the presence of fixed costs and the two-sidedness of the exchanges.

Exhibit 2a: Exercise of Market Power with “Elastic” (Flatter) Demand

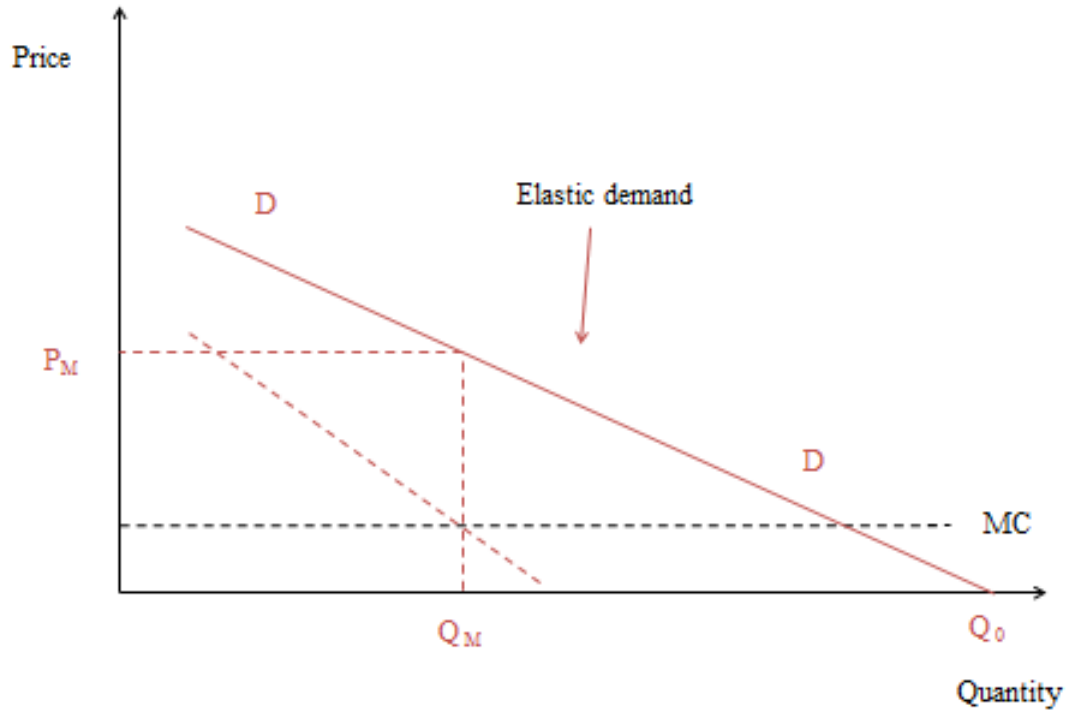


Exhibit 2b: Exercise of Market Power with “Inelastic” (Steeper) Demand

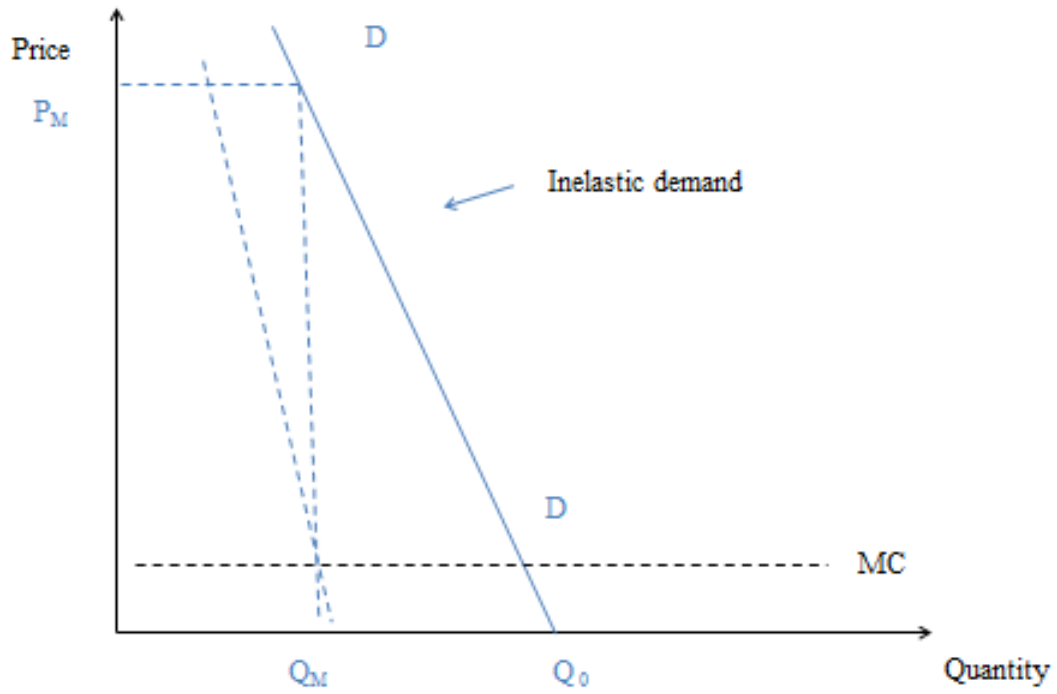


Exhibit 3: NASDAQ Customer Losses¹

<i>Year</i>	<i>Proportion of Customers Lost (Ordover Calculation)</i>	<i>Proportion of Revenue from Customers Lost (Evans Calculation)²</i>	<i>Proportion of Revenue from Customers Lost that Started to Use NYSE Arca after Leaving NASDAQ (Evans Calculation)³</i>
2008			
2009			
2010			
2011			
2012			
2013			
2014			
Mean 2008-2014			

¹ Calculations based on data in Professor Ordover’s reliance materials: “customer_level_sub_data .sas7bdat”, “matches.sas7bdat” and “nasdaq_dob_transactions.sas7bdat”.

² A given customer may have left NASDAQ partway through the prior year, so that the annual revenues for that customer would reflect only those months for which it purchased from NASDAQ. To avoid underestimating the revenues from the customers lost by NASDAQ, I calculated the proportion of revenue from customers lost by NASDAQ based on the average monthly revenues from each of the lost customers only in those months for which it paid fees to NASDAQ, added those estimates for all of the lost customers, and divided by the average monthly revenues from all customers. I took this same approach in the last column of the Exhibit.

³ When identifying customers that bought only NASDAQ depth-of-book data in one year and only NYSE Arca in the following year, to account for customers that may have switched in the middle of a year, I included customers that 1) only used NASDAQ in the current year and only used NYSE Arca in the following year, and 2) only used NASDAQ in the previous year, used both in the current year, and only used NYSE Arca in the following year.

Exhibit 4: NASDAQ Customer Gains¹

<i>Year</i>	<i>Proportion of Customers Gained (Ordover Calculation)</i>	<i>Proportion of Revenue from Customers Gained (Evans Calculation)²</i>	<i>Proportion of Revenue from Customers Gained that Started to Use NASDAQ after Leaving NYSE Arca (Evans Calculation)³</i>
2008			
2009			
2010			
2011			
2012			
2013			
2014			
Mean 2008-2014			

¹ Calculations based on data in Professor Ordover’s reliance materials: “customer_level_sub_data .sas7bdat”, “matches.sas7bdat” and “nasdaq_dob_transactions.sas7bdat”.

² A given customer may have joined NASDAQ partway through the year, so that the annual revenues for that customer would reflect only those months for which it purchased from NASDAQ. To avoid underestimating the revenues from the customers gained by NASDAQ, I calculated the proportion of revenue from customers gained by NASDAQ based on the average monthly revenues from each of the gained customers only in those months for which it paid fees to NASDAQ, added those estimates for all of the gained customers, and divided by the average monthly revenues from all customers. I took this same approach in the last column of the Exhibit.

³ When identifying customers that bought only NYSE Arca depth-of-book data in one year and only NASDAQ in the following year, to account for customers that may have switched in the middle of a year, I included customers that 1) only used NYSE Arca in the current year and only used NASDAQ in the following year, and 2) only used NYSE Arca in the previous year, used both in the current year, and only used NASDAQ in the following year.

REDACTED VERSION

ATTACHMENT 2

CV of David S. Evans

SHORT BIO

I am the Chairman of the Global Economics Group, based in its Boston office, and hold teaching positions at the University of Chicago and the University College London. I have BA, MA, and Ph.D. degrees in economics from the University of Chicago.

As an economist, I specialize in the field of industrial organization, which concerns the behavior of firms, and in antitrust economics, which is the portion of industrial organization that concerns the analysis of business practices that could limit competition and harm consumers. I have a particular expertise in the study of multi-sided platforms, such as financial exchanges, that serve as intermediaries between several groups of customers. I have written five major books and more than 100 scholarly articles, many published in leading economic journals and law reviews. My work has been widely read and cited.¹

Over the last 25 years, I have taught classes on antitrust economics at Fordham University Law School, University College London Faculty of Laws, and the University of Chicago Law School. I currently teach antitrust economics at the University of Chicago and the University College London. In addition, I have served on the faculty for the American Bar Association Annual Antitrust Meetings on three occasions. I have also taught various aspects of antitrust economics to judges in China and the European Union. In 2009 and 2010, I taught classes for judges, including basic economic principles and intellectual property, in the European Union for a program sponsored jointly by the University College London and the Toulouse School of Economics. At the request of the Chinese State Ministry of Industry and Information Technology (MIIT), in 2013 and 2014, I taught certain aspects of antitrust economics, including platform-based industries, to judges from the Chinese Supreme People's Court and provincial appeal courts. At their request, I have given lectures on antitrust at several competition authorities and sectoral regulators around the world and have been invited to give keynote addresses at various antitrust and other conferences around the world.

I have testified, or submitted testimony, to courts, arbitration panels and regulatory authorities, in the United States, including federal and state court, as well as Australia, Brazil, China, the European Union, Singapore, and Thailand. I have made appearances on antitrust issues before the U.S. Department of Justice, U.S. Federal Trade Commission, and the European Commission. In addition, I have testified before several committees of the U.S. Congress

¹ I am ranked among the top three percent of economists according to quality-weighted citations by IDEAS/Repec, which tracks publications and citations by economists worldwide. Many of my publications and citation rankings are available at <http://ideas.repec.org/e/pev9.html>. Like many social scientists, I post much of my work on the Social Science Research Network (SSRN). As of February 1, 2015, based on quality-weighted citations, I ranked 181 out of the top 30,000 social scientists globally that SSRN reports citation data for, 85 out of the top 8,000 economics professors globally that SSRN reports citation data for, and 5 out of the top 3,000 law professors globally that SSRN reports citation data for. My SSRN publications are available at http://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=268756.

including the Senate Banking Committee, the House Financial Services Committee, and the House Oversight Committee.

CONTACT DETAILS

Address: Global Economics Group
18 Tremont St.
Boston, Mass 02108

Mobile: 1 (617) 320 8933
Skype: david.s.evans
Email: devans@globaleconomicsgroup.com

EDUCATION

1979-1983

University of Chicago
Ph.D. and MA in 1983
Specialized in econometrics, industrial organization, and labor economics

1972-1975

University of Chicago
BA in Economics in 1975
Completed first year of graduate program

EMPLOYMENT HISTORY

2011-

Global Economics Group
Chairman

2004-

Market Platform Dynamics
Founder and Managing Director

2004-

Competition Policy International
Founder and Publisher

2006-

University of Chicago Law School
Lecturer, teaching various advanced courses in antitrust economics

2004-

University College London

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Visiting Professor in the Faculty of Laws, teaching various advanced courses in antitrust economics

Executive Director, Jevons Institute for Competition Law and Economics

2004-2011

LECG, LLC

Vice Chairman, LECG Europe

Head, Global Competition Policy Practice

Member of the boards of directors of various subsidiaries

1988-2004

NERA Economic Consulting

Senior Vice President

Member of the Management Committee

Member of the Board of Directors

1983-1995

Professor of Law, Fordham University Law School (1985-1995)

Associate Professor of Economics (1983-1989) (tenure as of 1988)

APPEARANCES AND TESTIMONY

Dr. Evans has testified before Federal and state courts as well as arbitration panels in the United States, the Chinese Supreme People's Court, and the General Court of the European Union. He has made personal appearances before or presented written testimony to the Australian Competition and Consumer Commission, European Commission, Federal Communications Commission, Federal Trade Commission, the U.S. Department of Justice, and the Securities and Exchange Commission. He has also testified before the House Financial Services Committee, the House Oversight Committee, and the Senate Banking Committee.

Examples of Dr. Evans's clients for whom he has made public submissions and appearances include Bloomberg, Google, Michael Tyson, Microsoft, Netflix, Organization for Economic Co-operation and Development, Tencent, and Visa.

REPRESENTATIVE MATTERS

Antitrust and Intellectual Property

Dr. Evans has worked on mergers, monopolization and abuse of dominance, and joint venture cases in multiple jurisdictions. A number of his matters have involved the intersection of antitrust and intellectual property and the antitrust of information technology/on-line businesses. Representative matters include:

- *United States v. Microsoft* on trial and remand regarding remedies and *Microsoft v. Commission of the European Communities* on tying and interoperability on behalf of Microsoft;
- Monster's acquisition of Yahoo! HotJobs before the Federal Trade Commission;
- WPP's acquisition of Taylor Nelson Sofres before the European Commission;
- Google's acquisition of DoubleClick for various third-party intervenors before the

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Federal Trade Commission, European Commission and Australian Competition and Consumer Commission;

- Investigation of VisaNet and Redecard by the Central Bank of Brazil and other regulatory authorities concerning certain exclusivity agreements and practices in the payment card industry;
- In *Twombly v. Bell Atlantic*, chief author of amicus brief by economists submitted to the United States Supreme Court in support of a grant of a writ of certiorari and in support of reversal; and
- In *Qihoo v. Tencent*, submitted testimony and to Chinese Supreme People's Court, The High People's Court of Guangdong Province, People's Republic of China, on behalf of Tencent regarding Qihoo's market definition and abuse of dominance claims against Tencent.
- Comcast's acquisition of Time Warner Cable for Netflix before the Federal Communications Commission and the Department of Justice.

Financial Regulation

Dr. Evans has worked on regulatory matters involving payment systems, consumer financial protection, derivatives regulation, and the regulation of exchanges. Representative matters include:

- Analysis of Consumer Financial Protection Bureau regulations for various financial institutions;
- Debit card regulatory proceedings before the Federal Reserve Board on behalf of various financial institutions;
- Regulation of the OTC commodity derivatives for the Government of Singapore;
- Analysis of Security Exchange Commission orders concerning pricing of market data submitted reports and presentations to the SEC on behalf of Bloomberg; and
- Assistance in creating educational programs for House Financial Services Committee members concerning the recent financial crisis.

HONORS AND RANKINGS

- Winner of the Business, Management & Accounting category in the 2006 Professional/Scholarly Publishing Annual Awards presented by the Association of American Publishers, Inc. for *Invisible Engines: How Software Platforms Drive Innovation and Transform Industries*.
- The International Who's Who of Competition Lawyers & Economists various years.
- Named among the "Top 25 Competition & Antitrust Practitioners" by Best of the Best USA, Legal Media Group.

PUBLICATIONS

Dr. Evans' publications since 2000 are largely available online at Evans' SSRN Page and his publications before 2000 are mostly available at Evans' IDEAS Page.

Books

Platform Economics: Essays on Multi-Sided Businesses, (Boston, Competition Policy International, 2011), with R. Schmalensee, M. Noel, H. Chang, and D. Garcia-Swartz.

Interchange Fees: The Economics and Regulation of What Merchants Pay for Cards, (Boston, Competition Policy International, 2011), with R. Schmalensee, R. Litan, D. Garcia-Swartz, H. Chang, M. Weichert, A. Mateus.

Trustbusters: Competition Authorities Speak Out (Boston: Competition Policy International, 2009), co-editor with F. Jenny.

Catalyst Code: The Strategies of the World's Most Dynamic Companies (Massachusetts: Harvard Business School Press, 2007), with R. Schmalensee. Translated into Chinese, Korean, Polish, and Russian.

Invisible Engines: How Software Platforms Drive Innovation and Transform Industries, (Massachusetts: MIT Press, 2006), with A. Hagiu and R. Schmalensee. Translated into Chinese and Korean.

Paying with Plastic (Massachusetts: MIT Press, first edition 1999, second edition 2005), with R. Schmalensee. Translated into Chinese

Microsoft, Antitrust and the New Economy: Selected Essays (New York: Kluwer Academic Publishers, 2002), editor.

The Economics of Small Businesses: Their Role and Regulation in the U.S. Economy (New York: Holmes and Meier, 1986), with W. Brock.

Breaking Up Bell: Essays on Industrial Organization and Regulation (New York: North Holland, 1983), editor and co-author of eight of ten chapters.

Articles and Book Chapters

“The Impact of the U.S. Debit Card Interchange Fee Caps on Consumer Welfare: An Event Study Analysis,” (with H. Chang and S. Joyce), *Journal of Competition Law and Economics*, 2015.

“The Antitrust Analysis of Multi-Sided Platform Businesses,” (with R. Schmalensee), in *Oxford Handbook on International Antitrust Economics*, R. Blair and D. Sokol, eds., Oxford: Oxford University Press, 2015

“The Antitrust Analysis of Rules and Standards for Software Platforms,” *Competition Policy International*, Autumn 2014.

“Market Definition Analysis in Latin America with Applications to Internet-Based Industries,” (with E. Mariscal), Working Paper (University of Chicago Law School and Centro de Investigacion y Docencia Economica), 2013.

“Paying with Cash: A Multi-Country Analysis of the Past and Future Use of Cash for Payments by Consumers,” (with K. Webster, G. Colgan, and S. Murray), Working Paper (University of Chicago Law School and Market Platform Dynamics), 2013.

“Payments Innovation and the Use of Cash,” (with K. Webster, G. Colgan, and S. Murray), Working Paper (University of Chicago Law School and Market Platform Dynamics), 2013.

“The Consensus Among Economists on Multisided Platforms and Its Implications for Excluding Evidence that Ignores It,” *CPI Antitrust Chronicle*, 2013, 6(1).

“Analyzing Competition among Internet Players: Qihoo 360 v. Tencent,” (with V. Y. Zhang and H. Chang), *CPI Antitrust Chronicle*, 2013, 5(1).

“Attention Rivalry among Online Platforms”, *Electronics Intellectual Property, MITT China*, 2013, 9, 30-41(in Chinese).

“Attention Rivalry among Online Platforms and Its Implications for Antitrust Analysis,” *Journal of Competition Law and Economics*, 2013, 9(2), 313-357.

“Economics of Vertical Restraints for Multi-Sided Platforms,” *Competition Policy International*, 2013, 9(1).

“Enhancing Financial Benchmarks: Comments on the OICU-IOSCO Consultation Report on Financial Benchmarks,” Working Paper (University of Chicago Law School and Global Economics Group), 2013.

“The Role of Keyword Advertising in Competition among Rival Brands,” (with Elisa Mariscal). *CPI Antitrust Chronicle*, 2012, 12(1).

“Will the Wheatley Recommendations Fix LIBOR?” (with R.M. Abrantes-Metz). *CPI Antitrust Chronicle*, 2012, 11(2).

“Governing Bad Behavior by Users of Multi-Sided Platforms,” *Berkeley Technology Law Journal*, 2012, 27(2).

“Replacing the LIBOR with a Transparent and Reliable Index of Interbank Borrowing: Comments on the Wheatley Review of LIBOR Initial Discussion Paper,” (with R.M. Abrantes-Metz), University of Chicago Institute for Law and Economics Olin Research Paper No. 620, 2012.

“Two-Sided Market Definition,” in *Market Definition in Antitrust: Theory and Case Studies*, 2012.

“Why Come Platform Businesses Face Many Frivolous Antitrust Complaints and What to Do About It,” *Competition Policy International*, 2012, 8(2).

“Lightening Up on Market Definition,” in *Research Handbook on the Economics of Antitrust Law*, E. Elhauge, ed., New York: Edward Elgar, 2012.

REDACTED VERSION

“Market Definition and Merger Analysis for Multi-Sided Platforms,” (with R. Schmalensee), 2012, *available at* <https://www.competitionpolicyinternational.com>

/assets/Uploads/MSP11-13-2012.pdf.

