



Testimony

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SECURITIES PRICING

Progress and Challenges  
in Converting to Decimals

Statement of Davi M. D'Agostino  
Financial Institutions and Markets Issues  
General Government Division



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# Securities Pricing: Progress and Challenges in Converting to Decimals

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Mr. Chairman and Members of the Subcommittee:

We are pleased to be here today to present the results of our assessment of the securities industry's progress toward implementing decimal trading as part of the monitoring we are doing at your request. In 1998, we testified before this Subcommittee about actions needed for the industry to convert from fractions to decimals.<sup>1</sup> At that time, we noted that the industry should complete its work in preparing for the 2000 date change before attempting to implement decimal trading. However, we also recommended that the Chairman, Securities and Exchange Commission (SEC), take various steps to ensure that timely implementation of decimal trading would occur thereafter. These steps included ensuring that the industry established definitive implementation time frames and assessed the impact of decimal trading on the securities industry's information processing and communication system capacities.

Today, I will focus my remarks on two key areas: the progress made to date toward converting to decimals and the challenges that remain. In response to our recommendations, SEC and the industry have taken actions to help ensure that the securities markets implement decimal pricing in 2000. SEC staff have been monitoring the securities industry efforts, which are being coordinated by the Securities Industry Association (SIA), to develop time frames and standards for implementing decimal pricing and have issued two orders directing industry participants to work jointly on these tasks. In addition, SIA commissioned a study of decimal trading's impact on trading and price quotation volumes.

Although securities market participants have made progress in preparing for decimal trading, some key challenges remain for the industry to successfully implement decimal trading. Because the capacity study commissioned by SIA projected that decimal trading is likely to significantly increase trade and quotation message traffic, a primary challenge will be to ensure that the industry's communication and processing systems have adequate capacity. The options markets and the Nasdaq Stock Market, Inc. (Nasdaq) face the greatest difficulty in preparing for the increased message traffic from decimal trading. Other steps that must be completed before decimal trading can be implemented include developing market standards and implementation procedures, ensuring that market participants' systems are ready to process decimal prices, and revising all rules necessary to govern trading. However, these steps are not yet complete and, in some cases, progress has been

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<sup>1</sup>Securities Pricing: Actions Needed for Conversion to Decimals (GAO/T-GGD-98-121, May 8, 1998).

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hampered by other impediments, including an ongoing antitrust investigation of the options markets.

This statement is based on our monitoring efforts to date. To monitor SEC and securities industry efforts to implement decimal trading, we observed the industry meetings being coordinated by SIA and interviewed SEC officials. Regarding the industry's efforts to assess decimal trading's impact on its system capacities, information technology and research methodology experts among our staff evaluated the private consulting firm's study. We interviewed officials from the consulting firm that prepared the capacity study, as well as representatives from the equities and options markets to discuss capacity issues. We also obtained and analyzed information from the Securities Industry Automation Corporation (SIAC) and the Options Price Reporting Authority (OPRA), which are the entities that administer the systems used to disseminate trade and price quotation messages for the stock and options markets.

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## Progress Made Toward Implementing Decimal Trading

As recommended in our 1998 testimony, SEC and the securities industry have taken various steps to help ensure that the securities markets transition to decimal trading in 2000. SEC staff have conducted periodic meetings with industry participants about decimal issues and have monitored the efforts of SIA committees working to implement various aspects of decimal trading. SEC staff also cooperated with the private consulting firm that prepared the study of decimal trading's impact on industry systems capacity and held discussions with this firm and other market participants on the study's results.

For its part, the securities industry, under the auspices of SIA, has been meeting to coordinate plans and standards for implementing decimals. In addition, the various U.S. exchanges, Nasdaq, and other securities organizations have also scheduled three industrywide tests of decimal trading in April, May, and June 2000.

