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January 26, 2005

Via Electronic Mail

Mr. Jonathan G. Katz
Secretary
Securities and Exchange Commission
450 Fifth Street, N.W.
Washington D.C. 20549-0609

Re: Proposed Rule on Regulation NMS (File No. S7-10-04)

Dear Mr. Katz:

The College Retirement Equities Fund ("CREF"), together with its companion organization Teachers Insurance and Annuity Association of America (collectively, "TIAA-CREF"), is pleased to submit comments to the Securities and Exchange Commission on the reproposed rules under Regulation NMS.

As background, CREF is registered with the SEC as an investment company. Its companion organization, TIAA, is a life insurance company. Together, TIAA-CREF comprises the principal retirement system for the nation's education and research communities. TIAA-CREF serves over 3.2 million people at over 15,000 United States institutions and jointly manages over $300 billion in assets. In addition to offering low cost fixed and variable annuities, we offer a series of retail and institutional mutual funds that are also registered investment companies with the SEC. As one of the nation's largest institutional investors, CREF holds shares in over 5,000 portfolio companies. Reflecting a variety of equity investment strategies and styles, TIAA-CREF traders use a multifaceted approach to trading, utilizing both exchanges and other alternatives such as electronic communication networks. Participants in the CREF Accounts and TIAA-CREF's mutual funds are the ultimate beneficiaries of market efficiencies and TIAA-CREF's trading strategies.

TIAA-CREF appreciates that the current Regulation NMS proposal is the product of considerable analysis and attention by the SEC Staff. Due to the importance of the regulation of market structure to the U.S. equity markets, and the complexity of the issues involved in such regulation, we asked one of our senior investment professionals, Paul L. Davis, who headed TIAA-CREF's trading operations for many years and spearheaded TIAA-CREF's use of alternative trading systems, electronic trading networks and algorithmic trading, to analyze the Regulation NMS proposal, and its impact on the U.S. equity marketplace. TIAA-CREF also consulted with Robert A. Schwartz, the Marvin M. Speiser Professor of Finance and University Distinguished Professor, Zicklin School of Business, Baruch College, CUNY, in preparing its comments on the Regulation NMS proposal. Professor Schwartz is an expert in equity market structure and regulation.

TIAA-CREF's comments to the reproposed rules under Regulation NMS are attached to this letter in the form of a separate report. Our comments focus primarily on the trade-through rule and the proposed alternatives. As the Report discusses in some detail, TIAA-CREF believes that to realize the powerful network economies of a securities market, orders from a diverse set of participants must be able to meet, interact with each other, and be turned into trades that lead to reasonably accurate price discovery and to reasonably complete quantity discovery. TIAA-CREF is concerned that both of the proposed trade-through rules will compromise these market functions, and believes that achieving an effective interaction between price and quantity discovery is a more fundamental objective than achieving the benefits of inter-market price protection. Comparing market structure quality with and without a trade-through rule, TIAA-CREF finds the trade-through rule difficult to justify, and recommends its elimination. We believe that without the trade-through rule, order flow will be free to integrate naturally, which will result in the fuller achievement of the two broad market center services that are of overriding importance: price discovery and quantity discovery.

TIAA-CREF is also mindful of the needs of the small investor. We believe, however, that the onus for retail best execution rests with the customers' brokers. We believe that to the extent that there are shortcomings in the rules concerning principal-agent conflicts, they be dealt with directly.

TIAA-CREF's comments in the attached Report also address a number of issues related to the trade-through rule raised by the Regulation NMS Reproposal, including free-riding, the role of limit orders, and principal-agent conflicts of interest. The Report also presents our views of how the U.S. equity marketplace of the future might continue to grow as a rapidly evolving network that draws its strength and world leadership from technology, competition, and size.

We applaud the Commission's commitment to address the complex but immensely important issues of market structure raised by Regulation NMS. Our comments are intended to help the Commission as it works to ensure that the U.S. equity markets continue to be the market leader for the foreseeable future.

We appreciate the opportunity to comment on the proposal. We would be pleased to discuss these matters with the SEC if you believe it would be helpful.

Very truly yours,

/s/ Stewart P. Greene

Stewart P. Greene

cc: The Honorable William H. Donaldson
The Honorable Paul S. Atkins
The Honorable Roel C. Campos
The Honorable Cynthia A. Glassman
The Honorable Harvey J. Goldschmid

Report

Comments on SEC Reg NMS: The Trade-Through Rule

Re: Release No. 34-50870; File No. S7-10-04

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January 26, 2005

Comments on SEC Reg NMS: The Trade-Through Rule

Re: Release No. 34-50870; File No. S7-10-04

by

Paul L. Davis and Robert A. Schwartz

Executive Summary

With market structure regulation as a facilitator, we envision that the U.S. equity marketplace of the future will continue to grow as a rapidly evolving network that draws its strength from technology, competition, and sheer size.