“Payments Innovation and Interchange Fees Regulation: How Inverting the Merchant-Pays Business Model Would Affect the Extent and Direction of Innovation,” Working Paper (University of Chicago Law School), 2011.

“How Changes in Payment Card Interchange Fees Affect Consumers Fees and Merchant Prices: An Economic Analysis with Applications to the European Union,” with A.M. Mateus, Working Paper (University of Chicago Law School and New University of Lisbon), 2011.

“Economic Analysis of Claims in Support of the ‘Durbin Amendment’ to Regulation Debit Card Interchange Fees,” with H.H. Chang and M.M. Weichert, Working Paper (University of Chicago Law School, Global Economics Group, and Market Platform Dynamics), 2011.

“The Antitrust Economics of Free.” *Competition Policy International*, 2011, 7(1).

“Conversations with Jon Leibowitz and Joaquin Almunia,” (with Jon Leibowitz and Joaquin Almunia). *Competition Policy International*, 2011, 7(1).

“The Economic Principles for Establishing Reasonable Regulation of Debit-Card Interchange Fees that Could Improve Consumer Welfare,” (with R.E. Litan and R. Schmalensee), Working Paper (University of Chicago Law School, AEI-Brookings Joint Center for Regulatory Studies, and MIT), 2011.

“The Regulation of Interchange Fees by the U.S. Federal Reserve Board: A Primer on Economic Principles, II,” *CPI Antitrust Chronicle*, 2011, 12(2).

“AT&T/T-Mobile: Does Efficiency Really Count?” (with H. Chang & R. Schmalensee) *CPI Antitrust Chronicle*, 2011, 10(2).

“Net Neutrality Regulation and the Evolution of the Internet Economy,” *CPI Antitrust Chronicle*, 2011, 8(2).

“A Presentation on Assessment of Market Power and Dominance,” *CPI Antitrust Chronicle*, 2011, 6(1).

“Economic Analysis of the Effects of the Federal Reserve Board’s Proposed Debit Card Interchange Fee Regulations on Consumers and Small Businesses,” (with R.E. Litan and R. Schmalensee), Working Paper (University of Chicago Law School, AEI-Brookings Joint Center for Regulatory Studies, and MIT), 2011.

“Essays on the Economics of Two-Sided Markets: Economics, Antitrust and Strategy,” Working Paper (University of Chicago Law School), 2010.

“Failure to Launch: Critical Mass in Platform Businesses,” (with Richard Schmalensee). *Review of Network Economics*, 2010, 9(4).

“The Effect of the Consumer Financial Protection Act of 2009 on Consumer Credit,” *Loyola Consumer Law Review*, 2010, 22(3).

“The Web Economy, Two-Sided Markets, and Competition Policy,” Working Paper (University of Chicago Law School), 2010.

“Why Now is Not the Time to Revamp Consumer Financial Protection,” Working Paper (University of Chicago Law School), 2010.

“The U.S. Needs Real Financial Reform,” *Forbes.com*, April 2010.

“The New Consensus on Class Certification: What it means for the Use of Economic and Statistical Evidence in Meeting the Requirements of Rule 23,” *CPI Antitrust Chronicle*, 2010, 1(1).

“A Response to Professor Levitin on the Effect of the Consumer Financial Protection Agency Act of 2009 on Consumer Credit,” (with J.D. Weight), George Mason Law and Economics Research Paper No. 09-56, 2009.

“The Middle Way on Applying Antitrust to Information Technology,” *CPI Antitrust Chronicle*, 2009, 11(2).

“How the Consumer Financial Protection Agency Act of 2009 Would Change the Law and Regulation of Consumer Financial Products,” (with J. Wright), *Bloomberg Law Reports: Risk and Compliance*, 2009, 2(10).

“The Online Advertising Industry: Economics, Evolution, and Privacy,” *Journal of Economic Perspectives*, 2009, 23(3), 37-60.

“Why Different Jurisdictions Do Not (and Should Not) Adopt the Same Antitrust Rules,” *Chicago Journal of International Law*, 2009, 10, 161.

“Innovation in Payments,” (with R. Schmalensee), in *Moving Money: The Future of Consumer Payments*, M. Baily and R. Litan, eds., DC: Brookings Institution Press, 2009.

“How Catalysts Ignite: The Economics of Platform-Based Start-Ups,” in *Platforms, Markets and Innovation*, A. Gawer, ed., Cheltenham, UK and Northampton, MA, US: Edward Elgar, 2009.

“The Microsoft Judgment and its Implications for Competition Policy towards Dominant Firms in Europe,” (with C. Ahlborn), *Antitrust Law Journal*, 2009, 75(3), 887.

“Trustbusting Goes Global,” in *Trustbusters: Competition Policy Authorities Speak Out*, D. Evans and F. Jenny, eds., Boston: Competition Policy International, 2009.

“What You Need to Know About Twombly: The Use and Misuse of Economic and Statistical Evidence in Pleadings,” *CPI Antitrust Chronicle*, 2009, 7(2).

“Errata to ‘The economics of market coordination for the pre-Fed check-clearing system: A peek into the Bloomington (IL) node,’” (with H. Chang, M. Danilevsky, and D. Garcia-Swartz), *Explorations in Economic History*, 2008, 45(4).

“Markets with Two-Sided Platforms,” (with R. Schmalensee), in *Issues in Competition Law and Policy*, Vol. 1, American Bar Association, August 2008.

“Antitrust Issues Raised by the Emerging Global Internet Economy,” *Northwestern University Law Review*, 2008, 102(4), 285-306.

“Competition and Regulatory Policy for Multi-sided Platforms with Applications to the Web Economy,” *Concurrences*, 2008, 2, 57-62.

“The Lawful Acquisition and Exercise of Monopoly Power and its Implications for the Objectives of Antitrust,” (with K. Hylton), *Competition Policy International*, 2008, 4(2).

“The Analysis of Mergers that Involve Multisided Platform Businesses,” (with M. Noel), *Journal of Competition Law and Economics*, 2008, 4(3).

“The Economics of the Online Advertising Industry,” *Review of Network Economics*, 2008, 7(3).

“The Economics of Market Coordination for the Pre-Fed Check-Clearing System: A Peek into the Bloomington (IL) Node,” (with H. Chang, M. Danilevsky, and D. Garcia-Swartz), *Explorations in Economic History*, 2008, 45(4).

“The Role of Cost in Determining When Firms Offer Bundles and Ties,” (with M. Salinger), *Journal of Industrial Economics*, 2008, 56(1).

“Economics and the Design of Competition Law,” in *Issues in Competition Law and Policy*, W Collins, ed., Vol. 1, American Bar Association, August 2008.

“Has the Pendulum Swung Too Far?” (with H. Chang), *Regulation*, Winter 2007-2008. 30(4).

“Do Mobile Operators Have a Dominant Position in a Market for the Wholesale Termination of Calls from Fixed to Mobile?” *The Economics of Mobile Prices, Vodafone Policy Paper Series*, 2007, 7(4).

“Designing the Right Product Offerings,” (with K. Webster), *Sloan Management Review*, Fall 2007.

“Pick Your Pricing,” (with R. Schmalensee), *Chief Executive Magazine, Incorporated*, No. 227, Summer 2007.

“The Industrial Organization of Markets with Two-Sided Platforms,” (with R. Schmalensee), *Competition Policy International*, 2007, 3(1).

“Defining Markets That Involve Multi-Sided Platform Businesses: An Empirical Framework with an Application to Google’s Purchase of DoubleClick,” (with M. Noel), Reg-Markets Center Working Paper No. 07-18, 2007.

“A Pragmatic Approach to Identifying and Analyzing Legitimate Tying Cases,” (with A. Padilla and M. Salinger), in *European Competition Law Annual 2003: What is an Abuse of a Dominant Position?* Oxford: Hart Publishing, 2006.

“The Optimal Prosecution of Corporate Fraud: An Error Cost Analysis,” (with H. Chang), Working Paper (LECG and eSapience), 2006.

“A Somber Anniversary: Terrorism Insurance Five Years after 9/11,” (with D. Garcia-Schwartz and A. Layne-Farrar), Barbon Discussion Paper No. 06-02, 2006.

“Untying the Knot: The Case for Overruling Jefferson Parish,” Working Paper (LECG), 2006.

“An Empirical Analysis of Bundling and Tying: Over-the-Counter Pain Relief and Cold Medicines,” (with M. Salinger), in *Recent Developments in Antitrust: Theory and Evidence*, J. Choi, ed., Massachusetts: The MIT Press, 2006.

“The Economics of Software Platforms: An Application of Theory of Two-Sided Markets,” (with A. Hagiu and R. Schmalensee), *Industrial Organization and the Digital Economy*, G. Illing and M. Peitz, eds., (Massachusetts: The MIT Press, July 2006).

“Tying: The Poster Child for Antitrust Modernization” in *Antitrust Policy and Vertical Restraints*, R. Hahn, ed., DC: Brookings Institution Press, 2006.

“The Architecture of Product Offerings,” (with Karen Webster), Working Paper (University of Chicago Law School and Market Platform Dynamics), 2006.

“Testimony on Tying for the DOJ/FTC Hearings on Single-Firm Conduct,” *CPI Antitrust Chronicle*, 2006, 11(1).

“The Law and Economics of Tying,” (with C. Ahlborn, J. Padilla, and M. Salinger), *CPI Antitrust Chronicle*, 2006, 11(1).

“Defining Antitrust Markets When Firms Operate Two-Sided Platforms,” (with M. Noel), *Columbia Business Law Review*, 2005, 3.

“U.S. v. Microsoft: Did Consumers Win?” (with R. Schmalensee and A. Nichols), *Journal of Competition Law and Economics*, 2005, 1(3), 497-539.

“The Effect of Regulatory Intervention in Two-Sided Markets: An Assessment of Interchange-Fee Capping in Australia,” (with H. Chang and D. Garcia-Swartz), *Review of Network Economics*, 2005, 4(4).

REDACTED VERSION

“Designing Antitrust Rules for Assessing Unilateral Practices: A Neo-Chicago Approach,” (with A. Padilla), *University of Chicago Law Review*, 2005, 72(1), 73-98.

“Why Do Firms Bundle and Tie? Evidence from Competitive Markets and Implications for Tying Law,” (with M. Salinger), *Yale Journal on Regulation*, 2005, 22(1), 37-89.

“The Logic and Limits of the Exceptional Circumstances Test,” (with C. Ahlborn and A. Padilla), *Magill and IMS Health, Fordham Journal of International Law*, 2005, 28(4), 1109-1156.

“Analyzing Market Definition and Power in Multi-sided Platforms Markets,” (with M. Noel), Working Paper (University of Chicago Law School and University of California, San Diego), 2005.

“The Economics of Interchange Fees and Their Regulation: An Overview,” MIT Sloan Working Paper No. 4548-05, May 2005.

“How Economists Can Help Courts Design Competition Rules – An EU and US Perspective,” *World Competition: Law and Economics Review*, 2005, 28(1).

“2004: The Beginning of Change,” *American Banker-Bond Buyer*, 2005, 17(12).

“The Economics of Interchange Fees and Their Regulation: An Overview,” (with R. Schmalensee), MIT Sloan Working Paper No. 4548-05, 2005.

“Tying Under Article 82 EC and the Microsoft Decision: A Comment on Dolmans and Graf,” (with A. Padilla), *World Competition: Law and Economics Review*, 2005, 28(1), 93-99.

“The Changing Role of Economics in Competition Policy Decisions by the European Commission during the Monti Years,” (with C. Grave), *Competition Policy International*, 2005, 1(1).

“Excessive Prices: Using Economics to Define Administrable Legal Rules,” (with A. Padilla), *Journal of Competition Law & Economics*, 2005, 1(1), 97-122.

“Curing Sinus Headaches and Tying Law: An Empirical Analysis of Bundling Decongestants and Pain Relievers,” (with M. Salinger), CESifo Working Paper Series No. 1519, 2005.

“The Retailer Class Action Antitrust Case Against the Card Associations,” (with H. Chang and R. Schmalensee), *The Payment Card Economics Review*, Winter 2004, Vol. 2.

“More Than Money: The Development of a Competitive Electronic Payments Industry in the United States,” *The Payment Economics Review*, Winter 2004, Vol. 2.

“The Growth and Diffusion of Credit Cards in Society,” *The Payment Economics Review*, Winter 2004, Vol. 2.

REDACTED VERSION

“The Role of Credit Cards in Providing Financing for Small Businesses,” (with D. Blanchflower), *Payment Card Economics Review*, Winter 2004, Vol. 2.

“A Little Knowledge Can Be a Dangerous Thing: Price Controls in the Yellow Pages Industry,” (with A. Oldale and E. Wang), *European Competition Law Review*, October 2004, 25(10), 607-610.

“A Survey of the Economic Role of Software Platforms in Computer-Based Industries,” (with R. Schmalensee and A. Hagi), CESifo Working Paper Series No. 1314, 2004.

“Software Patents and Open Source: The Battle Over Intellectual Property Rights,” (with A. Layne-Farrar) *Virginia Journal of Law & Technology*, Summer 2004, 9(10).

“The Antitrust Economics of Tying: A Farewell to Per Se Illegality,” (with C. Ahlborn and A. Padilla), *Antitrust Bulletin*, 2004, 49(1/2), 287-341.

“Competition, Cooperation and Upheaval: So-called co-opetition in payment cards is a work in progress-one affected by rapidly changing business relationships and punctuated by court decisions. How will this dance play out?” *American Banker-Bond Buyer*, 2004, 17(1).

“What’s Yours Is Mine,” *The Wall Street Journal*, February 2004, at A7.

“Will Retailers Stampeded to Drop Signature Debit?” *American Banker*, January 2004.

“Managing the Maze of Multisided Markets,” *Strategy+Business*, Fall 2003.

“Regulators set bar high for foreign insurers,” (with M. Ross), *South China Morning Post*, November 2003.

“Some Empirical Aspects of Multi-Sided Platform Industries,” *Review of Network Economics*, 2003, 2(3).

“Competing Theories,” *The Wall Street Journal*, July 2003.

“Demand-Side Efficiencies in Merger Control,” (with A. Padilla), *World Competition Law and Economics Review*, 2003, 26(2).

“Has the Consumer Harm Standard Lost Its Teeth?” (with H. Chang and R. Schmalensee), in *High-Stakes Antitrust - The Last Hurrah?* R. Hahn, ed., Washington, DC: Brookings Institution Press, 2003.

“The Antitrust Economics of Multi-Sided Platform Markets,” *Yale Journal on Regulation*, 2003, 20(2).

“Everything You Wanted to Know about Two-Sided Markets,” (with P. Passell), *The Milken Institute Review*, Second Quarter 2003.

“Government Preferences for Promoting Open-Source Software: A Solution in Search of a Problem,” (with B. Reddy), *Michigan Telecommunications and Technology Law Review*, 2003, 9(2).

“Open-source Software Poses Challenges for Legal and Public Policy,” *Washington Legal Foundation*, 2003, 18(4).

“The Failure of E-Commerce Business: A Surprise or Not?” (with D. Garcia-Swartz and B. Martin-Keating), *European Business Organization Law Review*, 2002, 3.

“Tying in Platform Software: Reasons for a *Rule-of-Reason* Standard in European Competition Law,” (with A. Padilla and M. Polo), *World Competition Law and Economics Review*, 2002, 25(4).

“Who Owns Ideas? The War Over Global Intellectual Property,” *Foreign Affairs*, November/December 2002.

“The New Trustbusters—Brussels and Washington May Part Ways,” *Foreign Affairs*, January/February 2002, 81(1).

“Class Certification, the Merits, and Expert Evidence,” *George Mason Law Review*, 2002, 11(1).

“Class Certification and the Substantive Merits,” (with R. Bone), *Duke Law Journal*, 2002, 51(4).

“Some Economic Aspects of Antitrust Analysis in Dynamically Competitive Industries,” (with R. Schmalensee), in *Innovation Policy and the Economy*, Vol. 2, A. Jaffe, J. Lerner and S. Stern, eds., Cambridge, MA: MIT Press, 2002.

“The Rise and Fall of Leaders in Personal Computer Software,” (with A. Nichols and B. Reddy), in *Microsoft, Antitrust and the New Economy: Selected Essays*, D. Evans, ed., Norwell, MA: Kluwer Academic Publishers, 2002.

“Why Does Microsoft Charge So Little for Windows,” (with A. Nichols and B. Reddy), in *Microsoft, Antitrust and the New Economy: Selected Essays*, D. Evans, ed., Norwell, MA: Kluwer Academic Publishers, 2002.

“Dodging the Consumer Harm Inquiry: A Brief Survey of Recent Government Antitrust Cases,” *St. John’s Law Review*, 2001, 75(3).

“Is Free Software the Wave of the Future?” *The Milken Institute Review*, Fourth Quarter 2001.

“Industry Regulation Through Antitrust: The Clinton Legacy and the Bush Future,” *Regulation*, Fall 2001.

“Clinton’s Brave New Business World,” *Regulation*, Fall 2001, 24(3).

REDACTED VERSION

“The Problem of Interchange Fee Analysis: Case Without a Cause?” (with C. Ahlborn and H. Chang), *European Competition Law Review*, 2001, 22(8).

“An Analysis of the Government’s Economic Case in *U.S. v. Microsoft*,” (with A. Nichols and R. Schmalensee), *Antitrust Bulletin*, Summer 2001.

“A Monopolist Would Still Charge More for Windows: A Comment on Werden,” and “A Monopolist Would Still Charge More for Windows: A Comment on Werden’s Reply,” (with B. Reddy, A. Nichols and R. Schmalensee), *Review of Industrial Organization*, 2001, 18(3).

“Competition Policy in the New Economy: Is European Competition Law Up to the Challenge?” (with C. Ahlborn and A. Padilla), *European Competition Law Review*, May 2001, No. 5.

“An Analysis of the Government’s Economic Case in *U.S. v. Microsoft*,” in *Antitrust Bulletin*, with A. Nichols and R. Schmalensee, Summer 2001. Reprinted in *Microsoft, Antitrust and the New Economy: Selected Essays*, D. Evans, ed., Norwell, MA: Kluwer Academic Publishers, 2002.

“*U.S. v. Microsoft*, Remedy or Malady?” (with K. Elzinga and A. Nichols), *George Mason Law Review*, 2001, 9(3). Reprinted in *Microsoft, Antitrust and the New Economy: Selected Essays*, D. Evans, ed., Norwell, MA: Kluwer Academic Publishers, 2002.

“Antitrust and the New Economy,” *Computer Industry Committee Newsletter*, Spring 2001.

“The Competitive Effects of the Collective Setting of Interchange Fees by Payment Card Systems,” (with H. Chang), *The Antitrust Bulletin*, Fall 2000.

“Be Nice To Your Rivals: How the Government Is Selling an Antitrust Case without Consumer Harm in *U.S. v. Microsoft*,” (with R. Schmalensee), in *Did Microsoft Harm Consumers? Two Opposing Views*, AEI-Brookings Joint Center for Regulatory Studies: Washington DC, May 2000.

“Consumers Lose if Leading Firms are Smashed for Competing,” (with R. Schmalensee), in *Did Microsoft Harm Consumers? Two Opposing Views*, AEI-Brookings Joint Center for Regulatory Studies: Washington DC, May 2000.

“Economics for the Third Industrial Revolution,” (with M. Leder), *Viewpoint, The Marsh & McLennan Companies Journal*, 1999, No. 1.

“All the Facts That Fit: Square Pegs and Round Holes in *U.S. v. Microsoft*,” *Regulation*, November 1999, 22(4).

“Joint Ventures: *MountainWest*,” (with R. Schmalensee), in *The Antitrust Revolution*, 3rd edition, J. Kwoka and L. White, eds., New York: Oxford University Press, 1998.

“Some Economic Principles for Guiding Antitrust Policy Towards Joint Ventures,” (with H. Chang and R. Schmalensee), *Columbia Business Law Review*, 1998, No. 2.

“A Guide to the Antitrust Economics of Networks,” (with R. Schmalensee), *Antitrust*, Spring 1996.