In January 2000, SEC took a significant step towards the implementation of decimal trading. On January 28, 2000, SEC issued an order<sup>2</sup> requiring certain market participants, including the stock and options exchanges, and National Association of Securities Dealers, Inc. (NASD),<sup>3</sup> to work

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<sup>2</sup> Order Directing the Exchanges and the National Association of Securities Dealers, Inc. To Submit a Decimalization Implementation Plan Pursuant to Section 11A(a)(3)(B), Exchange Act Release No. 34-42360, 65 Fed. Reg. 5003 (Jan. 28, 2000).

<sup>3</sup> Named as "Participants" in the order were the American Stock Exchange, LLC; the Boston Stock Exchange, Inc.; the Chicago Board Options Exchange, Inc.; the Chicago Stock Exchange, Inc.; the

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together to prepare a plan that would ensure that decimal trading would begin by July 3, 2000. Specifically, the order directed these market participants to develop and submit a plan to implement decimal trading to SEC by March 13, 2000.<sup>4</sup>

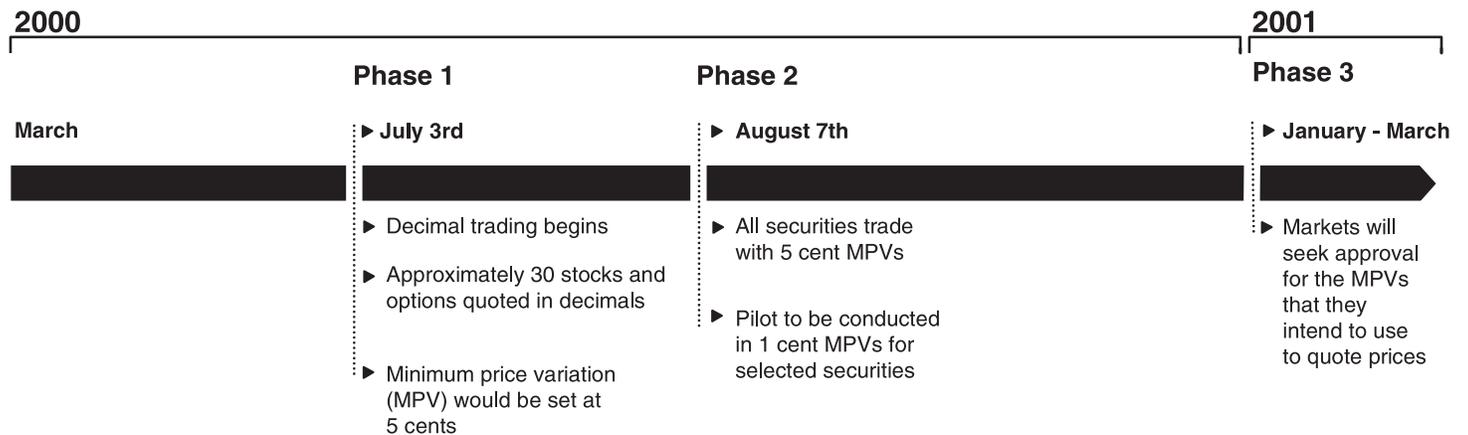
The market participants subject to the order have not yet formally submitted their implementation plan to SEC and the details are subject to change. However, the industry members, working under the auspices of SIA, developed a draft schedule for implementing decimal trading using a phased approach. According to that draft plan, the industry intends to begin the first phase of implementation in July 2000, as reflected in the SEC order. As shown in figure 1, under the draft plan, during the first month, the prices of a small number of stocks (about 30) would be quoted in decimals with a minimum price variation (MPV) no greater than a nickel. A second phase would then begin in which all stocks would be quoted with an MPV of no more than a nickel. During the second phase under that draft plan, a pilot would also be conducted in which a selected number of stocks would be quoted in penny increments. After January 2001, the final phase of the implementation would begin in which the individual markets would file rule changes with SEC seeking approval of the MPVs with which they intend to quote prices.