To realize the powerful network economies of a securities market, orders from a diverse set of participants must be able to meet, interact with each other, and be turned into trades that lead to reasonably accurate price discovery and to reasonably complete quantity discovery. We are concerned that both of the proposed trade-through rules (the market BBO alternative and the Depth of Book routing alternative) will compromise these market functions. Comparing market structure quality with and without a trade-through rule, we find a trade-through rule difficult to justify. We recommend its elimination. We further stress that achieving an effective interaction between price and quantity discovery is a more fundamental objective than achieving the benefits of inter-market price protection.

In reaching our conclusion, we explicitly recognize that two orders meeting in a trade (perhaps a limit order and a market order) do not, solely by themselves, discover price. Rather, price discovery is a dynamic process that operates in the context of other transactions that have recently been made, current quotes, and a richer tapestry of the expressed and latent interest of a broad array of market participants. Accordingly, the rules, systems and protocols for order integration that enable major participants to step forward and reveal their desires to buy and to sell are vitally important.

With a trade-through rule, different markets would not be able to compete on the basis of the quality of price discovery that they offer. On the contrary, a trade-through rule links markets in a way that perforce denies alternative market centers the ability to offer independent price discovery. Moreover, a trade-through rule that applies only to limit orders will harm the quality of price discovery. Limit orders are not the only source of the liquidity that leads to price discovery. Account should also be taken of the prevalent use of not held orders, hidden orders, and orders with special conditions. As markets move further away from plain vanilla limit order

book trading, a regulatory focus that gives undue weight to limit orders will more likely produce unintended consequences.

The Commission views the trade-through rule as a way of coping with problems associated with principal/agent conflicts of interest (related primarily to retail investors) and free riding. We too are mindful of the needs of the small investor. However, the onus for retail best execution rests with the customers' brokers. Our analysis suggests that the U.S. equity markets will be better served if shortcomings in rules dealing with principal/agent conflicts are dealt with directly.

We wish to point out that free-riding has a positive side. While a market center such as the NYSE may play the dominant role with regard to price discovery, an ATS such as Liquidnet, ITG's Posit, or an upstairs market maker can play a major role with regard to quantity discovery. If restrictions are placed on how large buy orders can meet large sell orders away from a primary market center, price dislocations can occur. Additionally, a large trade made in an ATS or by an upstairs market maker can validate the price discovery of a major market via the price certification that a large print at a price implies.

While individual trading facilities have rules and procedures that address the complexities of integrating their own order flow, the trade-through proposal is an intermarket order execution rule. The complexities of order integration are compounded in the intermarket setting. We emphasize that any intermarket trade-through rule, with all its necessary conditions and exemptions, will be unduly restrictive. We further question the efficiency of any intermarket sweep the book procedure when many orders are not prepositioned, when some orders have special conditions attached to them, and when time priority is not always used.

The report concludes with the statement that security markets will forever be complex institutions, and that it is unrealistic to expect that a perfectly efficient market will ever be achieved. In a fragmented environment, limit orders can be protected across markets only by government fiat. But limit orders are not the only source of the liquidity that leads to price discovery, and protecting them across markets has undesirable consequences. Based on the costs and benefits involved, we recommend the elimination of the trade-through rule. Without the rule, order flow will be freer to integrate naturally. This integration will result in the fuller achievement of the two broad market center services that are of overriding importance: price discovery that is reasonably accurate, and quantity discovery that is reasonably complete.

Introduction

In this report, we address one part of the broader Regulation NMS proposal – the trade-through rule. The Commission has requested comments on two alternative forms of the rule:

- Price protection be given to the best bid and offer (the BBO) of each market center (referred to as the "Market BBO alternative").
- Require order routing that would further give market centers depth-of-book (DOB) protection to quotations that individual market centers voluntarily display (referred to as the "DOB routing alternative").

One might consider the second alternative a logical extension of the first. Namely, if an order at the top of the book should be protected, would it be acceptable for an order at a second best price to be traded through? The fact is, after the top of the book orders have executed, the previously second best orders are now at the top of the book.