“Some Economic Aspects of Standards in Network Industries and Their Relevance to Antitrust and Intellectual Property Law,” (with B. Reddy), *Intellectual Property Antitrust, Practicing Law Institute*, July 1996, Vol. 1.

“Defining Relevant Antitrust Markets with Special Application to Intellectual Property,” *Intellectual Property Antitrust, Practicing Law Institute*, July 1996, Vol. 1.

“A Tailored Approach to Diversity Planning,” (with M. Oh), *HR Magazine*, 1996, 41(6).

“Market Definition in Antitrust and Patent-Infringement Litigation,” *Practicing Law Institute*, July 1995, Vol. 1.

“Economic Aspects of Payment Card Systems and Antitrust Policy Toward Joint Ventures,” (with R. Schmalensee), *Antitrust Law Journal*, Spring 1995.

“Retrospective Bias in the Displaced Worker Surveys,” (with L. Leighton), *Journal of Human Resources*, Winter 1995.

“Industry Dynamics and Small Firms,” in *Births and Start-up of Small Firms*, F. Cicogna, ed., Amsterdam: Kluwer Publishing Co., 1995.

“Common Statistical Fallacies in Pattern-and-Practice Employment Discrimination Cases,” *American Employment Law Council*, October 1995.

“Entrepreneurship and Small Business Growth: A Case Study,” (with Z. Acs), in *Advances in the Study of Entrepreneurship*, G. Libecap, ed., Greenwich, Ct.: JAI Press, 1993.

“An Economic Approach to the Mitigation of Damages in Age Discrimination Cases,” *Advanced Employment Law and Litigation: ALI-ABA Course of Study Materials*, Vol. 2, Washington, DC: American Law Institute-American Bar Association Committee on Continuing Professional Education, 1992.

“Small Business Formation and Success by Unemployed Workers,” (with L. Leighton), *Small Business Economics*, 1990.

“Trade Associations and the Exchange of Price and Nonprice Information,” in *Annual Proceedings of the Fordham Corporate Law Institute: 1992 and EEC/U.S. Competition and Trade Law*, B. Hawk, ed., 1990.

“An Estimated Model of Entrepreneurial Choice Under Liquidity Constraints,” (with B. Jovanovic), *Journal of Political Economy*, 1989, 97(4), 808-827. Reprinted in *Small Firms and Economic Growth*, International Library of Critical Writings in Economics, Z. Acs, ed., Cheltenham, UK: Edward Elgar Publishing, Ltd., 1995.

“Some Empirical Aspects of Entrepreneurship,” (with L. Leighton), *American Economic Review*, 1989, 79(3), 519-535. Reprinted in *Entrepreneurship*, International Library of Critical Writings in Economics, M. Casson, ed., Hants, England: Edward Elgar Publishing Co., 1990.

“Why Do Smaller Firms Pay Less?” (with L. Leighton), *Journal of Human Resources*, 1989, 24(4), 299-318. Reprinted in *Small Firms and Economic Growth*, Z. Acs, ed., Cheltenham, UK: Edward Elgar Publishing, Ltd., 1995.

“Small Business Economics,” (with W. Brock), *Small Business Economics*, 1989, 1(1), 7-20. Reprinted in *Small Firms and Economic Growth*, Z. Acs, ed., Cheltenham, UK: Edward Elgar Publishing, Ltd., 1995.

“Tests of Alternative Theories of Firm Growth,” *Journal of Political Economy*, 1987, 95(4), 657-674. Reprinted in *Small Firms and Economic Growth*, Z. Acs, ed., Cheltenham, UK: Edward Elgar Publishing, Ltd., 1995.

“The Determinants of Changes in U.S. Self-Employment, 1968-1987,” *Small Business Economics*, 1989, 1(2), 111-119.

“The Relationship Between Firm Growth, Size and Age: Estimates for 100 Manufacturing Industries,” *Journal of Industrial Economics*, June 1987. Reprinted in *The Empirical Renaissance in Industrial Economics*, R. Schmalensee, ed., London: Basil Blackwell, 1988.

“Natural Monopoly and the Bell System: Response to Charnes, Cooper and Sueyoshi,” (with J. Heckman), *Management Science*, 1988, 34(1), 27-38.

“Empirical Analysis of the Size Distribution of Farms: Discussion,” *American Journal of Agricultural Economics*, 1987, 69(2), 484-485.

“The Differential Effect of Regulation Across Plant Size: Comment on Pashigian,” *Journal of Law and Economics*, 1986, 29(1), 187-200.

“A Test for Subadditivity of the Cost Function with an Application to the Bell System,” *American Economic Review*, with J. Heckman, September 1986, 76(4), 856-858.

“The Economics of Regulatory Tiering,” (with W. Brock), *RAND Journal of Economics*, 1985, 16(3), 398-409. Reprinted in *Small Firms and Economic Growth*, Z. Acs, ed., Cheltenham, UK: Edward Elgar Publishing, Ltd., 1995.

“The Audience Revenue Relationship for Local Broadcast Stations,” (with F. Fisher and J. McGowan), *Bell Journal of Economics*, 1980, 11(2), 694-708.

“Cross Country Prediction of Consumption Patterns,” *Economic Letters*, 1979, 3(1), 85-88.

Testimony, 2002-Present

Trial Testimony

Qihoo 360 v. Tencent. Testified in support of Tencent before the Supreme People's Court, People's Republic of China, concerning Qihoo 360's market definition and abuse of dominance claims against Tencent. (Written testimony filed September 2013 for November 2013 trial).

Presidential Emergency Board No. 243, National Mediation Board, Case Nos. A-13569, A-13570, A-13572, A-13573, A-13574, A-13575, and A-13592. Testified in support of the National Railway Labor Conference concerning wages, benefits, and work rules for railroad workers. (October 2012).

Case T-201/04, *Microsoft v. Commission of the European Communities*. Testified in support of Microsoft before the Court of the First Instance of the European Union concerning the Commission's determination that Microsoft had abused its dominant position by refusing to license certain information regarding its operating system and by tying a media player to its Windows operating system. (April 2006).

Case T-201/04, *Microsoft v. Commission of the European Communities*. Testified before the Court of the First Instance of the European Union in support of Microsoft's application for a suspension of remedies during its appeal of a Commission decision. (October 2004).

In the Matter of the United Federation of Teachers, Local 2, AFT, AFL-CIO v. Board of Education of the City School District of the City of New York, Case Nos. M201-203, M201-215. Testified for the defendant in an arbitration concerning teacher compensation. (December 2002).

Deposition Testimony

MarchBanks Truck Service, Inc., et al. v. Comdata Network, Inc., et al., Case No. 07-1078-JKG. Testified for defendant concerning allegations of anticompetitive behavior with respect to Comdata's agreements with certain truck stop chains. (August 2013).

Meredith Corporation et al. v. SESAC, Case No. 09 Civ. 9177 (PAE). Testified for defendant concerning allegations of anticompetitive behavior with respect to the blanket licensing of local television music performance rights. (May 2013).

South Atlanta Motor Sales, Inc. v. Southeast Toyota Distributors, LLC, Case No. 30-114-Y-00229-07. Testified for the defendant in an arbitration concerning a racial discrimination claim. (November 2007).

Mitchell v. Metropolitan Life Insurance Company, No. 01-civ-2112 (S.D.N.Y.). Testified for the defendant concerning statistical analysis of wages and promotions by gender. (February 2003).

REDACTED VERSION

Rodolico et al. v. Unisys Corporation, CV-95-3653 (E.D.N.Y.). Testified for the defendant concerning statistical analysis of allegations of age discrimination in a layoff determination. (March 2002).

Delores Kaminsky, et al. v. First Union Corporation, No. 98-162 (E.D. Pa.). Testified for the defendant concerning the statistical evaluation of an age discrimination. (January 2002).

List of Materials Relied On

Case Materials

Terrence Hendershott and Aviv Nevo, Statement Regarding the SEC's Proposed Order Concerning the Pricing of Depth-of-Book Market Data, January 26, 2015, including documents cited in the report and reliance materials provided.

Expert Report of Janusz A. Ordover, January 26, 2015, including documents cited in the report and reliance materials provided.

Expert Report of Bernard S. Donefer, March 6, 2015.

NASDAQ Supplement to 2nd Discovery Response, including attachments.

[REDACTED], NASDAQ000661-674.

NASDAQ, GDP Review/1.18.11, NASDAQ000221-251.

Materials from Other Proceedings Concerning Depth-of-Book Data

David S. Evans, "An Economic Assessment of Whether 'Significant Competitive Forces' Constrain an Exchange's Pricing of Its Depth-of-Book Market Data," July 10, 2008.

David S. Evans, "Response to Ordover And Bamberger's Statement Regarding The SEC's Proposed Order Concerning The Pricing of Depth-of-Book Market Data," October 10, 2008.

David S. Evans, "Response to Ordover and Bamberger's Statement Regarding NASDAQ's Proposed Rule Change Concerning The Pricing of Depth-of-Book Market Data," March 21, 2011.

Statement of Janusz Ordover and Gustavo Bamberger, December 29, 2010.

NetCoalition v. SEC, 615 F.3d 525, 542 (D.C. Cir. 2010).

NetCoalition v. SEC, 715 F.3d 342, 345 (D.C. Cir. 2013).

Proposed Rule Change Filings by Exchanges

Notice of Filing of Proposed Rule Change Relating to Approval of Market Data Fees for NYSE Arca Data, File No. SR-NYSEArca-2006-21, Release No. 34-53952, October 12, 2006.

REDACTED VERSION

Notice of Filing and Immediate Effectiveness of Proposed Rule Change to Modify Rule 7019, File No. SR-NASDAQ-2010-110, Release No. 34-62907, September 14, 2010.

Notice of Filing and Immediate Effectiveness of Proposed Rule Change to Reorganize NASDAQ's Rules Governing the Fees Applicable to NASDAQ's Depth-of-Book Market Data, File No. SR-NASDAQ-2012-042, Release No. 66740, April 5, 2012.

Notice of Filing and Immediate Effectiveness of Proposed Rule Change Amending the Fees for NYSE ArcaBook, File No. SR-NYSEArca-2014-72, Release No. 34-72560, July 8, 2014.

Notice of Filing and Immediate Effectiveness of a Proposed Rule Change to Establish Fees for the BATS One Feed, and Amend Fees for BZX Top and BZX Last Sale, File No. SR-BATS-2015-11, Release No. 34-74285, February 18, 2015.

Economic and Antitrust Literature

Allen, R. G. D. (1938), *Mathematical Analysis for Economists*, Macmillan.

Areeda, Phillip E. and Herbert Hovenkamp, *Antitrust Law: An Analysis of Antitrust Principles and Their Application*, September 2014 Update, Wolters Kluwer.

Baumol, William J., John C. Panzar and Robert D. Willig (1982), *Contestable Markets and the Theory of Industry Structure*, Harcourt Brace Jovanovich.

Bodie, Zvi, Alex Kane and Alan J. Marcus (1998), *Investment*, 8th Edition, McGraw-Hill.

Cantillon, Estelle and Pai-Ling Yin (2011), "Competition between Exchanges: A Research Agenda", *International Journal of Industrial Organization*, Vol. 29 No. 3.

Eisenmann, Thomas R., Geoffrey Parker, and Marshall W. Van Alstyne (2006), "Strategies for Two-Sided Markets," *Harvard Business Review*, October Issue.

Evans, David S. (2003), "Some Empirical Aspects of Multi-sided Platform Industries," *Review of Network Economics*, Vol. 2 No. 3, pp. 191-209.

Evans, David S. and Richard Schmalensee (2015), "The Antitrust Analysis of Multi-Sided Platform Businesses," in in Roger D. Blair and D. Daniel Sokol (eds.), *The Oxford Handbook on International Antitrust Economics Vol. 1*, Oxford University Press.

Grossman, Sanford J. and Joseph E. Stiglitz (1980), "On the Impossibility of Informationally Efficient Markets", *American Economic Review*, Vol. 70, No. 3.

Kahn, Alfred E. (1988), *The Economics of Regulation*, MIT Press.

Kaplow, Louis and Carl Shapiro (2007), “Antitrust” in A. Mitchell Polinsky and Steven Shavell (eds.), *Handbook of Law and Economics, Vol. 2*, North-Holland.

Krueger, Malte (2009), “The Elasticity Pricing Rule for Two-Sided Markets: A Note,” *Review of Network Economics*, Vol. 8, No. 3, pp. 271-278.

Landes, William M. and Richard A. Posner (2003), *The Economic Structure of Intellectual Property Law*, Harvard University Press.

Olson, Mancur (1971), *The Logic of Collective Action: Public Goods and the Theory of Groups*, 2nd Edition, Harvard University Press.

Pindyck, Robert S. and Daniel L. Rubinfeld (2012), *Microeconomics*, 8th Edition, Prentice Hall.

Posner, Richard A. (2001), *Antitrust Law*, 2nd Edition, University of Chicago Press.

Prager, Robin A., Mark D. Manuszak, Elizabeth K. Kiser, and Ron Borzekowski (2009), “Interchange Fees and Payment Card Networks: Economics, Industry Developments, and Policy Issues,” Finance and Economics Discussion Series 2009-23, Board of Governors of the Federal Reserve System, available at <http://www.federalreserve.gov/pubs/feds/2009/200923/200923pap.pdf>.

Rochet, Jean-Charles and Jean Tirole (2003), “Platform Competition in Two-Sided Markets,” *Journal of The European Economic Association*, Vol. 1, No. 4, pp. 990-1029.

Rochet, Jean-Charles and Jean Tirole (2006), “Two-Sided Markets: A Progress Report,” *The RAND Journal of Economics*, Vol. 37, No. 3, pp. 645-67.

Tirole, Jean (1988), *The Theory of Industrial Organization*, MIT Press.

U.S. Department of Justice and the Federal Trade Commission (2010), *Horizontal Merger Guidelines*, pp. 10-11.

Weyl, E. Glen (2010), “A Price Theory of Multi-Sided Platforms,” *American Economic Review*, Vol. 100, No. 4, pp. 1642-1672.

Other Materials from Web Sites

BATS, “BATS One Feed”, available at http://cdn.batstrading.com/resources/market_data/products/bats_bats-one-feed.pdf.

Direct Edge Market Data Notice #12-02: Market Data Fees, February 22, 2012, available at <http://www.thetradingmesh.com/pg/newsfeeds/hftreview/item/38952/direct-edge-market-data-notice-1202-market-data-fees>.

REDACTED VERSION

NASDAQ, Investor Presentation, December, 2014, slide 7, available on NASDAQ Events & Presentations web page at <http://ir.nasdaqomx.com/events.cfm>.

Comments of Lee Shavel, NASDAQ CFO, at Credit Suisse 16th Annual Financial Services Forum, p. 3 (emphasis added), available on NASDAQ Events & Presentations web page at <http://ir.nasdaqomx.com/events.cfm>.

Reuters, “BATS exchanges to start charging for market data,” April 18, 2013, available at <http://www.reuters.com/article/2013/04/18/batsglobalmarkets-marketdata-fees-idUSL2N0D52AC20130418>

Work Papers

Aggregated HHI excluding TRF.xlsx

Exhibit 3 and 4.xlsx

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Monthly fee examples.sas

1. by year leave or join Nasdaq.sas
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**AN ECONOMIC ASSESSMENT OF WHETHER
“SIGNIFICANT COMPETITIVE FORCES”
CONSTRAIN AN EXCHANGE’S PRICING OF ITS
DEPTH-OF-BOOK MARKET DATA**

Dr. David S. Evans

**LECG, LLC
Head of Global Competition Policy Practice
Managing Director**

**University College London
Executive Director, Jevons Institute for Competition Law and Economics
Visiting Professor**

**University of Chicago Law School
Lecturer**

July 10, 2008

I. INTRODUCTION¹

NYSE Arca, Inc. (Exchange) requested that the Securities and Exchange Commission (SEC) approve a proposed rule change (the “Proposal”) that would allow the Exchange to establish certain fees for depth-of-book market data (also known as unconsolidated, or non-core, data).² The SEC has issued a Notice that presents a Proposed Order to approve that request and the SEC’s basis for doing so.³

In the Proposed Order, the SEC describes what it calls a “market-based” approach to its oversight of depth-of-book data pricing and other terms.⁴ The SEC bases its analysis on whether the exchange is subject to “significant competitive forces”⁵ in setting the terms, including any applicable fees, of its proposal for unconsolidated data. If it believes the answer is yes, then the SEC will approve the proposal unless it determines there is a “substantial countervailing basis to find that the terms nevertheless fail to meet an applicable requirement of the Exchange Act or the rules thereunder.”⁶ If it believes that the answer is no, then the SEC will require the exchange to provide “a substantial basis, other than competitive forces, in its proposed rule change demonstrating that the terms of the proposal are equitable, fair, reasonable, and not unreasonably discriminatory.”⁷

Based on this framework, the SEC presents its preliminary findings with respect to the Exchange’s Proposal. The SEC concludes that “[a]t least two broad types of significant competitive forces applied to NYSE Arca in setting the terms of

¹ This Report was prepared at the request of NetCoalition.

² Filing of Proposed Rule Change Relating to Approval of Market Data Fees for NYSE Arca Data, SEC Release No. 34-53952, 71 FR 33496 (June 9, 2006). As I discuss below, for the purpose of analyzing competition among exchanges, all exchanges owned by the same corporate parent should be aggregated because they are controlled by the same economic agent, which seeks to maximize the profits of the combined operations. Thus, for purposes of economic analysis, NYSE Arca and NYSE should be considered a single entity, NYSE Group.

³ Proposed Order Approving Proposal by NYSEArca, Inc. to Establish Fees for Certain Market Data and Request for Comment, SEC Release No. 34-57917, 73 Fed. Reg. 32751 (June 4, 2008) [hereinafter “Proposed Order”].

⁴ *Id.* at 32761.

⁵ *Id.* at 32762. For the purposes of this Report, I am assuming as correct the standard that is specified in the Proposed Order—that proposed terms for the sale of depth-of-book data are “equitable, fair, reasonable, and not unreasonably discriminatory” if those terms are subject to “significant competitive forces.” In particular, I am not addressing whether depth-of-book data necessarily constitute a relevant antitrust market but am addressing only whether “significant competitive forces” would necessarily constrain the setting of depth-of-book fees by the exchanges and thereby prevent the exercise of market power over those fees.

⁶ *Id.*

⁷ *Id.*

its Proposal.”⁸ One source of competitive constraint claimed by the SEC is the availability of alternatives to an exchange’s depth-of-book data. The other source is competition for order flow among trading venues, including exchanges, electronic communication networks (ECNs) and alternative trading systems (ATSS).

This Report examines whether the SEC’s conclusion is sound as a matter of economics and whether it is supported by the evidence the SEC presents. I have been asked to assume that the SEC is correct that competition exists for order flow and to address the question of whether that assumed competition would preclude an exchange from exercising significant market power over the pricing of depth-of-book market data.⁹

I find that the SEC’s preliminary conclusion regarding the existence of significant competitive constraints on the Exchange’s pricing of depth-of-book data is not supported by the analysis and evidence that the SEC presents. On the contrary, the economics and evidence indicate that:

- the Exchange likely has significant market power over the pricing of its depth-of-book market data;
- the availability of the alternative sources of depth-of-book data that the SEC identifies would not constrain that market power; and
- competition for order flow would not constrain that market power.

The remainder of this Report is organized as follows. Section II explains the flaws in the SEC’s conclusion that economically significant alternatives to an exchange’s depth-of-book data exist and that such alternatives constrain the exchange’s pricing of its depth-of-book data. Section III explains the flaws in both

⁸ *Id.* at 32763.

⁹ Market power refers to the ability to charge a price that exceeds the price that would be charged under competitive conditions. See DENNIS W. CARLTON & JEFFREY M. PERLOFF, *MODERN INDUSTRIAL ORGANIZATION* 642 (4th ed. 2005). Since most firms have some limited market power, economists typically focus on significant market power. Under the *Horizontal Merger Guidelines*, the ability to raise price above the competitive level by 5-10 percent for a sustained period of time is considered significant market power. See U.S. DEP’T. OF JUSTICE AND THE FED. TRADE COMM’N, *HORIZONTAL MERGER GUIDELINES* (1992, Revised 1997).

the SEC's premise and conclusion that competition for order flow constrains the pricing of depth-of-book data. Section IV concludes.