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Cincinnati Stock Exchange, Inc.; NASD; the New York Stock Exchange, Inc.; the Pacific Exchange, Inc.; and the Philadelphia Stock Exchange, Inc.

<sup>4</sup> The order also directs the exchanges and NASD (the Participants) to discuss the implementation of decimal trading with certain interested market participants (the "Interested Parties"). These Interested Parties include the International Securities Exchange, SIA, the National Securities Clearing Corporation, the Depository Trust Company, the Options Clearing Corporation, SIAC, the Intermarket Trading System Operating Committee, OPRA, the Consolidated Tape Association, and the Consolidated Quote Operating Committee.

Figure 1: Industry Draft Implementation Phases for Decimal Trading (as of February 25, 2000)



## Adequate Systems Capacity Is the Primary Challenge to Decimal Trading

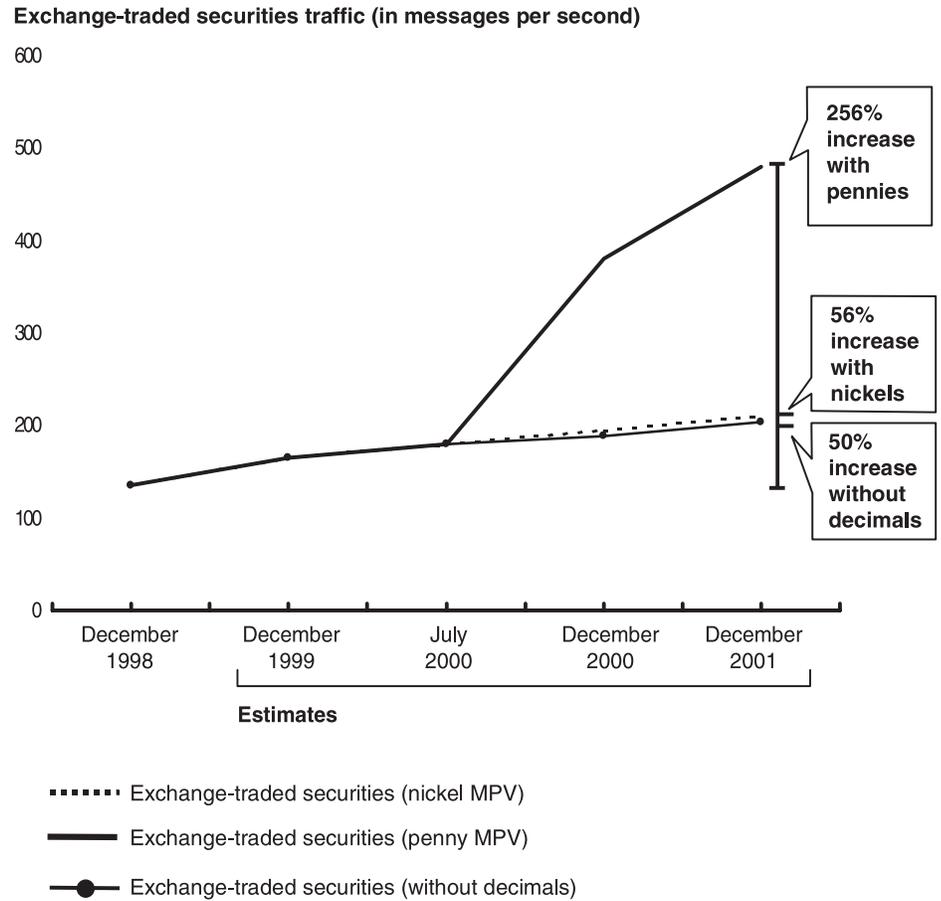
As we noted in our 1998 testimony, successful implementation of decimal trading in the United States would require regulators and the industry to ensure that adequate capacity exists to accommodate the expected trade and price quote message traffic that would have to be processed and communicated industrywide. The SIA-commissioned study of the impact of decimal trading on processing and communication capacities was performed by a private consulting firm, SRI Consulting. The SRI study concluded that substantial increases in message traffic in both the equities and options markets would likely occur.

At our request, SRI provided us with its most recent projections for peak message traffic volumes arising from decimal trading. These projections include not only the impact of decimal trading, but also of other developments in the markets that are increasing message traffic, such as record trading volumes and increased competition among options exchanges. SRI has developed projected peak message traffic volumes for exchange-traded securities, Nasdaq securities, and for equity and index options. For each type of security, SRI has estimated what the message traffic volumes will be by December 2001 for three scenarios: (1) without decimal trading, (2) with decimal trading with a nickel MPV, and (3) with decimal trading with a penny MPV.

As shown in figure 2 below, SRI estimates that peak message traffic for securities traded on the exchanges would be 50 percent higher by the end of 2001 from its December 1998 levels without any impact from decimal trading. However, if these securities trade in decimals with a penny MPV,

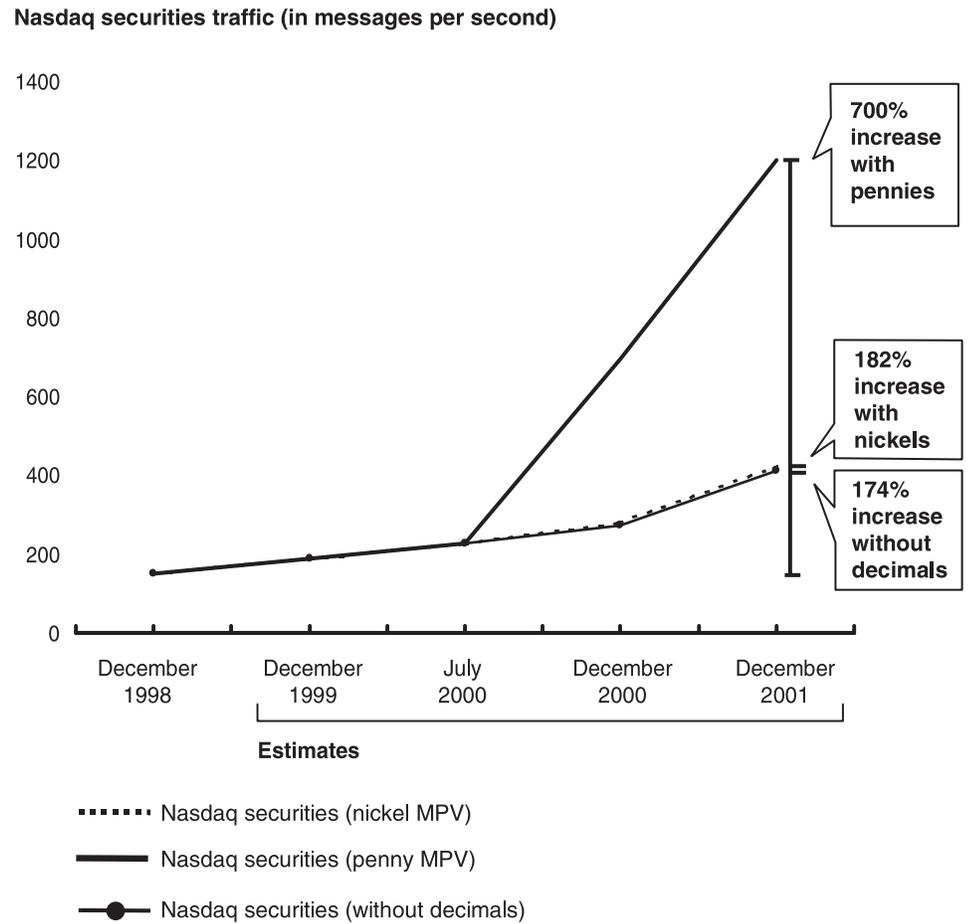
peak message traffic could increase by as much as 256 percent from December 1998 to December 2001.