II. THE ALTERNATIVES IDENTIFIED BY THE SEC DO NOT SIGNIFICANTLY CONSTRAIN THE PRICING OF AN EXCHANGE'S DEPTH-OF-BOOK DATA AND ARE NOT SUBSTITUTES.

The SEC concludes that alternative sources of information “impose significant competitive pressures on an exchange in setting fees for its depth-of-book order data.”¹⁰ It identifies four categories of data that are supposedly alternatives that constrain an exchange in pricing its depth-of-book data:

1. depth-of-book data from other trading venues;
2. the exchange's own consolidated data;
3. “pinging” the various markets by routing oversized marketable limit orders; and
4. the threat of independent distribution of depth-of-book data by securities firms and data vendors.¹¹

A. The SEC Does Not Adequately Support Its Claims of Alternative Products.

The SEC does not present any evidence to support its claim that the four alternatives that it identifies are in fact economic substitutes for depth-of-book data that would constrain an exchange's pricing of that data. Ordinarily, an analysis of whether two products are substitutes for each other would consider whether consumers would readily switch between products in response to changes in relative prices. The SEC provides no evidence that any of the alternative sources of data it mentions are treated as substitutes by market participants, allow market participants

¹⁰ Proposed Order, *supra* note 3, at 32766.

¹¹ *Id.* at 32765.

to achieve the same objective, or have similar costs. The SEC simply lists alternatives and asserts that they are substitutes. That is not enough.

Common and well-accepted methods are used to determine whether products are sufficiently close substitutes such that an increase in the price of one product would lead consumers to substitute another product and thereby make that price increase unprofitable. A basic inquiry is whether products serve the same purpose from the standpoint of the customer. If a consumer were considering the substitutes for a BMW, she probably would not consider a bicycle as a substitute because, for virtually all uses, a BMW and a bicycle do not serve the same purposes in a reasonably interchangeable way. Even within the category of automobiles, low-end automobiles such as Kias may not be substitutes for high-end cars such as BMWs because potential buyers of BMWs would not usually consider a Kia as a reasonably substitutable alternative to a BMW.

As an alternative to the principle of reasonable interchangeability, the SSNIP (small but significant non-transitory increase in price) test is commonly used by the U.S. Department of Justice, the Federal Trade Commission, the European Commission, and many other competition authorities to identify which products are sufficiently close substitutes so as to constrain the exercise of market power.¹² The SSNIP test poses the hypothetical question of whether a producer could profitably increase the price of a product or group of products by 5-10 percent above the competitive level. If it is possible, then that product or group of products constitutes a market and products outside that market are not sufficiently strong substitutes to defeat an attempted price increase. If it is not possible, then other products must provide good enough substitutes and should be included in the market as competitive forces that constrain the exercise of market power.

The SEC neither purports to define a relevant market nor presents any evidence that demonstrates that its proffered alternatives to an exchange's depth-of-book data are reasonably interchangeable with such data or would constrain the

¹² EINER ELHAUGE & DAMIEN GERADIN, GLOBAL COMPETITION LAW AND ECONOMICS 287-288 (2007).

pricing of such data under the SSNIP (or any other) test. As I discuss next, none of those alternatives is likely a significant constraint on the exchanges' pricing of depth-of-book data.

B. The Alternative Sources of Depth-of-Book Data Identified by the SEC Are Likely Not Substitutes for an Exchange's Depth-of-Book Data.

The purpose of assessing whether substitutes exist for NYSE Arca (or any other exchange's) depth-of-book data is to identify products that will act as competitive constraints if the Exchange attempts to exercise market power in its pricing of depth-of-book data. The relevant substitutes must therefore come from independent competitors that set prices independently of the Exchange. If another potential source of depth-of-book data is controlled by the same corporate entity, that product does not provide an effective competitive constraint—the corporate entity's profit-maximizing incentive is to coordinate the pricing of both products, not to use one to compete with the other.¹³

For the purposes of analyzing market power over depth-of-book data, the combined share of NYSE and NYSE Arca is relevant, not their respective individual shares. The pricing of depth-of-book data for both NYSE and NYSE Arca are controlled by the same corporate entity, NYSE Group. To the extent that, hypothetically, a price increase in NYSE Arca's depth-of-book data results in shifts to purchases of NYSE's depth-of-book data, those are revenues that are retained by the same corporate entity.

The SEC observes that NYSE and NYSE Arca “operate as separate trading centers with separate limit order books, and each distributes its depth-of-book order data separately for separate fees.”¹⁴ That is beside the point. Even if NYSE and

¹³ For that reason, related corporate entities are treated as a single economic actor for antitrust purposes. *Cf. Copperweld Corp. v. Independence Tube Corp.*, 467 U.S. 752, 769-72 (1984). In *Copperweld*, the Supreme Court rightly observed that, where entities are not “separate economic actors pursuing separate economic interests,” they should be considered “a single actor” on the marketplace. *Id.* at 769-70. The Court further stated that “there can be little doubt that the operations of a corporate enterprise organized into divisions must be judged as the conduct of a single actor. . . . A division within a corporate structure pursues the common interests of the whole, rather than interests separate from those of the corporation itself.” *Id.* at 770.

¹⁴ Proposed Order, *supra* note 3, at 32763, n.184.

NYSE Arca are operated as separate exchanges, the same corporate entity controls and profits from both exchanges and will coordinate the pricing of the two. Aggregating the shares of distinct products sold by the same firm is the routine practice in merger review and in the antitrust case law.

I now consider the four data sources that the SEC claims are alternatives that significantly constrain the pricing of an exchange's depth-of-book data.

1. Depth-of-book data from other trading venues

The SEC first asserts that depth-of-book data from other trading venues constrain the Exchange's pricing of its own depth-of-book data. At the outset, we note that each exchange's depth-of-book data are unique to that exchange. Depth-of-book data from NYSE, for example, reflect different orders from depth-of-book data from Nasdaq or BATS or Direct Edge. To have a reasonably comprehensive picture of liquidity below the top of the book, depth-of-book data from all exchanges with substantial trading are required. That proposition underlies the rules and regulations that have led to the consolidated tape—*i.e.*, the requirement that all trading venues contribute their data so that the national-best-bid-and-offer and the last-transaction data can be compiled and displayed to the investment community.

In addition, depth-of-book data from different trading venues reflect liquidity of substantially different magnitudes and quality. Nasdaq and NYSE Group, for example, operate by far the leading exchanges for trading in U.S.-listed equities. Based on the statistics reported by the SEC for December 2007, NYSE accounts for 22.6 percent of all trading volume and NYSE Arca accounts for 15.4 percent. Thus, the NYSE Group accounts for 38.0 percent of all trading volume.¹⁵ Nasdaq accounts for 29.1 percent of all trading volume.¹⁶ NYSE Group and Nasdaq control the only

¹⁵ *Id.* at 32763 (Table 1). NYSE is in the process of acquiring the American Stock Exchange, which accounts for a further 0.8 percent. Press Release, NYSE Euronext, NYSE Euronext to Acquire the American Stock Exchange (Jan. 18, 2008), available at <http://www.nyse.com/press/1200568235016.html>.

¹⁶ *Id.* at 32763 (Table 1). Nasdaq has also announced the pending acquisition of the Philadelphia Stock Exchange, which accounts for a further 0.1 percent. See Press Release, NASDAQ, NASDAQ to Acquire Philadelphia Stock Exchange (Nov. 7, 2007), available at <http://www.nasdaq.com/newsroom/news/newsroomnewsStory.aspx?textpath=pr2007\ACQPMZ200711070730P RIMZONEFULLFEED130788.htm&year=11/07/2007%20+7%3a30AM>.

trading venues of any significant size. While there are smaller trading venues—primarily BATS and Direct Edge—they account for substantially less trading volume.

In analyzing market power over depth-of-book data, it is important to recognize that the depth-of-book data for a given stock are unique. The depth-of-book data on trading in AT&T are distinct from the depth-of-book data on trading in Google. A trader interested in trading AT&T stock needs data on AT&T trading—if one exchange has a significant share of trading in AT&T, data from another exchange that has a significant share of trading in Google is not directly pertinent to the AT&T investment decision.

The dominance of NYSE Group and Nasdaq in pertinent liquidity is even more apparent when we consider separately trading in NYSE-listed and Nasdaq-listed stocks. For trading in NYSE-listed stocks in December 2007, NYSE Group exchanges had a 53.6 percent share and Nasdaq had a 18.4 share.¹⁷ By contrast, the SEC reported shares for BATS of 5.1 percent and for Direct Edge of 3.0 percent for trading in NYSE-listed stocks.¹⁸ For trading in Nasdaq-listed stocks in December 2007, Nasdaq had a 45.4 percent share and NYSE Group had a 14.8 percent share.¹⁹ By contrast, the SEC reported shares for BATS of 7.9 percent and for Direct Edge of 6.9 percent.²⁰

A broker-dealer interested in depth-of-book data is unlikely to ignore the depth-of-book data available from the leading trading venues. The value of the depth-of-book data from trading venues that have a significant share of trading volume in a significant group of securities is higher than the value of depth-of-book data from a trading venue that does not have such a share.

The availability of data from other trading venues therefore does not effectively constrain the prices that significant venues can charge. This finding is

¹⁷ I have used the same source and time period for these shares as reported by the SEC. See ArcaVision, available at <http://www.arcavision.com>. NYSE had a share of 41.2% while NYSE Arca had a share of 12.4%.

¹⁸ Proposed Order, *supra* note 3, at 32763.

¹⁹ See ArcaVision, available at <http://www.arcavision.com>. NYSE does not offer trading of Nasdaq-listed stocks.

²⁰ Proposed Order, *supra* note 3, at 32763.

confirmed by the asymmetry that the SEC acknowledges in the pricing of depth-of-book data by different trading venues.²¹ Venues without significant liquidity in a substantial number of securities may have difficulty charging significant (or any) prices for their market data and may have difficulty getting their market data distributed (in the absence of regulatory requirements) while venues with significant liquidity—NYSE Group and Nasdaq—can and do charge significant prices for their data as I discuss further below.

2. Consolidated data

The SEC's second claimed alternative is consolidated data. The consolidated data consist of the national best bid and offer for a stock and the last sale for a stock reported in any market.²² Depth-of-book data, however, reflect liquidity *below the top-of-book* that is different from, and in addition to, the liquidity reflected by consolidated data. As NYSE Arca explains:

Now more than ever, in order to see and estimate true market liquidity, you need to look beyond just the top of book price. When comparing all available liquidity at the inside to ArcaBook, you'll see that within five cents of the NBBO, ArcaBook data may provide six times more liquidity than is offered by all market centers' top of book at the market inside.²³

The customers that purchase depth-of-book data are those that need the significant additional information on liquidity provided by depth-of-book data.²⁴ No rational purchaser would pay significant fees in excess of the fees that he or she pays for consolidated data to acquire depth-of-book data if the two were good substitutes.

²¹ *Id.* at 32769; *see also* Section III for a discussion of this issue.

²² *Id.* at 32770.

²³ *See* ArcaBook: Speed, Depth and Value at a Competitive Price, *available at* <http://www.nyxdata.com/nyxdata/DesktopModules/Bring2mind/DMX/Download.aspx?PortalId=0&EntryId=6095>.

²⁴ The SEC also states that “only 19,000 professional users purchase Nasdaq’s depth-of-book data product and 420,000 professional users purchase core data in Nasdaq-listed stocks.” (As I discuss below, *see infra* note 41, this figure may understate the number of professional users of all of Nasdaq’s depth-of-book data products.) The SEC believes that this strongly suggests that no exchange has monopoly pricing power for its depth-of-book data because the substantial majority of professional users either do not believe they need the data or that the cost exceeds the value they place on the data. That is the wrong conclusion to draw. Monopolists commonly set prices to restrict output—the fact that a monopolist is selling only to a subset of potential customers is consistent with its having set prices above competitive levels so that only those that value its product highly will purchase the product.

If the price of depth-of-book data were increased, the consumers of those data would not increase their purchases of consolidated data since they already consume those data and the data do not reflect additional liquidity. Likewise, if the price of depth-of-book data were decreased, the consumers of those data would not likely purchase less consolidated data. Thus, consolidated and depth-of-book data are not economic substitutes and the former cannot constrain the pricing of the latter.

3. “Pinging”

“Pinging” orders are “oversized marketable limit orders [designed] to access an exchange’s total liquidity available at an order’s limit price or better.”²⁵ Pinging orders are used to expose liquidity that is hidden in reserve orders on an exchange. A pinging order will execute against any hidden liquidity, and thus reveal depth information that is not available from the exchange’s depth-of-book data. Pinging orders find liquidity that is not displayed. They do not gather information on depth-of-book data that are available for purchase.

The SEC asserts that the use of pinging may be expanded into a viable substitute for an exchange’s depth-of-book data. The SEC appears to argue that, because pinging orders extract data that are not available from the exchange’s depth-of-book data, and is superior in *that* respect, pinging can also serve as a substitute to the depth-of-book data. But the SEC has provided no evidence that pinging provides a viable alternative that would significantly constrain the pricing of depth-of-book data by the exchanges.

In fact, pinging does not appear capable of replicating an exchange’s depth-of-book data. First, pinging places limit orders that incur the risk of execution to gather the data. If the execution is not optimal, the trade can involve a cost greater than the market data.

Second, the information on liquidity returned from a pinging order is substantially different from the information provided by an exchange’s depth-of-

²⁵ Proposed Order, *supra* note 3, at 32765.

book data. When a pinging order is executed, the execution reveals only that the number of shares specified in the order were available at the specified price. The executed order does not indicate whether more liquidity at that price was available or whether any liquidity beyond that price remains available.

Alternatively, when a pinging order is not executed, one knows only that the specifically requested liquidity at that price is not available. But that information does not indicate if a lesser amount of liquidity at or beyond that price is available.

Pinging is thus an inferior substitute, if a substitute at all, for depth-of-book data. Despite the SEC's suggestion, an increase in the price of depth-of-book data would not plausibly result in a significant increase in pinging, and a decrease in the price of depth-of-book data would not plausibly result in a significant decrease in pinging. The SEC has not presented any evidence to the contrary.

4. Collaboration

The SEC's claim that the threat of potential entry by a collaborative venture of securities firms currently imposes a significant competitive constraint on the Exchange's pricing of its depth-of-book data is speculative, implausible, and unsubstantiated.

The U.S. Department of Justice and the Federal Trade Commission's *Horizontal Merger Guidelines* require entry to be "timely, likely, and sufficient in its magnitude, character and scope to deter or counteract" attempts to exercise market power.²⁶ To be timely, entry needs to take place within two years.²⁷ To be likely, entry needs to be profitable at competitive prices.²⁸ And to be sufficient, entry needs to deter or counteract the exercise of market power.²⁹

²⁶ U.S. DEP'T. OF JUSTICE AND THE FED. TRADE COMM'N., HORIZONTAL MERGER GUIDELINES § 3.0 (1992, Revised 1997).

²⁷ *Id.* § 3.2.

²⁸ *Id.* § 3.3. Specifically, the *Horizontal Merger Guidelines* use profitability at pre-merger prices as the relevant standard.

²⁹ *Id.* § 3.4.

The SEC has provided no evidence that the threat of entry by a collaborative effort is timely, likely or sufficient so as to impose a current competitive constraint on the Exchange's pricing of depth-of-book data. In fact, securities firms almost certainly could not successfully collaborate in a timely and sufficient manner so as to impose a significant constraint on the ability of the Exchange to exercise market power over its depth-of-book data.

Consider the hurdles and expense that the securities firms would face to provide complete depth-of-book data through collaboration. To provide such depth-of-book data, hundreds of securities firms would have to come together, agree to join a collaborative effort, and provide the depth-of-book data on a timely basis. To form a collaborative enterprise, one or more securities firms would have to act as entrepreneurs to organize their direct competitors, enlist still other securities firms in the venture, establish governance and voting structures, and form an on-going joint venture that compiles and distributes comprehensive data on a timely basis. The organizational costs of doing so are likely prohibitive.

The competing firms, which are diverse, would also have to agree how to split the costs and revenues associated with supplying the depth-of-book data. The process of securing such an agreement on acceptable business terms would likely be time-consuming, challenging, and costly. Forming successful joint ventures of two firms is ordinarily difficult; forming one among hundreds of competitors would be more difficult by far. For example, the venture may fail if only one significant securities firm refuses to participate or if large securities firms, recognizing this, refuse to participate in the absence of receiving a disproportionate share of the net benefits. In addition, the joint venture would have to address the numerous regulatory issues associated with collaborations among direct competitors.³⁰

Even if the large competitor collaboration could be formed, its product may be of a quality that is inferior to that of the exchanges. To serve as an economically relevant substitute for depth-of-book products, the hypothetical collaboration's

³⁰ See, e.g., U.S. DEP'T. OF JUSTICE AND THE FED. TRADE COMM'N, *Antitrust Guidelines for Collaborations Among Competitors* (April 2000).

depth-of-book data must be substantially comprehensive across exchanges, which in turn would require virtually industry-wide participation. In the likely event that the hypothetical collaboration's depth-of-book product is not substantially comprehensive, its incomplete information on available liquidity may well not serve as a viable substitute for an exchange's complete offering.

Moreover, the exchange would have to believe that the collaborative effort could provide the depth-of-book data at such a price that the exchange would not be able to exercise market power. The collaborative venture, however, would face a significant cost disadvantage relative to the exchanges. The exchanges obtain the depth-of-book data for free as a byproduct of their being SROs. The collaborative venture would collect the depth-of-book data at a higher cost and less efficiently than the exchanges. The collaborative venture would therefore confront a higher cost structure with greater logistical challenges than those of an exchange and, as a result, would not likely impose a significant constraint on the Exchange's pricing of depth-of-book data.

5. Summary on the availability of substitutes

Competition authorities and courts consider the availability of only close substitutes—ones that consumers would, in fact, turn to in the face of a price increase—as constraints on the exercise of significant market power. The SEC's analysis ignores that established framework and asserts, with no economic or factual basis, that several alternatives are substitutes for the depth-of-book data. The SEC seems to further assume that any degree of substitution (*e.g.*, bicycles for cars as modes of transportation) can constrain market power without any consideration of whether the products at issue are reasonably interchangeable for the relevant end use or whether one can defeat a price increase of the other.

III. COMPETITION FOR ORDER FLOW DOES NOT SIGNIFICANTLY CONSTRAIN THE EXCHANGE'S DEPTH-OF-BOOK DATA PRICING.

In this section, I consider whether competition for order flow significantly constrains the pricing of an exchange's depth-of-book data, the other supposed competitive constraint that the SEC has identified in the Proposed Order. The SEC has claimed that competition for order flow and the pricing of depth-of-book data are "two sides of the same coin" and, therefore, competition for order flow is a significant constraint on any market power the exchanges possess over depth-of-book data. Both the SEC's premise and its conclusion are wrong.

A. The SEC's Premise that Order Flow and Depth-of-Book Data Are "Two Sides of the Same Coin" Is Wrong.

The lynchpin of the SEC's argument is that order flow competition and depth-of-book data are "two sides of the same coin" insofar as a strong and direct relationship exists between the two. That is wrong. The relationship between the two is neither strong nor direct.

An exchange has at least three sources of revenue relevant to the Proposed Order: liquidity providers, liquidity takers, and depth-of-book market data purchasers. The provision and taking of liquidity generates order flow and constitutes the trading process. Market data are a byproduct of the trading process.

A strong and direct relationship exists between order flow and prices for liquidity providers and liquidity takers. Liquidity providers are given rebates and other incentives to provide liquidity to the exchanges; those price incentives directly affect the volume of liquidity provided. Liquidity takers are charged for using this liquidity; those fees directly affect the volume of liquidity taken.

Depth-of-book data, by contrast, are a byproduct of the process of providing and taking liquidity (*i.e.*, order flow). Depth-of-book data do not directly lead to order flow and they are not priced to encourage order flow. Rather, depth-of-book data pricing reflects the value of the information provided—that is, the extent of liquidity disclosed. Exchanges charge fixed fees for each person using the data

independent of the amount of orders generated by that individual. Firms responsible for high trading volume are charged the same as firms that use the data for research purposes and do not trade at all.³¹ I explain these points in more detail below.