**Figure 2: SRI Projections for Exchange-Traded Securities' Peak Message Traffic From December 1998 to December 2001 (Data as of February 24, 2000)**



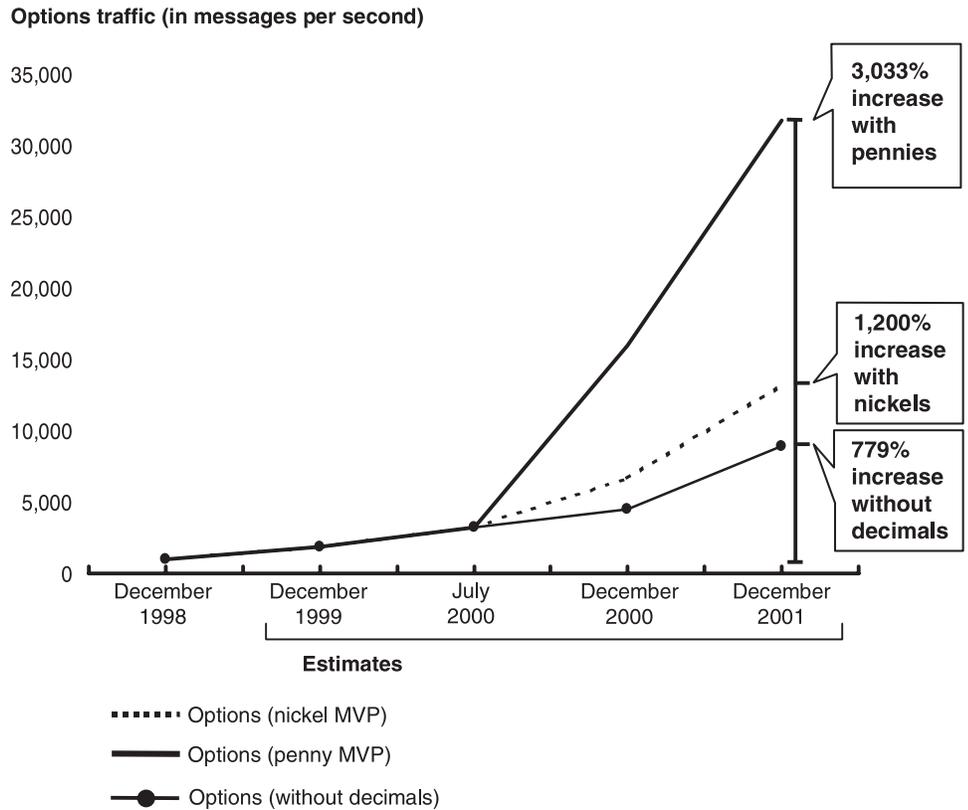
As shown in figure 3 below, SRI estimates that peak message traffic for securities traded on Nasdaq will be 174 percent higher by the end of 2001 from its December 1998 levels without any impact from decimal trading. However, if Nasdaq securities trade in decimals with a penny MPV, SRI projects that peak message traffic for securities traded on Nasdaq could increase by 700 percent by December 2001.

**Figure 3: SRI Projections for Nasdaq Securities' Peak Message Traffic From December 1998 to December 2001 (Data as of February 24, 2000)**



As shown in figure 4 below, SRI estimates that peak message traffic for equity and index options will be 779 percent higher by the end of 2001 from its December 1998 levels without any impact from decimal trading. However, if these options trade in decimals with a penny MPV, SRI projects that their peak message traffic could increase by 3,033 percent by December 2001.

**Figure 4: SRI Projections for Options' Peak Message Traffic From December 1998 to December 2001 (Data as of February 24, 2000)**



As you requested, we evaluated this study and found that it generally used reasonable methodologies to produce its findings. The study's projections for securities trading with a nickel MPV and for options traffic were produced using historical data and projection models similar to those already used in the industry. However, the traffic estimates for decimal trading in securities with penny MPVs may have been subject to greater error because they relied on the opinions of market participants as the primary input to the models used for these projections. However, neither SRI nor we could identify other reasonable sources of such information. SEC officials noted during the time that the market participants provided input to the SRI study, trading volumes in securities markets were rapidly increasing and this would have made estimating future volumes even more difficult. Nevertheless, they said that these participants would have been the best sources for such estimates. For example, an SRI official told us that historical data could not be used to estimate trading behavior for penny MPVs because securities on U.S. or foreign markets do not generally trade in such increments.

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Recognizing the potential impact of decimal trading on the industry's system capacities, as previously discussed, the second phase of the industry's implementation plan is expected to include a pilot program, in which selected securities would be quoted with penny MPVs. Such a pilot should help the market participants and SEC to evaluate the potential effects of smaller trading increments on capacity and trading behavior.<sup>5</sup>

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### Options Exchanges Are Most Challenged in Addressing Likely Message Traffic Increases

Based on the SRI projections, the transition to decimal trading in U.S. securities markets could have the greatest impact on message traffic volumes for options. The OPRA system is used to disseminate trade and price quote messages for equity and index options industrywide. OPRA officials told us that upgrading their systems to handle the increase in options traffic expected from decimal trading is a major challenge. One OPRA official said that increasing the system's capacity to handle the projected decimal trading volumes would "require enough telephone lines to support a small city." Furthermore, OPRA representatives noted that some of the message traffic projections for options are so high that traders would have difficulty interpreting and acting on such rapidly changing information.

To be able to process the current and projected message traffic volumes, OPRA intends to begin increasing the capacity of the system. According to OPRA officials, they expect to increase the OPRA system's processing capacity during 2000 from its current maximum of 3,000 messages per second to 12,000 messages per second by December 2000.

However, this additional capacity will not be adequate to accommodate the SRI projections. OPRA has begun taking several steps to reduce quotation traffic because the current message volumes are already approaching industry capacity limits. For example, each of the options exchanges has agreed to internally prioritize its own quote and trade report message volume so that the amount of traffic submitted to OPRA does not exceed specified percentage allocation of the OPRA system's total capacity.

The participants in the OPRA systems have also been working with SRI to prepare additional strategies to further reduce this system's message traffic. For example, they are considering discontinuing price quotes for options with low trading volumes. In addition, they have discussed

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<sup>5</sup> In its January 28, 2000, order, SEC directs that such a pilot is to be conducted if the decimals implementation plan submitted by the market participants includes a phased-in approach in which a minimum increment greater than a penny is used.

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establishing MPVs for options quotations of 5 cents or a 10 cents as another way of limiting message traffic after decimal trading begins. According to an SIA official, such steps are necessary to reduce the expected message volume to levels below the maximum capacity of the options systems. Because of potential market impacts, SEC plans to review the mitigation strategies proposed by the exchanges and must approve any resulting changes to exchange rules, including any restrictions on the level of options quotation MPVs.

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## Decimal Trading Also Poses Capacity Challenges For the Nasdaq Market

As the SRI study indicated, trading in decimals will also increase message traffic for the equities markets, but to a lesser degree than for the options markets. According to SIA officials, the exchanges offering listed securities likely have adequate capacity to absorb the likely increase in quotation message traffic expected to result from decimal trading. However, as shown previously, SRI's latest projections indicated that trading in penny MPVs may increase Nasdaq quotation message traffic by 700 percent between December 1998 and December 2001.

According to Nasdaq officials, their market is already experiencing processing strains because of unprecedented increases in trading volumes. For example, they provided us with data that indicated that their average daily share volume since the beginning of 2000 is almost 1.7 billion shares, which represents a 61 percent increase over their average daily volume in 1999.