An exchange's *trading* platform depends on the participation of *traders*. Some trading participants provide liquidity to the exchange and other trading participants take liquidity. A trade takes place only when a party offering to buy or sell at a given price meets another party that is willing to take the other side of the trade at that price. (Traders may be both liquidity providers and liquidity takers at different times for different trades.) Liquidity providers and takers are not symmetric, however, in their importance to the platform. The providers of liquidity attract users of liquidity, as well as other providers of liquidity, all of which generate trading activity for the platform.

We therefore expect prices to favor the side that is more important—orders that provide liquidity.³² And, in fact, we observe pricing practices that offer significant incentives for liquidity providers. NYSE and Nasdaq, for example, both pay rebates to liquidity providers. For NYSE, in 2007, liquidity rebates totaled \$626 million, in comparison with its net revenues of \$317 million from fees for trading and access to the trading platform.³³ For Nasdaq, in 2007, liquidity rebates totaled \$1,050 million, in comparison with its net revenues of \$322 million from fees for trading and access to the trading platform.³⁴

³¹ Indeed, the Proposed Order suggests that charging differing prices for market data depending on the purchaser's placement of order flow may be unreasonably discriminatory. See Proposed Order, *supra* note 3, at 32762, 32768. Our point here, however, is that fees are currently structured in a manner that does not have a direct effect on order flow.

³² Jean-Charles Rochet & Jean Tirole, *Two-Sided Markets: A Progress Report*, 37 RAND J. OF ECON. 645 (2006).

³³ NYSE Euronext, Annual Report (Form 10-K) (March 25, 2008). Gross revenues for NYSE Group in the United States related to cash trading were \$1,165 million in 2007, with net revenues of \$317 million after \$626 million in liquidity rebates (including payments to specialists) and \$222 million in routing and clearing fees. (NYSE Group also received \$86 million related to derivatives trading.)

³⁴ Nasdaq OMX Group, Inc., Annual Report (Form 10-K) (Feb. 25, 2008). Gross revenues for Nasdaq in the United States related to trading were \$1,903 million in trading fees and \$77 million in platform access fees. Nasdaq had net trading related revenues of \$322 million after \$1,050 million in liquidity rebates, \$35 million in tape fees revenue shared with market participants for placing orders and reporting trades to Nasdaq (under two separate programs), and \$575 million in brokerage, clearance and exchange fees.

Smaller trading venues offer even more aggressive liquidity rebates. For example, the BATS ECN pays a \$0.0024 rebate per executed share for orders that add liquidity for Tapes A and C securities and charges a \$0.0025 fee per executed share for orders that remove liquidity.³⁵ That is, of the \$0.0025 transaction fee it receives from the taker of liquidity, it pays \$0.0024 out to the trader that provided the liquidity. For Tape B securities, BATS pays *more* in a rebate (\$0.0030) than it takes as a transaction fee (\$0.0025).

NYSE Arca recently announced similar pricing. For Tape A and C securities, the pricing structure is inverted, including a rebate of \$0.0028 for orders that add liquidity and a fee of \$0.0027 for orders that take liquidity. For Tape B securities, the rebate is \$0.0023 for orders that add liquidity and the fee is \$0.0028 for orders that take liquidity.³⁶

As the Proposed Order observes, orders that provide liquidity attract other traders to the platform. The more liquidity and trading on a given platform, the greater the number of traders that are interested in participating on that platform. Trading venues compete to attract liquidity, which generates trading volume, which in turn generates trading revenues for the platform. Accordingly, the prices that are most relevant to attracting order flow are the transaction fees, including the liquidity rebates, associated with placing orders on a trading venue.

The pricing behavior reviewed above confirms that competition for order flow among trading venues is reflected most directly in the transaction fees they charge and the liquidity rebates they offer. Each trading venue sets its transaction prices and liquidity rebates to provide direct incentives for market participants to

³⁵ See BATS Fee Schedule, Effective July 1, 2008, *available at* http://www.batstrading.com/subscriber_resources/BATS%20Fee%20Schedule%20-%20effective%20July%201,%202008.pdf. BATS also charges a routing charge of \$0.0029 for orders routed to other venues.

³⁶ These are NYSE Arca's fees for its most active tier of trading customers. The fees for other tiers also reflect significant liquidity rebates. NYSE Arca also charges a routing fee of \$0.0029 for orders executed by another market center or participant, except on the NYSE where the routing fee is \$0.0008 (or \$0.0006 for customers using NYSE Arca's Primary Sweep Order). These fees are effective July 1, 2008. See NYSE Group, NYSE Arca Announces Unified Equities Transaction Pricing, Effective July 1 (June 19, 2008), *available at* <http://www.nyse.com/press/1213870771815.html>.

offer liquidity to and place orders on that venue. Supply and demand forces work as expected—fees are decreased and rebates are increased to attract more order flow.

Fees for depth-of-book data, however, do not vary with the purchaser's order flow generally or with the purchaser's order flow on the providing exchange. The exchanges therefore do not use depth-of-book data to stimulate trades, as they use rebates and fees for liquidity providers and takers. Rather, depth-of-book data are typically priced on a fixed monthly fee per device subscribed. In addition, some exchanges offer an option for an enterprise license to cover all users, a per company maximum fee cap, and a per company access fee.³⁷ I am not aware of exchanges' pricing their depth-of-book data based on the extent to which those data are used for orders.

B. The SEC's Conclusion that Order Flow Competition Significantly Constrains Depth-of-Book Data Pricing Is Wrong.

Based on the faulty premise that order flow and market data are two sides of the same coin, the SEC draws the conclusion that competition for order flow limits an exchange's ability to set prices for depth-of-book data. That is wrong.

Although an exchange may have an incentive to make available its depth-of-book data, the exchange nevertheless can charge prices above competitive levels for those data if the exchange is not constrained by significant competitive forces in their sale and such data have value to customers by reflecting substantial liquidity. Once a seller makes a product available, the price that the seller charges for the product is a function of the demand for the product and whether economically significant substitutes are available. In the case of depth-of-book data, the exchange will identify the profit-maximizing price for the data even if that price is higher than would be paid by a significant number of potential purchasers. The SEC implicitly recognizes that important point by noting that Nasdaq's depth-of-book product, which is presumably profitably priced, is purchased by a small percentage of Nasdaq's professional users.³⁸

³⁷ SEC Release No. 34-53952, *supra* note 2, at 33496-33497.

³⁸ See *infra* note 41.

Nasdaq's publicly reported revenue information confirms that exchanges with significant order flow have significant pricing power for their unconsolidated data.³⁹ In 2007, Nasdaq received consolidated data revenue of \$87 million and unconsolidated data revenue of \$88 million.⁴⁰ Thus, of its market data revenue, *more than half* was received from consumers of unconsolidated data. This figure is particularly striking because, according to the SEC, "only 19,000 professional users purchase Nasdaq's depth-of-book data product and 420,000 professional users purchase core data in Nasdaq-listed stocks."⁴¹ That means that Nasdaq was able to extract more than 50 percent of its 2007 market data revenue from its sale of unconsolidated data, even though *less than 5 percent* of professional users purchased its depth-of-book data.

Furthermore, we would not expect pricing for market data to be constrained by "fierce" competition for order flow. Order flow competition implies that traders can and do switch easily among many alternative trading venues and that an exchange would have little or no leverage to charge higher prices to its trading participants. That competition appears to be reflected in the exchanges' transaction pricing and the substantial rebates they pay to liquidity providers.

By contrast, as discussed above, an exchange with substantial liquidity maintains significant leverage over the consumers of its depth-of-book data.⁴² That dynamic—significant leverage over market data customers and little or no leverage over providers and takers of liquidity—results in prices for market data that reflect

³⁹ I discuss Nasdaq's revenues as NYSE does not report its revenues from consolidated versus unconsolidated data.

⁴⁰ This is net of \$46 million in consolidated data fees that Nasdaq collects and is required (as a result of its role as the Securities Information Processor for Nasdaq-listed securities) to share with other trading venues based on their respective shares of trading in Nasdaq-listed securities.

⁴¹ Proposed Order, *supra* note 3, at 32766. The SEC's reference to 19,000 professional users of Nasdaq's depth-of-book data may be an understatement. The Nasdaq letter cited by the SEC indicates that there were 19,000 professional users of TotalView. The Nasdaq letter did not indicate how many professional users purchased its other depth-of-book data products. See Letter from Jeffrey Davis, Vice President and Deputy General Counsel, The Nasdaq Stock Market, dated May 18, 2007, at 6.

⁴² I have already shown in Section II that the purported alternatives offered by the SEC do not in fact provide economic substitutes for depth-of-book data and thus do not significantly constrain depth-of-book data pricing.

significant market power and prices for order flow that reflect competitive conditions.⁴³

C. The Evidence on Which the SEC Relies Does Not Support the SEC's Conclusions.

The SEC presents four sources of support for its conclusion that order flow competition constrains pricing for depth-of-book data:

1. An industry textbook.
2. The Report of the SEC Advisory Committee on Market Information.
3. The strategy followed by BATS (an ECN) of not charging for market data.
4. Island's choosing not to display its order book to avoid being subject to the Inter-market Trading System (ITS) regulations and losing significant order flow.⁴⁴

None support the SEC's conclusions.

The first two sources are statements to the effect that, in the absence of the regulatory requirement for *consolidated* data from all trading venues to be displayed, many data vendors would not display data from smaller trading venues and that those venues would therefore find it difficult to compete for order flow. Those statements do no more than acknowledge: (1) that the pricing power of market data derives from the significance of the liquidity that the market data reflect; and (2) that some degree of transparency may be an important component of a platform that is appealing to traders. Both points were discussed above, and neither establishes that competition for order flow constrains market data pricing.

⁴³ The SEC asserts that, if "NYSE Arca were truly able to exercise monopoly power in pricing its non-core data, it likely would not choose a fee that generates only a small fraction of the transaction fees that admittedly are subject to fierce competitive forces." See Proposed Order, *supra* note 3, at 32769. That is a non-sequitur. That a firm charges fees for one product that result in total revenue that is greater or less than the total revenue from the sale of another product says nothing about the firm's market power over either product.

⁴⁴ *Id.* at 32764.

The third reference is to statements by the BATS ECN regarding its strategy of not charging for market data. That strategy is hardly surprising, as market data reflecting little liquidity have little value and the smaller trading venues that supply such data have little pricing power.

And the fourth reference is to the experience of the Island ECN when it chose not to display its order book at all to avoid the Inter-market Trading System (ITS) regulations and lost significant order flow. That experience hardly establishes that order flow constrains the prices of market data. As discussed above, even if a viable trading venue must make some of its market data available, the prices that can be charged for those data depend both on the significance of the liquidity that the data reflect and on the availability of economically significant substitutes.

Indeed, the Report of the SEC Advisory Committee on Market Information itself confirms that the larger exchanges retain market power over their data even if the smaller trading venues do not:

Supporters of the Display Rule point out, however, that while the abandonment of the rule plainly would take away any artificial market power of the non-primary markets, it is unlikely to be a significant restraint on the pricing power of the primary markets. To the extent that market participants need the data generated by, for example, the NYSE or Nasdaq, they would still be forced to buy it. Accordingly, the absence of the Display Rule would not ensure the appropriate level of fees for the primary markets' data.⁴⁵

In sum, the evidence proffered by the SEC suggests only the following unremarkable propositions:

- smaller exchanges cannot charge significant prices for depth-of-book data because those data do not reflect significant liquidity; and
- larger exchanges can charge prices above competitive levels for depth-of-book data because they control—as noted in Section II—a significant portion of the liquidity for each stock (*e.g.*, 53.6 percent in the case of

⁴⁵ SEC ADVISORY COMMITTEE ON MARKET INFORMATION, REPORT OF THE ADVISORY COMMITTEE ON MARKET INFORMATION: A BLUEPRINT FOR RESPONSIBLE CHANGE (Sept. 14, 2001).

NYSE Group for NYSE-listed stocks) and are not constrained by the availability of reasonably interchangeable substitutes.⁴⁶

The SEC has presented no evidence or analysis that could support its claim that order flow and depth-of-book data are “two sides of the same coin” and that, therefore, “fierce” order flow competition necessarily constrains the exercise of significant market power in the provision of depth-of-book data.

IV. CONCLUSIONS

Scholarly literature and case law provide an analytical framework for assessing whether firms can exercise significant market power over prices and whether substitutes or other constraints discipline that market power. The SEC does not rely on that framework (or substitute a coherent one of its own) to reach its conclusion that the Exchange necessarily charges “equitable, fair, reasonable, and not unreasonably discriminatory” prices for its depth-of-book data because of “significant competitive forces.”

To the contrary, economics and the relevant facts establish:

- the Exchange likely has significant market power over the pricing of its depth-of-book market data;
- the availability of the alternative sources of depth-of-book data that the SEC identifies would not constrain that market power; and
- competition for order flow would not constrain that market power.

I therefore conclude, as a matter of economics, that the SEC has presented no credible analysis or evidence to support the position that the pricing of depth-of-book data is subject to significant competitive forces.

⁴⁶ Indeed, comparing the absolute prices of several products, as the SEC does with respect to the depth-of-book products of NYSE, Nasdaq, and NYSE Arca (*see* Proposed Order, *supra* note 3, at 32769), does not speak to whether the price of any of the products reflects significant market power. The price of a given product relative to another product is a function of the demand for the given product, all else being equal. Sellers of products for which demand is relatively greater will be able to set relatively higher prices, and vice versa, even assuming the absence of economically significant substitutes for both products.

**RESPONSE TO ORDOVER AND BAMBERGER'S
STATEMENT REGARDING THE SEC'S PROPOSED
ORDER CONCERNING THE PRICING OF DEPTH-
OF-BOOK MARKET DATA**

Dr. David S. Evans

**LECG, LLC
Chair of Global Competition Policy Practice
Managing Director**

**University College London
Executive Director, Jevons Institute for Competition Law and Economics
Visiting Professor**

**University of Chicago Law School
Lecturer**

October 10, 2008

I. INTRODUCTION¹

NYSE Arca, Inc. (NYSE)² requested the Securities and Exchange Commission (SEC) to approve a proposed rule change that would allow NYSE to establish certain fees for depth-of-book market data (also known as unconsolidated, or non-core, data).³ The SEC has issued a Notice that presents a Proposed Order to approve that request and the basis for doing so.⁴

In my previous Report, I demonstrated that the Proposed Order's preliminary conclusion that significant competitive forces constrain NYSE's pricing of depth-of-book data is not supported by the analysis and evidence presented by the Proposed Order.⁵ To the contrary, the economics and evidence show that:

- NYSE likely has significant market power over the pricing of its depth-of-book market data;
- the supposedly alternative sources of depth-of-book data that the Proposed Order identifies would not significantly constrain market power over depth-of-book data; and

¹ This Report was prepared at the request of NetCoalition.

² For the purpose of analyzing competition among exchanges, all exchanges owned by the same corporate parent should be aggregated as under the control of the same economic agent, which seeks to maximize the profits of the combined operations. Indeed, NYSE Euronext itself has criticized Nasdaq for "totally ignor[ing] the NYSE Arca trading in NYSE-listed securities." Press Release, NYSE Euronext (last visited Oct. 9, 2008), http://www.nyse.com/pdfs/NYSE_Response_Letter1.pdf [hereinafter "NYSE Euronext Press Release"]. Thus, for purposes of economic analysis, the NYSE Arca and New York Stock Exchange trading venues should be considered a single entity. Ordover and Bamberger do not appear to dispute this conclusion.

³ Filing of Proposed Rule Change Relating to Approval of Market Data Fees for NYSE Arca Data, SEC Release No. 34-53592, 71 Fed. Reg. 33,496 (June 9, 2006).

⁴ Proposed Order Approving Proposal by NYSE Arca, Inc. to Establish Fees for Certain Market Data and Request for Comment, SEC Release No. 34-57917, 73 Fed. Reg. 32,751 (June 10, 2008) [hereinafter "Proposed Order"].

⁵ Dr. David S. Evans, An Economic Assessment of Whether "Significant Competitive Forces" Constrain an Exchange's Pricing of Its Depth-of-Book Market Data (July 10, 2008) [hereinafter "Report"].

- competition for order flow would not prevent the exercise of significant market power over depth-of-book data.

On August 1, 2008, Nasdaq submitted a letter to the SEC urging approval of the Proposed Order and attaching a supporting Statement of Janusz Ordover and Gustavo Bamberger.⁶ Those authors reach three principal conclusions:⁷

- “[E]ven though market information from one platform may not be a perfect substitute for market information from one or more other platforms, the existence of alternative sources of information can be expected to constrain the prices platforms charge for market data.”⁸
- “[A] trading platform cannot generate market information unless it receives trade orders. For this reason, a platform can be expected to use its market data product as a tool for attracting liquidity and trading to its exchange.”⁹
- Competition among exchanges constrains the “total return” each exchange earns from its “sale of joint products,” and thus the “total price of trading on that platform” is constrained by the “total price of trading on rival platforms.”¹⁰

⁶ Statement of Janusz Ordover and Gustavo Bamberger (Aug. 1, 2008) [hereinafter “Statement”].

⁷ The argument that platform competition constrains the total return of the exchange is one that Ordover and Bamberger make throughout their submission but is not presented in their conclusions, which instead focus on the first two arguments.

In addition to the economic flaws in Ordover and Bamberger’s total return analysis that are discussed in Section IV below, Ordover and Bamberger ignore an important part of the relevant landscape—namely the legal framework within which exchanges must operate. For example, NetCoalition has advised me that Congress, by way of the Exchange Act, requires an “exclusive processor” of market data (such as NYSE) that distributes quotation and transaction data to do so on terms that are “fair and reasonable” and “not unreasonably discriminatory.” Proposed Order, *supra* note 4, at 32,760 & n.156.

By arguing that a relatively low price for transaction services effectively offsets a relatively high price for market data, *see* Statement, *supra* note 6, ¶¶ 8, 23 & nn.23-24, Ordover and Bamberger ignore the above-referenced statutory mandate and thereby make their economic argument largely irrelevant within the context in which U.S. exchanges must operate.

⁸ Statement, *supra* note 6, ¶ 38.

⁹ Statement, *supra* note 6, ¶ 38.

¹⁰ Statement, *supra* note 6, ¶¶ 7 & 23.

Those conclusions are conceptually flawed, and the authors provide no meaningful factual support for any of them.

In Section II, I address Ordover and Bamberger's flawed claim that alternative sources of depth-of-book data act as a significant competitive constraint on the prices that a given exchange can charge for its depth-of-book data. They do not, and could not, present evidence to support that claim. Neither Nasdaq nor any smaller exchange provides depth-of-book data that are reasonably substitutable for NYSE's depth-of-book data.

In Section III, I show that Ordover and Bamberger's claim that competition for order flow acts as a significant competitive constraint on an exchange's pricing of its depth-of-book data is analytically flawed and factually inconsistent with how exchanges work. Ordover and Bamberger assume a symmetrical demand relationship between order flow and depth-of-book data where none exists. Depth-of-book data prices do not affect the marginal incentive to place orders and, therefore, do not significantly affect order flow decisions. On the other hand, depth-of-book data revenue can be used to offset the costs of liquidity rebates and discounts that attract more order flow. Additional order flow increases the value of, and the prices that an exchange can charge for, its depth-of-book data.

In Section IV, I show that Ordover and Bamberger's "total return" analysis is based on the incorrect assumption that the price of depth-of-book data is part of the marginal cost faced by broker-dealers in making trading decisions. Even if one were to assume that depth-of-book data prices were one component of the "total price of trading" on a platform, that component does not affect the marginal incentives to

execute a trade. Because depth-of-book data prices are not part of the marginal cost of executing a trade, depth-of-book data prices are not constrained by inter-platform competition for orders. Further, even if depth-of-book data and trade execution services are “joint products” with “joint costs,” the price of one does not necessarily constrain the price of the other because they are sold separately and face distinct competitive conditions.