Because of their need to expand their ability to process these volumes, Nasdaq officials have informed SEC that their market would not be ready until the first quarter of 2001 to accommodate their own lower estimates of the increased message traffic expected from decimal trading with penny increments. Nasdaq has not factored into its planning the increased estimates from SRI. In addition, Nasdaq will not be able to participate in the first two industrywide decimal trading tests scheduled for April and May 2000, but intends to participate in the June test.

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## Decimal Implementation Progress Has Been Slowed in Other Areas

In addition to addressing capacity issues, the timely implementation of trading with decimal prices in U.S. securities markets will also require other efforts to be completed in a coordinated manner across the securities industry. These include finalizing standards for market operations and practices; revising exchange and market regulations; and readying the systems of the exchanges, broker-dealers, and other market participants for decimal prices. Cooperation among market participants in a key area has been hampered in part by antitrust concerns. However, the SEC order issued in January 2000 may help address many of these

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concerns that have slowed industry progress by clearly stating that such cooperation is in the public interest.

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## Development of Market Standards Has Been Delayed by Antitrust Concerns

For the conversion to decimal trading to be successful, various standards, practices, and implementation procedures have to be agreed to by the exchanges, markets, and other market participants. An example of the types of issues requiring agreement among the participants is the methodology for converting prices in pending orders that have yet to be executed when the markets transition from fractional to decimal prices. Another issue involves determining how orders will be routed and processed by the markets if different exchanges establish different MPVs.

However, we observed and officials confirmed that progress among the various SIA committees and subcommittees working on these decimals-related issues has been slowed by antitrust concerns. Currently, the U.S. Department of Justice is conducting an investigation of antitrust issues in the options markets and various private entities have filed lawsuits alleging anticompetitive behavior by the options markets. Market participants told us that, as a result, joint discussions of decimal trading issues could be viewed as having anticompetitive implications. Because of these concerns, some SIA committee meetings on decimal issues were postponed or were not attended by all relevant officials. SIA officials acknowledged that these antitrust concerns have slowed the various decimal committees' work to complete the necessary standards and implementation procedures.

SEC and others have attempted to mitigate the effect of antitrust concerns on the progress of the decimal trading implementation. On September 8, 1999, SEC issued an order that directed certain stock and options exchanges, SIAC, and OPRA to work cooperatively on options quote message traffic issues expected to arise as a result of decimals-related issues.<sup>6</sup> The SEC order noted that such cooperation was unlikely to have adverse impacts on competition and would be in the public interest. In a letter dated September 23, 1999, the Department of Justice approved the SIA's proposed plan for exchanging information among market participants relating to decimal implementation. SIA's plan outlined specifically how information would be aggregated and disclosed and set limitations on the type of information that would be shared among participants. According to the business review letter, as long as the

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<sup>6</sup> Application and Order Pursuant to Section 11A (a)(3)(B), Exchange Act Release Rel. No. 34-41843, 64 Fed. Reg. 50126 (Sept. 8, 1999). The order specifically applied to the American Stock Exchange, LLC.; the Chicago Board Options Exchange, Inc.; the Pacific Exchange, Inc.; the Philadelphia Stock Exchange, Inc.; the International Securities Exchange, and OPRA.

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information exchanges were of the nature SIA proposed and were conducted according to the practices it outlined, the Department would not consider such activities to be anticompetitive.

Despite these actions, cooperation among the industry participants working on the decimal implementation continued to be hampered by antitrust concerns. For example, at a December 1999, SIA steering committee meeting held after the release of SEC's order and the Department of Justice letter, certain industry participants left the meeting when the discussion turned to how MPVs would be processed because of their continuing concerns over the antitrust implications. According to SIA officials, other delays continued to occur because of these concerns.