II. PRICES FOR DEPTH-OF-BOOK DATA FROM ONE EXCHANGE ARE NOT SIGNIFICANTLY CONSTRAINED BY THE AVAILABILITY OF DEPTH-OF-BOOK DATA FROM OTHER EXCHANGES

Ordover and Bamberger claim that: “[E]ven though market information from one platform may not be a perfect substitute for market information from one or more other platforms, the existence of alternative sources of information can be expected to constrain the prices platforms charge for market data.”¹¹

Ordover and Bamberger provide no evidence to support their claim, other than asserting that they “understand” that “many ‘professional’ traders . . . view depth-of-book information from NYSE Arca and Nasdaq as reasonable substitutes because all depth-of-book products are effectively proxies for liquidity that would be available should the current NBBO change.”¹² That assertion is contrary to what happens in the marketplace.

As an initial matter, Ordover and Bamberger’s claim applies to depth-of-book data only from NYSE and Nasdaq. That is, even assuming Ordover and Bamberger

¹¹ Statement, *supra* note 6, ¶ 38.

¹² Statement, *supra* note 6, ¶ 32.

were correct that the price of NYSE's depth-of-book data constrains Nasdaq's depth-of-book data prices, that would imply a duopoly over depth-of-book data. Except for special circumstances that Ordover and Bamberger have not identified or documented, duopolies do not have competitive prices. Indeed, the variety of prices for depth-of-book data indicates the lack of a market-clearing price that one would expect in a competitive market with significant substitution among products. Highest among depth-of-book data prices are those charged by Nasdaq and NYSE, reflecting their market power over their respective depth-of-book data products, while smaller trading venues have no choice but to charge little or nothing for their depth-of-book data.¹³

Moreover, Ordover and Bamberger present no empirical evidence to support their claim as to substitutability between NYSE and Nasdaq. They do not attempt to show, for example, that traders actually do substitute between depth-of-book data from NYSE and Nasdaq, and marketplace evidence is to the contrary.

While depth-of-book data from NYSE and from Nasdaq both provide information about liquidity if the price of a security changes from the NBBO, NYSE's and Nasdaq's respective depth-of-book data reflect liquidity of different magnitudes and quality. Although Ordover and Bamberger assert that Nasdaq's and NYSE's depth-of-book data are "proxies" for each other, that assertion is contradicted by differences in the quantity and quality of liquidity across equities and

¹³ The SEC cited evidence in its Proposed Order that suggested that small trading venues may have difficulties getting distribution of their market data in the absence of display rules governing the distribution of consolidated data. See Proposed Order, *supra* note 4, at 32,764 n.195 (citing Larry Harris, *Trading and Exchanges, Market Microstructure for Practitioners* 99 (2003)).

by their own evidence of the volatility of the exchanges' shares of trading volume.¹⁴ If, as Ordover and Bamberger suggest, trading volume in NYSE-listed and Nasdaq-listed stocks constantly shifts, one exchange's depth-of-book data will not provide a reliable proxy for the other's data, which may reflect significantly different liquidity as a result of volatile competition for order flow.¹⁵

The Security Traders Association ("STA") observes that, as a matter of marketplace reality, a broker-dealer needs the depth-of-book data feeds from each significant venue on which a given security trades for a useful perspective of available liquidity:

We do not believe that the depth-of-book feeds from the various exchanges are fungible. Depth-of-book feeds are not substitutes for one another: NASDAQ's depth-of-book data for IBM will be different from the NYSE depth-of-book data for IBM. On the contrary, each depth-of-book data feed reflects the market conditions for a particular security on that particular venue. For a full appreciation of the liquidity available in the entire marketplace . . . as a commercial and competitive matter, a broker-dealer needs the depth-of-book feeds from each significant venue on which the security trades.¹⁶

Moreover, as I explained in my previous report, a market professional's need for information about a particular security can be satisfied only by data about that particular security. For example, market information about the market depth of the

¹⁴ Statement, *supra* note 6, ¶¶ 10-12.

¹⁵ For example, NYSE Euronext touts itself as the "the dominant source of liquidity in NYSE-listed securities, especially in thinly traded issues" with "more volume than NASDAQ in 99.4% of NYSE-listed stocks." NYSE Euronext Press Release *supra* note 2. A customer interested in assessing the liquidity and market depth of stocks listed on the New York Stock Exchange therefore could not satisfy that interest by purchasing only Nasdaq's depth-of-book data.

¹⁶ Bart M. Green & John Giese, STA Comment Letter at 3 (Sept. 11, 2008), <http://www.sec.gov/comments/34-57917/3457917-15.pdf>. [hereinafter "STA Comment Letter"].

securities of Microsoft would not be useful to a trader seeking to determine the market depth of IBM securities. Ordover and Bamberger, however, do not address the broad variations in the liquidity of individual securities across exchanges. Nor do they explain how one set of depth-of-book data for all securities on one exchange could be reasonably substitutable for depth-of-book data for all securities on another exchange.

In sum, Ordover and Bamberger provide no meaningful evidence to demonstrate that the depth-of-book data from other trading venues significantly constrain the pricing of depth-of-book data from NYSE or Nasdaq. In my previous submission, I demonstrated that the other three supposedly alternative sources of depth-of-book data identified by the Proposed Order (NYSE's own consolidated data; "pinging" the various markets by routing oversized marketable limit orders; and the threat of independent distribution of depth-of-book data by securities firms and data vendors) are not material substitutes for an exchange's depth-of-book data.¹⁷

I thus conclude that no reasonably substitutable alternatives to NYSE's depth-of-book data are available to act as the "significant competitive forces" that the Proposed Order required to presume that the proposed NYSE prices are "equitable, fair, reasonable, and not unreasonably discriminatory."¹⁸

¹⁷ Report, *supra* note 5, Section II.

¹⁸ Proposed Order, *supra* note 4, at 32,751.

III. PRICES FOR DEPTH-OF-BOOK DATA ARE NOT SIGNIFICANTLY CONSTRAINED BY COMPETITION FOR ORDER FLOW

In my previous submission, I demonstrated that competition for order flow does not significantly constrain an exchange's market power over depth-of-book data—that order flow and market data are *not* “two sides of the same coin.”¹⁹

Without addressing my analysis, Ordover and Bamberger reach the opposite conclusion, claiming that competition for attracting liquidity and trading constrains prices for depth-of-book data.²⁰ They rely on two propositions. First, Ordover and Bamberger state that “a trading platform cannot generate market information unless it receives trade orders.”²¹ Second, they assert that, “[f]or this reason, a platform can be expected to use its market data product as a tool for attracting liquidity and trading to its exchange.”²²

Ordover and Bamberger provide no economic analysis or evidence as to why the second proposition should follow from the first. In economic terms, Ordover and Bamberger are asserting that a change in the price of depth-of-book data would have a similar impact on demand for order flow as a change in the price of order flow would have on the demand for depth-of-book data. That symmetrical and reciprocal relationship does not, in fact, exist.

The following propositions demonstrate that the relationship between the demand for depth-of-book data and the demand for order flow is asymmetrical.

¹⁹ Report, *supra* note 5, Section III.

²⁰ See, e.g., Statement, *supra* note 6, ¶ 6 (“In Section II, we show that competition between trading platforms constrains the price of market data sold by each platform.”).

²¹ Statement, *supra* note 6, ¶ 38.

²² Statement, *supra* note 6, ¶ 38.

(1) *The input relationship between order flow and depth-of-book data is asymmetrical.* The price of depth-of-book data is at most only one of many factors considered in placing trades. NYSE has itself explained that “[t]he markets base competition for order flow on such things as technology, customer service, transactions costs, ease of access, liquidity, and transparency.”²³ Changing the price of only depth-of-book data is thus unlikely to have a significant effect on the demand for transactions.

Market data are also used for purposes other than trading and, in that regard, are not an input to order flow at all. As Ordoover and Bamberger explain, market data are “useful in a number of ways” that do not involve trading, including “valuing securities and portfolios,” “evaluating the performance of a broker or trader,” or obtaining a “barometer of market sentiment.”²⁴ They acknowledge that market data are useful to “firms that act as intermediaries between trading platforms and the public but do not trade themselves,” such as Google and Yahoo!²⁵ For customers purchasing depth-of-book data and not placing trades on an exchange, the depth-of-book data price thus stands entirely on its own.

In contrast, order flow is the sole input for generating and increasing the value of depth-of-book data. Indeed, depth-of-book data are a byproduct of order flow. Without order flow, depth-of-book data would not exist.

²³ Proposed Order, *supra* note 4, at 32,764 n.193 (citing Letter from Mary Yeager, Corporate Secretary, NYSE Arca, to the Honorable Christopher Cox, Chairman, Commission, dated February 6, 2007, at 16).

²⁴ Statement, *supra* note 6, ¶¶ 20-21.

²⁵ Statement, *supra* note 6, ¶ 20 n.21.

(2) *The effects of changes in prices of trading on the demand for depth-of-book data, and vice versa, are also asymmetrical.* Depth-of-book data are priced and sold separately from trade execution services. Depth-of-book data are sold in monthly subscriptions and are typically based on a fixed monthly fee per device.²⁶ That fixed subscription fee is independent of the amount of orders generated by the subscriber and is not expressed as part of, or affected by, trade execution services.

An exchange charges subscribers the same per-device fee whether or not they place orders on the exchange. Indeed, as the SEC recognizes, an exchange may not “unreasonably discriminate among types of subscribers, such as by favoring participants in the NYSE Arca market or penalizing participants in other markets.”²⁷ In addition, each monthly subscription provides data on all securities traded on an exchange, and customers are charged the same price whether or not they examine the depth-of-book data for one security, all securities, or some number in between.

In contrast, each trade is executed with respect to an individual security, and exchanges charge fees (with separate discounts and rebates for trade execution services) that are separate from depth-of-book data subscription fees. The trade execution fees are determined on a transactional basis and are designed specifically to affect trading incentives and attract liquidity. Those transaction-based fees for order flow allow traders to assess the costs and benefits of placing a given trade for a given security on a given venue and thus affect traders’ marginal incentives to direct order flow among exchanges.

²⁶ In addition, there may be a cap on the total monthly data fees paid by each company. There may also be per-company fees for access to the datafeeds from the exchange’s servers. SEC Release No. 34-53592, *supra* note 3, at 33,496-33,497.

²⁷ Proposed Order, *supra* note 4, at 32,768.

An increase or decrease in the monthly subscription fee for depth-of-book data, however, does not change a trader's marginal cost to purchase or sell a particular security on a particular exchange. That is, in choosing where to place the next trade, an entity would not consider the cost of the subscription fee. Likewise, in setting the depth-of-book monthly subscription fee, the exchange would consider the effect of that fee on the marginal incentive to subscribe to depth-of-book data, but not on the marginal incentive to trade generally or for a particular security.²⁸

*(3) The asymmetrical relationship between the demand for order flow and depth-of-book data is illustrated by considering the consequence of a small but significant price increase for each product.*²⁹ A five percent increase in the monthly subscription fee for depth-of-book data would not have any material effect on the demand for order flow for two reasons. First, as noted above, the increase in the price of depth-of-book data would have no effect on the price of, and therefore the marginal demand for, order flow. Second, as also noted above, depth-of-book data are just one of many inputs into the demand for order flow.

On the other hand, a five percent increase in the price of transactions might well have a material effect on order flow and thus on the demand for depth-of-book data. If increasing the price of transactions would reduce the amount of orders, it would thereby reduce the amount of, and value of, depth-of-book data. In such a

²⁸ My position here and in my prior Report does not assume that no relationship whatsoever exists between the pricing of depth-of-book data and the volume of order flow. Even if some traders may deem an exchange to be a non-viable trading venue if it declines to make depth-of-book data available at all (or at an extremely high price), the level of depth-of-book data pricing within a range that includes the exercise of significant market power will not affect traders' marginal incentives as to where to place their next buy or sell order.

²⁹ A price increase of approximately five percent is generally viewed as small but significant. See U.S. Dep't of Justice and Fed. Trade Comm'n, Horizontal Merger Guidelines §1.11 (Rev. 1997).

case, the willingness of customers to pay for depth-of-book data would decline, especially if those data reflected a significant reduction in liquidity.

* * * * *

Ordover and Bamberger, and the Proposed Order, have ignored the asymmetry discussed above and thus have erred in their assessment as to whether an exchange can exercise market power over depth-of-book data. Although Ordover and Bamberger recognize that depth-of-book data are a direct byproduct of order flow,³⁰ they do not explore the important implication of that byproduct relationship.

That relationship indicates that competition for order flow will not constrain an exchange's depth-of-book data prices and may serve to increase them. Lower order flow prices generally will increase order flow, which, in turn, will increase the value of depth-of-book data. That is, by attracting additional order flow, an exchange will not only gain the transaction fees associated with the order flow, it will also increase the amount it can charge for its depth-of-book data.

Increased depth-of-book revenue can be used to offset the costs of liquidity rebates and discounts that attract order flow. Indeed, the STA observes that "raising the market data fees would enable [the exchanges] to pay higher rebates and thus, attract more order flow."³¹ We see that observation empirically verified in the case of consolidated tape data. Trading venues use revenue from consolidated tape data to compete for order flow. As Nasdaq states: "Participants in the UTP Plan have used

³⁰ Statement, *supra* note 6, ¶¶ 7 & 17.

³¹ STA Comment Letter, *supra* note 16, at 3.

tape fee revenues to establish payment for order flow arrangements with their members and customers.”³²

The economically rational strategy for exchanges, given the asymmetrical relationship of order flow and depth-of-book data, is thus to set lower prices for order flow, which has the effect of increasing the value of, and the prices the exchanges can charge for, their depth-of-book data.

IV. PRICES FOR DEPTH-OF-BOOK DATA ARE NOT SIGNIFICANTLY CONSTRAINED BY INTER-PLATFORM COMPETITION

Ordover and Bamberger focus on the “total return” or “aggregate return” that a platform receives from trade execution services and depth-of-book and other market data.³³ They claim that the “total price of trading” on a platform is constrained by the total price of trading on alternative platforms.³⁴ Ordover and Bamberger include in the price of trading the prices of (at least) market data and trade execution.³⁵ Ordover and Bamberger thus appear to argue that, even if an exchange charges relatively high prices for market data, inter-platform competition will cause those market data prices to be effectively offset by relatively low prices for other products or services offered by the exchange, such as providing access to liquidity.³⁶

³² Nasdaq Stock Market, Inc., Annual Report (Form 10-K), at 17 (Feb. 25, 2008).

³³ Statement, *supra* note 6, ¶ 7.

³⁴ Statement, *supra* note 6, ¶ 23.

³⁵ Statement, *supra* note 6, ¶ 23 & nn.23-24.

³⁶ Statement, *supra* note 6, ¶¶ 7-8, 23 & nn.23-24.

Even if one assumes that depth-of-book data prices are a component of the “total price of trading,” as discussed in the previous section, that component does not affect the marginal incentives of a broker-dealer to execute a trade. On the other hand, transaction fees can and do affect order flow decisions. Thus, while inter-platform competition for trading may constrain the prices of trade execution services, it does not significantly constrain depth-of-book data fees.

Ordover and Bamberger further attempt to advance their “total return” argument by characterizing trade execution services and market data as “joint products” with “joint costs” and by asserting that trading platform competition will necessarily constrain the total return from those joint products.³⁷ To the contrary, where two “joint products” of the same facility are sold separately—as trade execution services and depth-of-book data are—the pricing of each product is determined by the distinct competitive conditions that each product confronts.

A classic example of joint products with joint costs is the production of wool and mutton. Wool and mutton are joint products of a sheep, and many of the costs of producing both products (*i.e.*, the care, feeding, and handling of the sheep) are the same. However, the demand conditions for wool could be independent of those for mutton.

Suppose, for example, that market conditions are such that only one firm can produce desirable wool (because its sheep have much better wool than its competitors’ sheep), while many firms can produce desirable mutton (because the

³⁷ Statement, *supra* note 6, ¶ 7 (“Competition among trading platforms can be expected to constrain the aggregate return each platform earns from its sale of joint products . . .”).

mutton from all sheep is perfectly substitutable). Under those conditions, the competition to produce mutton, however intense it might be, will not significantly constrain the monopoly wool producer's pricing of wool. If other firms cannot produce wool of satisfactory quality, the monopoly wool producer will face no competition in the pricing of wool, even as the pricing of mutton faces intense competition. Of course, that is unlikely to be the case for sheep farmers—our point is only that the existence of joint costs/joint products does not ensure a particular competitive outcome in either product market.

In the case of trading venues, competition for order flow does not significantly constrain depth-of-book data pricing simply because they are viewed as joint products. Regardless of competitive conditions for trade execution, an exchange can charge supracompetitive prices for depth-of-book data if the exchange does not face significant competitive constraints in the sale of such data and such data have value by reflecting substantial liquidity. As demonstrated in my previous report and Sections II and III above, that is the case here.

V. CONCLUSION

As explained above, Ordoover and Bamberger's unsupported assertion that supposedly alternative sources of depth-of-book data act as a competitive constraint on an exchange's depth-of-book data is contradicted by empirical evidence. Data from different trading venues are not meaningfully substitutable. Exchanges with significant liquidity thus may charge prices for depth-of-book data that would exceed competitive levels.

In addition, Ordoover and Bamberger's claim that competition for order flow acts as a significant competitive constraint on an exchange's pricing of its depth-of-book data incorrectly assumes a symmetrical and reciprocal relationship between the demand for, and the pricing of, order flow and depth-of-book data. In fact, their relationship is asymmetrical and results in an incentive to charge lower order flow prices and higher depth-of-book data prices.

Finally, Ordoover and Bamberger's assertion that depth-of-book data prices are constrained by inter-platform competition for trading incorrectly assumes that the cost of depth-of-book data is part of the marginal cost of trading. In fact, depth-of-book data prices do not affect broker-dealers' marginal incentives to place trades. Nor does labeling depth-of-book data and trade execution services as "joint products" with "joint costs" make one a constraint on the pricing of the other. Each must be assessed in light of the individual competitive conditions that it confronts. Here, the lack of reasonably interchangeable sources of depth-of-book data provides exchanges with significant market power over the pricing of those data.

I conclude by reiterating the main propositions from my prior Report:

- NYSE likely has significant market power over the pricing of its depth-of-book market data;
- the supposedly alternative sources of depth-of-book data that the Proposed Order identifies would not significantly constrain market power over depth-of-book data; and
- competition for order flow would not prevent the exercise of significant market power over depth-of-book data.

**RESPONSE TO ORDOVER AND BAMBERGER'S
STATEMENT REGARDING NASDAQ'S PROPOSED
RULE CHANGE CONCERNING THE PRICING OF
DEPTH-OF-BOOK MARKET DATA**

Dr. David S. Evans

**Global Economics Group, LLC
Chairman**

**University of Chicago Law School
Lecturer**

**University College London
Executive Director, Jevons Institute for Competition Law and Economics
Visiting Professor**

March 21, 2011

I. INTRODUCTION

Nasdaq Stock Market, LLC (“Nasdaq”) has requested that the Securities and Exchange Commission (“SEC”) approve a proposed rule change (the “Proposal”) concerning the fees it charges for its depth-of-book market data (also known as unconsolidated, or non-core, data). Specifically, Nasdaq proposed to provide a discount on the fees it charges its “non-professional” users for depth-of-book data products if they provide order flow above certain specified thresholds. Through this pricing structure, Nasdaq would bundle its depth-of-book data with its trade-execution services.

It is my understanding that it is Nasdaq’s burden, as an “exclusive processor” of market data, to establish that fees for its depth-of-book data are “fair and reasonable” and “not unreasonably discriminatory.”¹ I also understand that the SEC has adopted a “market-based” approach for evaluating whether depth-of-book data fees are “fair and reasonable” and that this approach was the subject of a decision last year by the United States Court of Appeals for the D.C. Circuit in *NetCoalition v. Securities and Exchange Commission* (the “*NetCoalition* Decision”).²

This Response examines the conclusions set forth in the Statement from Janusz Ordover and Gustavo Bamberger, on which Nasdaq relies to argue that the fees it seeks to charge are constrained by competitive forces and thus “fair and reasonable.”³ Ordover and Bamberger claim that *any* price that Nasdaq, in its sole

¹ See 15 U.S.C. § 78k-1(c)(1)(C)-(D); 17 C.F.R. § 242.603(a).

² 615 F.3d 525 (D.C. Cir. 2010).

³ Statement of Janusz Ordover and Gustavo Bamberger (December 29, 2010) [hereinafter “Statement”].

discretion, seeks to charge for market data is constrained by significant competitive forces because Nasdaq confronts “platform competition.”⁴ Based on that premise, Ordover and Bamberger conclude that Nasdaq may charge high prices for market data – no matter how high those prices might be – because they supposedly are offset by relatively low prices for transaction services.⁵ Indeed, Ordover and Bamberger state that “there is no need to regulate the pricing of proprietary data” given the “platform” competition on which they rely.⁶ But that is contrary to what I understand to be the SEC’s statutory mandate, which places special emphasis on the widespread availability of data and recognizes the value of these data for efficient financial markets.⁷ As a result, Ordover and Bamberger’s opinions are not relevant to the legal and regulatory context in which U.S. exchanges must operate.

Putting aside that Ordover and Bamberger’s opinions are irrelevant, those conclusions are also not supported by the economics or evidence. According to

⁴ In the context of addressing Nasdaq’s Proposal, I discuss whether Nasdaq’s depth-of-book data prices are constrained by significant competitive forces within what I understand to be the regulatory framework for the SEC’s assessment of the pricing of depth-of-book data. This is based on the SEC’s “market-based” approach in NYSE Arca for assessing whether depth-of-book data fees are equitable, fair and reasonable; Nasdaq and Ordover and Bamberger are taking the same approach in connection with Nasdaq’s Proposal. The SEC noted in NYSE Arca that “reliance on competitive forces is the most appropriate and effective means to assess whether terms for the distribution of non-core data are equitable, fair and reasonable, and not unreasonably discriminatory.” See Order Setting Aside Action by Delegated Authority and Approving Proposed Rule Change Relating to NYSE Arca Data, SEC Release No. 34-59039, 73 Fed. Reg. 74770 (December 2, 2008) [hereinafter, “NYSE Arca Order”], at 74781. I understand that the SEC’s regulatory mandate would not permit it to find that high depth-of-book data fees are fair and reasonable because they may be offset by low prices for transaction services.

⁵ See Statement, *supra* note 3, ¶¶ 5-6, 23.

⁶ See Statement, *supra* note 3, ¶ 5; see also ¶ 6 (“Regulatory forbearance is thus fully warranted in the absence of any showing that the pricing strategies will anti-competitively disadvantage rival platforms and some well-defined customer groups of the investing public.”).

⁷ The statute is consistent with the view that exchange-related data provide positive externalities for the financial markets, and that making these data widely available at fair and reasonable prices helps make financial markets more efficient. Individual producers of these data do not take these externalities into account in their pricing decisions.

Ordover and Bamberger, Nasdaq's depth-of-book data fees are constrained by competitive forces in three ways. First, Ordover and Bamberger claim that "the existence of alternative sources of information can be expected to constrain the prices platforms charge for market data."⁸ Second, they claim that order flow competition constrains depth-of-book data prices because "a platform can be expected to use its market data product as a tool for attracting liquidity and trading to its exchange."⁹ Third, in a restatement of the order-flow-competition argument, they assert that trading services and depth-of-book data are "joint products" the "total" price of which is constrained by the "total price of trading on rival platforms."¹⁰

Ordover and Bamberger made similar arguments in the context of the application by NYSE Arca to charge certain fees for its depth-of-data products that is the subject of the *NetCoalition* decision.¹¹ In that matter, I submitted two reports addressing those arguments, which I attach hereto as Exhibits A and B for the SEC's convenience.¹² As explained previously, and as I will explain below, Ordover and Bamberger's conclusions are wrong and the authors provide no meaningful factual support for any of them.

⁸ See Statement, *supra* note 3, ¶ 40.

⁹ See Statement, *supra* note 3, ¶ 67.

¹⁰ See Statement, *supra* note 3, ¶¶ 19, 38

¹¹ In the NYSE Arca matter, the SEC did not rely upon Ordover and Bamberger's reasoning in approving NYSE Arca's fees and the D.C. Circuit did not address their arguments on appeal. See *NetCoalition*, 615 F.3d at 542 n.16 (stating that the "total platform" theory "is not the theory of competition on which the SEC relied [in approving NYSE Arca's proposed fees] and it may not press it for the first time on appeal.").

¹² Dr. David S. Evans, An Economic Assessment of Whether "Significant Competitive Forces" Constrain an Exchange's Pricing of Its Depth-of-Book Market Data (July 10, 2008) [hereinafter "Evans First NYSE Arca Report"]; Dr. David S. Evans, Response to Ordover And Bamberger's Statement Regarding the SEC's Proposed Order Concerning the Pricing of Depth-Of-Book Market Data (October 10, 2008) [hereinafter, "Evans Second NYSE Arca Report"].

This Response is organized as follows. Section II provides relevant industry background and explains the fundamental characteristics of depth-of-book data, how they are used by traders, and how they are priced and sold.

Section III addresses Ordover and Bamberger's unsupported assertion that alternative sources of depth-of-book data act as a significant competitive constraint on the prices that a given exchange can charge for its depth-of-book data. Ordover and Bamberger have not undertaken any analysis to show that this is the case. Nor could they make such a showing because each exchange's depth-of-book data are unique to that exchange and traders must purchase such data from all exchanges with significant depth-of-book liquidity to know how much liquidity is available at what prices and where.

In Section IV, I show that Ordover and Bamberger's claim that competition for order flow acts as a significant competitive constraint on an exchange's pricing of its depth-of-book data is analytically flawed and factually inconsistent with how exchanges work. Depth-of-book data prices do not affect the marginal incentive to place orders and, therefore, do not significantly affect order-flow decisions. On the other hand, depth-of-book data revenue can be used to offset the costs of liquidity rebates and discounts that attract more order flow – as Nasdaq is now admittedly trying to do.

Finally, in Section V, I show that Ordover and Bamberger's "total return" analysis does not address the question of whether depth-of-book data fees are competitively constrained. Where two "joint products" of the same facility are sold as separate products and, there are limited substitutes for one of the products,

competition between the producers of the joint product (what Ordover and Bamberger call “platform competition”) will not prevent the exercise of market power for that product.

II. INDUSTRY BACKGROUND

A. Importance of Depth-of-Book Data Following Decimalization

Nasdaq’s Proposal concerns the prices of Nasdaq’s depth-of-book data. Depth-of-book data consist of information regarding limit orders to buy stock at prices lower than, or to sell stock at prices higher than, the best prices on each exchange.¹³ That is, depth-of-book data provide information on prices “below” the “top of the book” and the number of shares being offered at those prices. Top-of-book data, by contrast, provide information on the best prices available on each exchange and the number of shares being offered at those prices.¹⁴

The importance of depth-of-book data has increased significantly since the transition to “decimalization.” Prior to decimalization, stock prices were measured in 1/16ths of a dollar, or 6.25 cents (and 1/8ths of a dollar before that). Starting in 2001, stock prices on U.S. exchanges were “decimalized,” or quoted in one-cent increments. One of the main potential benefits of decimalization was the possibility of decreased spreads between the best bid and offer for a given security. On the other

¹³ NYSE Arca Order, *supra* note 4, at 74780.

¹⁴ The SEC requires each exchange to report top-of-book data for each security, as well as data on the last sale of each security, to a central data processor, which then consolidates the data and disseminates it to market participants. The consolidated “core” data consist of (1) last sale reports on each security, (2) the current best bid and offer (price and number of shares available) for each security on each exchange, and (3) national best bid and offer across exchanges. *See NetCoalition*, 615 F.3d at 529.

hand, decimalization also resulted in a decrease in the number of shares offered for trading at the top of the book.

To take a simple example, prior to decimalization, a given stock could have been quoted at \$19.9375 (\$19 and 15/16ths), \$20.00 or \$20.0625 (\$20 and 1/16ths). If traders wishing to buy that stock chose to offer the closest price point to their target prices, then all buy orders with a target price between \$19.97 and \$20.03 would be priced at \$20.00.¹⁵ And if no buyers had a target price at or above \$20.03, then the top of the book for buy orders would be at \$20.00 and would consist of all orders with a target price between \$19.97 and \$20.03.

With decimalization, the same stock could be quoted at \$19.97, \$19.98, \$19.99, \$20.00, \$20.01, \$20.02, and \$20.03. The buy orders that would have been offered at the \$20.00 price point prior to decimalization are spread among the seven price points between \$19.97 and \$20.03 after decimalization. If the highest target price among buyers is, for example, at \$20.03, then the top of the book would be at \$20.03 and would consist only of orders with target prices between \$20.025 and \$20.035. Prior to decimalization, orders with target prices between \$19.97 and \$20.025 would have been at the top of the book and would have been included in the consolidated tape data. With decimalization, these orders would instead be below the top of the book and included only in depth-of-book data.

¹⁵ Traders will not necessarily follow this strategy of choosing the closest price point to their target prices, and other factors associated with a transition to decimalization (such as a decrease in the bid-ask spread) would also affect trading decisions, but the example given is illustrative of the likely decrease in liquidity available at the top of the book. In addition, I note that the range of \$19.97 to \$20.03 given in the text is approximate; the exact range, \$19.96875 to \$20.03125, is slightly larger.

Decimalization therefore led to a significant decrease in the number of shares available for trading at the top of the book and correspondingly increased the importance of shares available for trading below the top of the book.¹⁶ This change meant that larger orders were less likely to be filled at the top-of-book price and increased the value of depth-of-book data, which provide important information on the likely range of prices at which large orders may be filled.¹⁷

B. Importance of Depth-of-Book Data from Different Exchanges

Each exchange's depth-of-book data reflect the limit orders placed on that exchange, which differ materially from the limit orders placed on other exchanges. That is because different traders place different orders on different exchanges. Depth-of-book data from Nasdaq, for example, generally reflect different limit orders from depth-of-book data from NYSE or Direct Edge. If a trader placed each order on all available exchanges, it would risk having the same order filled on multiple exchanges, which could be a costly result. The depth-of-book data from one exchange therefore differs materially from the depth-of-book data from other exchanges.

To have a reasonably comprehensive view of liquidity below the top of the book, depth-of-book data from all exchanges with substantial depth-of-book liquidity are required. There are two main reasons for that fact.

¹⁶ See *NetCoalition*, 615 F.3d at 530, n. 7; NYSE Arca Order at 74780.

¹⁷ *NetCoalition*, 615 F.3d at 530, n. 7; NYSE Arca Order at 74780 (“With the initiation of decimal trading in 2001, however, the value to market participants of non-core data, particularly depth-of-book order data, increased”).

First, depth-of-book data from all exchanges with significant liquidity for a given security are important in making trading decisions for that security. Regulation NMS provides “trade-through protection” to the displayed “top-of-book” quotations.¹⁸ A “trade-through” occurs when trades in one market center are executed at prices inferior to those another market center is offering at the same time. By offering trade-through protection, Regulation NMS protects the trader against choosing to execute a trade on an exchange with less favorable terms and guarantees execution at the best price available at the top of the book.

By contrast, no trade-through protection is afforded to quotations below the top of the book. Rather, for traders to identify the exchange on which the optimal price and volume are offered for a given security, and for an assessment of the likely price of a significant order, my understanding is that they must purchase and review the depth-of-book data from each trading venue with significant liquidity for that security. In the absence of such data, for the many orders that are unlikely to be filled at the top of the book, they might miss an opportunity to route an order at lower cost and/or have a more accurate estimate of the likely price of the order.

The Security Traders Association (“STA”) has confirmed this marketplace reality. According to the STA, a broker-dealer needs the depth-of-book data from each significant venue on which a given security trades for a useful perspective of available liquidity:

¹⁸ Effective on August 29, 2005, SEC adopted Regulation NMS, which contains four interrelated proposals. The “Order Protection Rule” or so-called “Trade-Through Rule”, as one of the four proposals, requires trading centers to obtain the best price for investors when such price is represented by automated quotations that are immediately accessible. *See* <http://www.sec.gov/rules/final/34-51808.pdf>.

We do not believe that the depth-of-book feeds from the various exchanges are fungible. Depth-of-book feeds are not substitutes for one another: NASDAQ's depth-of-book data for IBM will be different from the NYSE depth-of-book data for IBM. On the contrary, each depth-of-book data feed reflects the market conditions for a particular security on that particular venue. For a full appreciation of the liquidity available in the entire marketplace . . . as a commercial and competitive matter, a broker-dealer needs the depth-of-book feeds from each significant venue on which the security trades.¹⁹

The consequences of a trader's not purchasing the depth-of-book data for a major center of liquidity, such as Nasdaq, can be substantial. A broker-dealer without depth-of-book data from Nasdaq will have a materially incomplete view of the available volume and prices in a given security. The availability of NYSE volumes and prices for that security is in no meaningful sense a substitute for the different Nasdaq volume and prices.

Indeed, the broker-dealer that forgoes Nasdaq depth-of-book data could have significantly higher costs of trading and may fail to make profitable trades it would otherwise make because it did not know about available liquidity on Nasdaq. Such traders would face significant competitive pressure from other traders that did purchase the Nasdaq depth-of-book data and demonstrate substantially superior results.

Simply put, a broker-dealer cannot ignore the depth-of-book data available from the leading trading venues. And, as Ordoover and Bamberger acknowledge, "all

¹⁹ Bart M. Green & John Giese, STA Comment Letter at 3 (Sept. 11, 2008), <http://www.sec.gov/comments/34-57917/3457917-15.pdf> [hereinafter "STA Comment Letter"].

else equal, the deeper is the ‘depth-of-book’ information on an exchange, the more valuable it is.”²⁰

The second reason that traders value depth-of-book data from each exchange with significant depth-of-book liquidity is that exchanges vary in the available liquidity for different securities and thus in the ability of traders to actually consummate trades on those exchanges. Securities for which Nasdaq is the primary center of liquidity will differ from those for which NYSE or NYSE Arca is the primary center of liquidity. For example, in October 2010, for Tape A securities (for which NYSE is the initial listing exchange), NYSE had about 1.9 times the volume of trading that Nasdaq did, and NYSE and NYSE Arca combined had about 2.9 times the volume of trading that Nasdaq did.²¹ Similarly, for Tape C securities (for which Nasdaq is the initial listing exchange), Nasdaq had about 2.2 times the volume of trading that NYSE Arca did. For many individual securities, the differences would be even greater. This reinforces the fact that an asset manager seeking broad diversification in its equity portfolio cannot ignore either NYSE or Nasdaq or assume data from one exchange is a substitute for data from the other.

²⁰ Statement, *supra* note 3, ¶ 16.

²¹ The statistics reported are for the same time period (October 2010) and using the same data source (BATS) as relied on by Ordover and Bamberger. *See* Statement, *supra* note 3, ¶ 12, n. 4; at http://www.batstrading.com/market_summary. For the purpose of analyzing competition among exchanges, all exchanges owned by the same corporate parent should be aggregated because they are controlled by the same economic agent, which seeks to maximize the profits of the combined operations. Thus, for purposes of economic analysis, NYSE and NYSE Arca should be considered a single entity. Ordover and Bamberger also report statistics for NYSE and NYSE Arca combined. I have also reported the comparison of trading on NYSE (exclusive of NYSE Arca) to trading on Nasdaq. The relative proportions of trading volume are informative of the relative importance of depth-of-book data from the respective exchanges even though shares of depth-of-book data may differ from shares of trading volume. *See* NYSE Arca Order, *supra* note 3, at 74784 (“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 the depth-of-book order data provided by other exchanges and ECNs will be proportionally more important in assessing market depth”).

A trader's need for information about a particular security can be satisfied only by data about that particular security. The depth-of-book data on trading in Microsoft are distinct from the depth-of-book data on trading in WalMart. A trader interested in trading Microsoft stock, perhaps because the trader believes that Microsoft will be highly successful in mobile phones, needs data on Microsoft liquidity and therefore needs depth-of-book data from the exchanges that have substantial liquidity in Microsoft stock. Data on liquidity for WalMart, or for that matter most other stocks, from one exchange would not be a significant substitute for data on liquidity for Microsoft on another exchange.

C. Pricing of Depth-of Book Data

Depth-of-book data are sold in monthly subscriptions and are typically based on a fixed monthly fee per device.²² That fixed subscription fee is independent of the volume of orders generated by the subscriber.²³ The fixed fee is also independent of the extent to which customers use the data. Each monthly subscription provides data on all securities traded on an exchange, and customers are charged the same price whether or not they examine the depth-of-book data for one security, all securities, or some number in between.

²² In addition, there may be a cap imposed by the exchange on the total monthly data fees paid by each company for certain types of fees. There may also be per-company fees for access to the datafeeds from the exchange's servers. *See* Filing of Proposed Rule Change Relating to Approval of Market Data Fees for NYSE Arca Data, SEC Release No. 34-53592, 71 Fed. Reg. 33496 at 33496-33497 (June 9, 2006).

²³ As I discuss below in Section IV.C, Nasdaq's proposed discount schedule, which would provide for higher discounts on non-professional depth-of-book data fees and trading fees for firms that place orders above certain specified thresholds on Nasdaq, does not result in order-flow competition providing a significant competitive constraint on depth-of-book data fees.

An increase or decrease in the monthly subscription fee for depth-of-book data does not therefore change a trader's marginal cost to purchase or sell a particular security on a particular exchange. That is, in choosing where to place the next trade, an entity would not consider the cost of the subscription fee. Likewise, in setting the depth-of-book monthly subscription fee, the exchange would consider the effect of that fee on the marginal incentive to subscribe to depth-of-book data, but not on the marginal incentive to trade generally or for a particular security.²⁴

III. PRICES FOR DEPTH-OF-BOOK DATA FROM ONE EXCHANGE ARE NOT SIGNIFICANTLY CONSTRAINED BY THE AVAILABILITY OF DEPTH-OF-BOOK DATA FROM OTHER EXCHANGES.

According to Ordover and Bamberger, “the existence of alternative sources of information can be expected to constrain the prices platforms charge for market data.”²⁵ Ordover and Bamberger provide no factual support for that assertion, and it is contrary to what happens in the marketplace.

For the reasons discussed above, depth-of-book data from exchanges with substantial liquidity – which obviously includes Nasdaq – are essential information for those traders who buy them. Each is a component of the fixed-cost base of trading data that must be purchased and aggregated.

²⁴ My position here and in my prior Reports does not assume that there is no relationship whatsoever between the pricing of depth-of-book data and the volume of order flow. Some traders may decide not to use a trading venue that declines to make depth-of-book data available at all or charges an extremely high price for that data. However, the fixed fees paid for depth-of-book data pricing will not affect the traders' marginal incentives as to where to place their next buy or sell order since the cost of that trade is not affected at all by the decision to use or not use depth-of-book data that the trader has already purchased.

²⁵ See Statement, *supra* note 3, ¶ 67.

To have a reasonably comprehensive view of liquidity below the top of the book, depth-of-book data from all exchanges with substantial depth-of-book liquidity are required. Indeed, for traders to identify the exchange that is the optimal exchange on which to place a large trade, they must purchase and review the depth-of-book data of each center of significant liquidity. Otherwise, they will have a significantly incomplete view of the liquidity for that particular security and might miss the opportunity to execute a trade for that security at a superior price.

Even when other exchanges have some depth-of-book liquidity for a particular security, traders value the liquidity and pricing information available on Nasdaq. Significantly, traders cannot purchase depth-of-book data from Nasdaq just for those securities for which other exchanges have limited liquidity. Nasdaq (and other exchanges) offer their depth-of-book data on an all-or-nothing basis, not by security.

In short, a broker-dealer cannot ignore the depth-of-book data available from a major trading venue, such as Nasdaq. The existence of depth-of-book data from other exchanges does not therefore significantly constrain Nasdaq's pricing of its own depth-of-book data.

IV. COMPETITION FOR ORDER FLOW DOES NOT SIGNIFICANTLY CONSTRAIN DEPTH-OF-BOOK DATA PRICING.

In this section, I address Ordover and Bamberger's conclusion that competition for order flow constrains the pricing of Nasdaq's depth-of-book data. According to Ordover and Bamberger, that is the case because "a trading platform cannot generate market information unless it receives trade orders," suggesting that a

strong and direct relationship exists between order-flow competition and market data prices.²⁶ “For this reason,” Ordover and Bamberger claim, “a platform can be expected to use its market data product as a tool for attracting liquidity and trading to its exchange,” thereby constraining market data prices.²⁷ That assertion is unsupported and wrong.