SEC expects that its January 2000 order will remove any further unwillingness among industry participants to work together on decimal implementation arising from the antitrust concerns. The order cites SEC's authority under the Securities Exchange Act of 1934 to require joint activity by the self-regulatory organizations that could otherwise be asserted to have an impact on competition where such activity serves the public interest and the interests of investors. The order states that decimal pricing could benefit investors and increase market efficiency and fair competition. Because information in the securities markets is processed and shared among various entities, the SEC order indicates that "it is imperative that all market participants convert to decimals in a coordinated manner." The order states, therefore, that having these participants work jointly in discussing, developing, and implementing decimal trading furthers the public interest.

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## **Exchange and Market Rules Also Have to Be Revised**

The conversion from trading in fractional to trading in decimal prices will also require changes to various self-regulatory organization's rules, but the industry has not yet completed or submitted to SEC a full set of proposed rule changes. For example, SEC officials said that rules that refer to fractional increments would have to be revised to reflect comparable decimal increments. In summer of 1999, SEC staff asked the exchanges and NASD to submit listings of the rules they anticipated would need revision as the result of implementing decimals. According to SEC officials, they received lists of rules that primarily addressed technical and administrative changes. However, they told us that changes to other types of rules may be required as a result of decimal trading. For example, some officials have indicated that the rules regarding short selling,<sup>7</sup> which

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<sup>7</sup> Short selling occurs when investors borrow shares of a stock that they do not currently own from other investors and then sell those shares. Such investors profit when the stock's price declines and they are able to repurchase the shares at a lower price to replace the ones they borrowed.

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require that such trades be executed only after an upward movement in the security's price, may have to change if decimal trading results in very low MPVs, such as pennies. With smaller MPVs, market officials said that manipulating the market to ensure that a higher priced trade occurs before selling short would be less costly and possibly easier to accomplish. However, not all of the markets' initial submissions to SEC addressed these types of rules. A New York Stock Exchange official told us that his exchange wanted to wait to see exactly how decimal pricing affected trading before they propose changes to rules that govern trading practices.

In the fall of 1999, SEC again asked the exchanges and NASD to submit final proposed rule changes by January 3, 2000. However, as of January 28, 2000, SEC had not yet received all such proposals in final form.

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## Exchanges and Other Market Participants Must Ready Their Systems for Decimal Securities Prices

In addition to the industrywide efforts, each individual market participant, including the exchanges, broker-dealers, information vendors, and others, must also make changes to their processing and communication systems to accommodate decimal prices. As of July 1999, an SIA survey of firm readiness indicated that little progress had been made because firms were focusing on ensuring that their systems would correctly process date information in 2000. Now that most of that work has been completed, we would expect that market participants could turn their attention to readying their systems for decimals. According to a SEC official, SEC has begun conducting examinations to assess firm readiness and will be coordinating with the examination staff of the various exchanges and NASD to ensure that similar reviews are conducted of other market participants.

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## GAO Efforts Going Forward

As part of the continuing effort to monitor the industry's progress toward implementing decimal trading that you have asked us to perform, we intend to conduct various activities over the coming months. We plan to continue monitoring SEC's and the industry's progress in preparing for decimal trading in various areas, including

- The approval process for market rule changes,
- The assessments made by regulators of broker-dealers' efforts to ready their systems for decimals, and
- The results of testing among exchanges and member firms.

In addition, we will continue to participate as observers on the industry committees currently preparing market standards and implementation procedures.

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**Statement**

**Securities Pricing: Progress and Challenges in Converting to Decimals**

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Mr. Chairman, Members of the Subcommittee, this concludes my prepared remarks. We would be happy to answer any questions you have at this time.

**Contact and Acknowledgements**

For further information regarding this testimony, please contact Davi M. D'Agostino at (202) 512-5431. Individuals making key contributions to this testimony included Cody J. Goebel, Michael A. Burnett, Jean-Paul Reveyoso, Carl M. Ramirez, Sindy R. Udell, and Katherine M. Raheb.

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