A. The Relationship Between Order Flow Competition And the Price of Depth-of-Book Data Is Neither Strong Nor Direct.

The premise of Ordover and Bamberger’s argument is that order flow and depth-of-book data are directly and inextricably linked because “a trading platform cannot generate market information unless it receives trade orders.”²⁸ That assertion distorts the relationship between the two.

An exchange has at least three sources of revenue relevant to the Proposal: liquidity providers, liquidity takers, and depth-of-book market data purchasers. The provision and taking of liquidity generates order flow and constitutes the trading process. Market data are a byproduct of the trading process.

A strong and direct relationship exists between order flow and prices for liquidity providers and liquidity takers. Liquidity providers are given rebates and other incentives to provide liquidity to the exchanges; those price incentives directly affect the marginal revenue of providing liquidity, and, consequently, the volume of liquidity provided. Liquidity takers are charged for using this liquidity; those fees

²⁶ Statement, *supra* note 3, ¶ 67.

²⁷ Statement, *supra* note 3, ¶ 67.

²⁸ Statement, *supra* note 3, ¶ 67.

directly affect the marginal cost of taking liquidity and, consequently, the volume of liquidity taken.

Trading venues compete to attract liquidity, which generates trading volume, which in turn generates trading revenues for the platform. Each trade is executed with respect to an individual security, and exchanges charge fees (with separate discounts and rebates for trade-execution services) that are determined on a transactional basis and are designed specifically to affect trading incentives and attract liquidity. Those transaction-based fees for order flow allow traders to assess the costs and benefits of placing a given trade for a given security on a given venue and thus affect traders' marginal incentives to direct order flow among exchanges. Accordingly, the prices that are relevant to attracting order flow (aside from the prices of securities that are purchased or sold) are the transaction fees, including the liquidity rebates, associated with placing orders on a trading venue.²⁹

There is not a similar strong or direct relationship between order flow and the price of depth-of-book data. Consider a trader who has purchased monthly subscriptions to the depth-of-book data of the significant exchanges. As I pointed out above, depth-of-book data are sold as monthly subscriptions and are typically based,

²⁹ Nasdaq also claims that it “believes that non-professional users that are able to make use of depth data also have a degree of knowledge about market structure that would cause them to favor limit orders, rather than market orders, when buying and selling. Thus, through the proposal, NASDAQ hopes to encourage a ‘virtuous circle’ in which firms route more liquidity-providing orders to NASDAQ and consume and distribute more data in order to receive the discount, with increased data distribution in turn encouraging still more liquidity provision.” *See* Notice of Filing and Immediate Effectiveness of Proposed Rule Change To Link Market Data Fees and Transaction Execution Fees, SEC Release No. 34-63745, 76 Fed. Reg. 4970 at 4971 (January 20, 2011) [hereinafter “Proposed Rule Change”]. The “virtuous circle” claim is not analyzed by Ordoover and Bamberger and is otherwise not supported by Nasdaq. I understand that non-professional users do not generally choose which trading venues to direct their limit orders. There will therefore be no direct impact on orders placed on Nasdaq (the claimed “virtuous circle”) from decisions made by non-professional users even if the greater consumption of depth-of-book data posited by Nasdaq takes place.

at least in part, on a monthly fee per device and include all securities on the exchange. As a result, the prices that the trader pays for placing an order on an exchange in a particular stock depends only on the prices that the exchange charges for orders and does not depend on the monthly subscription price. Moreover, when the trader made the decision to purchase depth-of-book data for the major exchanges, the trader did not know which exchange that data would later show to be the best trading venue having the best prices and liquidity for that stock. Whether the monthly subscription price is high or low does not affect, in any way, the decision on where to place an order.³⁰

Consequently, the availability of depth-of-book data do not directly lead to order flow because that depends mainly on what liquidity has been placed on the several exchanges that traders can consider and because the price of orders is independent of the monthly subscription price. An increase or decrease in the monthly subscription fee for depth-of-book data would not change a trader's marginal cost of buying or selling a particular security on a particular exchange. That is, in choosing where to place the next trade, a trader would not consider the cost of the subscription fee, which has already been incurred and is a fixed amount that does not vary with trading activity. Contrary to Ordoover and Bamberger's suggestion, the exchanges do not use depth-of-book data to stimulate trades, as they use rebates and fees for liquidity providers and takers.

³⁰ There is a very weak relationship between the monthly subscription price and orders. If an exchange sets the monthly subscription price so high that few traders purchase it, then the number of traders placing orders on that exchange for any stock would likely be reduced. One of the costs of setting the subscription price too high is then the loss of order flow revenue. *See also, supra* note 24.

If anything, the fact that market data is a byproduct of order flow suggests that competition for order flow provides an incentive to increase the price of the depth of book data. Lower order flow prices generally will increase order flow, which, in turn, will increase the value of depth-of-book data. That is, by attracting additional order flow, an exchange will not only gain the transaction fees associated with the order flow, but it will also increase the amount it can charge for its depth-of-book data.

Increased depth-of-book revenue can be used to offset the costs of liquidity rebates and discounts that attract order flow. Indeed, the Securities Trading Association observes that “raising the market data fees would enable [the exchanges] to pay higher rebates and thus, attract more order flow.”³¹ We see that observation empirically verified in the case of consolidated tape data. Trading venues use revenue from consolidated tape data to compete for order flow. As Nasdaq states: “Participants in the UTP [consolidated tape] Plan have used tape fee revenues to establish payment for order flow arrangements with their members and customers.”³²

The profit-maximizing strategy for exchanges, absent any regulatory requirements, would be to set lower prices for order flow, which would have the effect of increasing the value of, and the prices the exchanges can charge for, their depth-of-book data.

³¹ STA Comment Letter, *supra* note 19, at 3.

³² Nasdaq Stock Market, Inc., Annual Report (Form 10-K), at 17 (Feb. 25, 2008).

B. Ordover and Bamberger’s Conclusion That Order-Flow Competition Significantly Constrains Depth-of-Book Data Pricing Is Wrong.

Based on the premise that market data would not exist without order flow, Ordover and Bamberger jump to the conclusion that competition for order flow is a significant competitive constraint because “a platform can be expected to use its market data as a tool for attracting liquidity and trading to its exchange.”³³ That is wrong.

Although an exchange has an incentive to make available its depth-of-book data, and not to set such an exorbitant price that few potential buyers of the data would be willing to pay (effectively making it unavailable), the exchange nevertheless can charge prices above competitive levels for those data if the exchange is not constrained by significant competitive forces in their sale and such data have value to customers by reflecting substantial liquidity. Once a seller makes a product available, the price that the seller can charge for the product is a function of whether consumers value the product and whether economically significant substitutes are available.

Furthermore, one would not expect pricing for market data to be constrained by competition for order flow. Order-flow competition implies that traders can and do switch easily among many alternative trading venues. That simply underscores the need for traders to purchase depth-of-book data from all venues with significant liquidity, as they will not know at the time of the data-purchase decision where

³³ Statement, *supra* note 3, ¶ 67.

liquidity may shift and cannot take the risk that they will miss a significant source of liquidity at favorable volumes and prices.

Consider a small increase in the price of each product. A five percent increase in the monthly subscription fee for depth-of-book data would not have any material effect on the demand for order flow for two reasons. As noted above, the increase in the price of depth-of book data would have no effect on the price of, and therefore the marginal demand for, transactions.

On the other hand, a five percent increase in the price of transactions might well have a material effect on order flow and also on the demand for depth-of-book data. Increasing the price of transactions would reduce the number of orders and would thereby reduce the amount of, and value of, depth-of-book data. In such a case, the willingness of customers to pay for depth-of-book data would decline, especially if those data reflected a significant reduction in liquidity.

An exchange with substantial liquidity therefore maintains significant leverage over the consumers of its depth-of-book data. That dynamic – significant leverage over market data customers and little or no leverage over providers and takers of liquidity – can result in high prices for market data through the exercise of significant market power over unique liquidity data, and low prices for order flow that reflect intense competition and the ability to use revenues from depth-of-book data to subsidize execution costs.

C. The Evidence On Which Ordover And Bamberger Rely Does Not Support Their Conclusion That Nasdaq’s “Platform” Proposal Is Constrained By Competitive Forces.

As discussed above, the fees paid for depth-of-book data do not generally vary with the volume of orders placed on an exchange. This is one reason why

competition for order flow does not act as a significant competitive constraint on depth-of-book data prices. Indeed, the only instance of which I am aware where there is a relationship between a firm's use of an exchange for trading and the fees paid for depth-of-book data from that exchange is the current Nasdaq proposal.

As an initial matter, the discount reflected in the Nasdaq market data fees in question here applies only to data fees for non-professional users, so it has no impact on data fees for professional users. Even for fees for non-professional users, a consideration of the economic incentives resulting from the proposed rate schedule demonstrates that it does not provide for a significant competitive constraint of order flow competition on depth-of-book data prices.

Nasdaq's proposal provides for increasingly higher discounts on non-professional depth-of-book data fees and trading fees for firms that place orders above certain specified thresholds on Nasdaq.³⁴ In particular, for non-professional depth-of-book data fees, under Nasdaq's proposal, greater use of Nasdaq for trading provides for higher discounts on Nasdaq's depth-of-book data fees for non-professional users. While Nasdaq's proposal is on its face a discount on the price of depth-of-book data for non-professional users, in terms of Nasdaq's incentives to attract order flow, the proposed discount scheme would provide an incentive to raise the undiscounted price of Nasdaq's depth-of-book data.³⁵ A higher depth-of-book

³⁴ See Proposed Rule Change, *supra* note 29, at 4971.

³⁵ The Proposal would provide a discount on the current price of Nasdaq's depth-of-book data for non-professional users for those firms that qualified for the applicable discount tiers. If the view expressed by Nasdaq and Ordover and Bamberger that Nasdaq should be free to set its depth-of-book data fees at any level it wishes were accepted, Nasdaq would be able to raise the non-discounted price of its depth-of-book data in the future.

data price means a larger discount for placing more orders on Nasdaq. Higher, rather than lower, undiscounted depth-of-book data prices will provide a greater incentive to place orders on Nasdaq (in terms of the effect of this proposed discount scheme).

This does not therefore mean that the net price of Nasdaq's depth-of-book data for non-professional users would be significantly constrained by the competition for order flow. Nasdaq is simply offering a discount on market data in exchange for the placement of order flow. Nor have Ordover and Bamberger provided any evidence or analysis that competition for order flow would act as a significant competitive constraint on the price of depth-of-book data as a result of the proposed discount scheme.

Ordover and Bamberger also cite Nasdaq's introduction of a cap on the "non-displayed use" of certain Nasdaq depth-of-book data (for use on personal computers and servers for analysis and processing of trading, where the data are not displayed to a user), which they claim was in response to Nasdaq's concern that a member would move order flow from Nasdaq to a competing platform, as evidence of the constraining effect of platform competition on the price of depth-of-book data.³⁶ As discussed by Ordover and Bamberger, the focus of competition among exchanges in recent years has been for the sale of transaction services rather than competition in the sale of depth-of-book data. Ordover and Bamberger's examples of pricing competition among exchanges are almost exclusively on the prices of transaction

³⁶ Statement, *supra* note 3, ¶ 29.

services rather than of depth-of-book data.³⁷ The only example offered of competition among exchanges in the use of depth-of-book data pricing to compete for order flow is the cap for non-displayed use.

My understanding is that this example does not illustrate competition among exchanges in the pricing of depth-of book data. Rather, in the past, Nasdaq had not attempted to charge for the non-displayed use of depth-of-book data, but had recently become concerned about the possible shift from displayed to non-displayed use of depth-of-book data, such as through an increased use of algorithmic trading rather than human traders. Instead of illustrating an attempt to compete on depth-of-book data prices, this example illustrates an attempt to restructure its depth-of-book data fees and, possibly, to increase prices to broker-dealers.³⁸

V. PRICES FOR DEPTH-OF-BOOK DATA ARE NOT SIGNIFICANTLY CONSTRAINED BY INTER-PLATFORM COMPETITION.

Ordover and Bamberger argue that inter-platform competition acts as a significant competitive constraint on the pricing of depth-of-book data. Ordover and Bamberger focus on the “total return” or “aggregate return” that a platform receives from trade execution services and depth-of-book and other market data.³⁹ They

³⁷ Statement, *supra* note 3, ¶¶ 23-25. Ordover and Bamberger make reference to what they claim is competition with Nasdaq in the pricing of its “Last Sale” data used for display on web sites. The Last Sale data report the last sale price of different securities and are not depth-of-book data. Even if Ordover and Bamberger’s claim were correct with respect to Last Sale data, it would not indicate that there is competition for the pricing of Nasdaq’s depth-of-book data. There is no reason to expect that the competitive conditions for Last Sale data displayed for informational purposes on public web sites would be indicative of those for depth-of-book data used by traders for evaluating and placing large orders.

³⁸ As I have noted in my prior reports, the fact that exchanges with significant depth-of-book liquidity do not face significant competitive constraints on pricing of depth-of-book data does not mean that they can increase prices indefinitely without facing customer resistance. *See* Evans Second NYSE Arca Report, *supra* note 12, at 14-15.

³⁹ Statement, *supra* note 3, ¶¶ 5, 19, 28.

claim that the “total price of trading” on a platform – including the price of execution and the price of data – is constrained by the total price of trading on alternative platforms.⁴⁰ Based on that hypothesis, Ordover and Bamberger contend that Nasdaq should be free to set depth-of-book data prices at whatever high price it chooses because “an ‘excessive’ price” for market data would result “in lower prices for other products sold by the firm.”⁴¹

Ordover and Bamberger’s claim is therefore not that the price of *depth-of-book data* will be constrained by platform competition, but rather, that an elevated price for depth-of-book data will be offset by a lower price for trade execution. Even if that were true, it is irrelevant to the statutory standard for exchange fees. The relevant standard suggested by the SEC is whether the *price of depth-of-book data* is significantly constrained by competitive forces, not whether an elevated data price for all customers is offset by lower trade execution prices (for some customers). Indeed, in the *NetCoalition* decision, the D.C. Circuit identified “the costs of collecting and distributing market data” as the relevant costs to consider in the competitive analysis, not the total costs of the trading venue or whether there were countervailing effects on the price of trading services.⁴² The allocation of the total costs of the trading venue simply does not address the fundamental proposition of whether competition for trading services constrains the price of market data.

Ordover and Bamberger’s economic argument is also fundamentally flawed. Even if one assumes that depth-of-book data prices are a component of the “total

⁴⁰ Statement, *supra* note 3, ¶ 38.

⁴¹ Statement, *supra* note 3, ¶ 21.

⁴² *NetCoalition*, 615 F.3d at 537.

price of trading,” that component does not affect the marginal incentives of a broker-dealer to execute a trade, as discussed in the previous section. On the other hand, transaction fees can and do affect order flow decisions and thus the generation of valuable depth-of-book data. Thus, while inter-platform competition for trading may constrain the prices of trade execution services, it does not significantly constrain depth-of-book data fees. As noted above, that inter-platform competition could result in high depth-of-book data fees cross-subsidizing low trade execution fees.

Ordoover and Bamberger further attempt to advance their “total return” argument by characterizing trade execution services and market data as “joint products” with “joint costs” and by asserting that trading platform competition will necessarily constrain the total return from those joint products.⁴³ Where two “joint products” of the same facility are sold as separate products and in separate proportions, if there is market power in one of the products, the price of that product will not be competitively constrained by “platform competition.”

A classic example of joint products with joint costs is the production of wool and mutton, to which Ordoover and Bamberger and Nasdaq refer numerous times. Wool and mutton are joint products of a sheep, and many of the costs of producing both products (*i.e.*, the care, feeding, and handling of the sheep) are the same. However, the demand conditions for wool are independent of those for mutton. There is no relationship between the final demand for wearing sweaters and that for eating lamb chops.

⁴³ Statement, *supra* note 3, ¶ 5 (“Competition among trading platforms can be expected to constrain the aggregate return each platform earns from its sale of the array of its products, including the joint products at issue here, which are execution services and proprietary data. . .”).

Suppose, for example, that market conditions are such that only one firm can produce desirable wool (because its sheep have much better wool than its competitors' sheep), while many firms can produce desirable mutton (if we assume the mutton from all sheep is perfectly substitutable). Under those conditions, the competition to produce mutton, however intense it might be, will not significantly constrain the monopoly wool producer's pricing of wool. If other firms cannot produce wool of satisfactory quality, the monopoly wool producer will face no competition in the pricing of wool, even as the pricing of mutton faces intense competition. Our point here is that the existence of joint costs for joint products does not ensure a particular competitive outcome in either product market.

Ordover and Bamberger appear to agree with this elementary point, but argue that "competitive concerns" are "not present here because, as we have seen, other exchanges have been able to enter, flourish, and divert business from NASDAQ."⁴⁴ But Ordover and Bamberger do not provide any basis for their assertion that there is no reason for concern over Nasdaq's *depth-of-book data* pricing because other platforms are able to compete for *order flow*. And, in fact, intense competition among trading platforms could result in all of them choosing to adopt high prices for depth-of-book data and low prices for transaction services. That would not be consistent with the objectives of the Exchange Act.

Moreover, as Ordover and Bamberger acknowledge, "all else equal, the deeper is the 'depth-of-book' information on an exchange, the more valuable it is."⁴⁵

⁴⁴ Statement, *supra* note 3 ¶ 41.

⁴⁵ Statement, *supra* note 3, ¶ 16.

As I discussed in Section II above, there are significant differences in the volume of trading across exchanges and the value of the depth-of-book data on different exchanges. Such an outcome is compatible with significant competition for order flow among exchanges.

Indeed, when new trading platforms such as BATS and Direct Edge entered, they started with no trading volume and no market data of value. This substantial disadvantage with respect to depth-of-book data relative to NYSE and Nasdaq did not prevent BATS and Direct Edge from competing for order flow. That is, there is no basis for Ordover and Bamberger's claim that market power in depth-of-book data would necessarily be reflected in significantly diminished competition for order flow.

As I have explained, in the case of trading venues, competition for order flow does not significantly constrain depth-of-book data pricing even if they are viewed as joint products. Regardless of competitive conditions for trade execution, an exchange can charge supracompetitive prices for depth-of-book data if the exchange does not face significant competitive constraints in the sale of such data and such data have value by reflecting substantial liquidity. As demonstrated in Sections III and IV above, that is the case here.⁴⁶

Finally, even if Ordover and Bamberger's "total products" theory were correct, consumers that purchase little or no trade execution services from Nasdaq would pay elevated prices for depth-of-book data with little or no offset from lower

⁴⁶ See also Evans First NYSE Arca Report, *supra* note 12.

trade execution prices. The prices paid by those customers would not be constrained by significant competitive forces.

VI. CONCLUSION

The fundamental problem with Ordover and Bamberger's argument is that it is simply not relevant to the matter before the SEC. Their basic argument is that competition between exchanges results in the elimination of profit and makes their *total* prices track their *total* costs. If exchanges charge high prices for depth-of-book data, they would charge low prices for order flow or something else. Whether that is true or not—and Ordover and Bamberger provide no evidence that it is—it is irrelevant to the question before the SEC. An outcome in which “platform” competition results in high-priced data that is used to subsidize order flow does not show that those data prices are fair and reasonable.

Nothing about sheep, mutton and wool salvages the flaw in this argument. The sheep market happens to be intensely competitive in mutton and wool. But that does not mean that all businesses based on joint products are competitive in both. As noted above, if only a handful of farmers had good wool for sweaters, those farmers could have market power in wool even though they were selling mutton on a competitive market.

The fact is that exchanges, which are the subject of this proceeding, are quite different from sheep. Only Nasdaq can supply the depth-of-book data that traders need for assessing whether they should trade on Nasdaq and elsewhere. Nasdaq has incentives to charge high prices for those data and in fact to use the revenue from that data to subsidize order flow. Nasdaq's depth-of-book data prices are not constrained by competitive forces and nothing that Ordover and Bamberger say changes that fact.