Our comments apply to the DOB proposal, but we also focus on the more fundamental question – should there be a trade-through rule in the first place? We think not. In reaching this conclusion, we take account of various issues pertaining to intermarket competition and to competition between customer orders. We agree with the Commission that a trade-through rule, in and of itself, will protect and encourage the placement of limit orders, but point out the dangers of focusing too exclusively on limit orders as the source of price discovery. We suggest that the proposed trade-through rule will undermine the vibrancy of competition, and that both price and quantity discovery will suffer.

Regulation, Technology, Competition and the Future

Change in the structure of U.S. equity markets has been dramatic in recent years, and will likely continue to be so for some time to come. The three main drivers are regulation, technology, and competition. Regulation in a number of ways has played a constructive role in sparking change in markets that, primarily because of competitive barriers and technological inertia, had been slow to improve their efficiency. Regulatory initiatives such as the preclusion of fixed commission rates, the mandate to develop an NMS, the Order Handling Rules, and the introduction of decimal pricing have had major impacts on the markets.

Once innovation has started, technological enhancements and competition have proven to be powerful driving forces behind the substantial changes that we are witnessing. In Europe as well, a combination of regulatory initiatives, intense cross-boarder competition, and the application of modern electronic technology has resulted in a massive re-engineering of the European equity markets.

Technology leads to competition in a number of ways. Most importantly, technology links different markets and customers together; it enables the development and growth of alternative trading venues; it facilitates the use of financial instruments such as the derivative and ETF products; and it supports the collection and evaluation of trade data (quotes, transaction prices, and volume) that enable customers to assess their trading costs, and to make more informed selections among alternative trading venues. The intensified competition spans financial instruments and trading venues, both domestic and international, and those venues that do not keep up with technology developments and economic realities can suddenly fall by the wayside.

What will our equity markets look like in the future? With market structure regulation as a facilitator, we envision an equity marketplace that will continue to grow as a rapidly evolving network that draws its strength from technology, competition, and sheer size. For a spectrum of products ranging from telephones and fax machines to standardized software such as Microsoft Word, networks deliver powerful economies of scale as they grow in size and come to encompass increasing numbers of participants.[1]

The efficiency of our equity marketplace as a network will depend on the ease with which orders from a broad spectrum of participants can interact so as to achieve reasonably accurate price discovery and reasonably complete quantity discovery. In the coming years we expect:

- The continued development of hybrid combinations of alternative facilities by individual trading centers.
- An increased linkage of alternative trading venues by order management systems and aggregators.
- A more rapid and wider dissemination of market information.
- Order handling will be more electronic and algorithmic.

[1] For further discussion and references, see W. Brian Arthur, *Increasing Returns and Path Dependency in the Economy*, University of Michigan Press, 1994.

- Niche players and new products will emerge in ways which are impossible to predict until they happen.
- Investors, both institutional and retail, will be more sophisticated and knowledgeable about how best to handle their orders and manage their trading costs.
- Trading costs will be driven down for a broad spectrum of participants.

As these developments occur, our markets will operate more efficiently as networks.

Is Trade-Through Prohibition Required?

Against these thoughts about the future, we ask whether or not trade-through prohibition is required for our markets to become more efficient networks. We feel not. In and of itself, the trade-through rule is not necessary if the problems it is designed to deal with can be handled in other ways. The Commission pays particular attention to two important issues pertaining to trade-through: (1) principal/agent conflicts of interest that can arise if retail investors are not able to monitor "whether their individual orders miss the best displayed prices at the time they are executed"[2] and (2) free riding on prices set by limit orders. While the Commission is wise to consider them, neither of these issues, in our opinion, provides sufficient justification for imposing a trade-through prohibition. We explain why in subsequent sections of this report.

Moreover, the natural evolution of markets will decrease any need that may exist today for a trade-through prohibition. With electronic venues, anonymity and control is standard, and speed may also be comparable across the various electronic platforms. However, the ability to trade in size can remain an important differentiator, and one electronic venue may still trade-through another. But many of today's trade-throughs involve the interface between fast and slow markets and, if this distinction fades in the coming years, so too will the incidence of trade-throughs that the regulation is intended to guard against.

Trade-throughs will also become less prevalent if domestic order flow comes to be more concentrated in a single market center. This might be the outcome if one market center emerges as a highly efficient hybrid that wins the battle for order flow. If this were to happen, the regulatory objective of ensuring sufficient competition between alternative domestic markets

[2] Securities and Exchange Commission Release No. 34-50870 (December 16, 2004) p. 39.

would no longer be operable.[3] Recognizing this we ask, what is the meaning of competition if one of the competitors is not allowed to win, at least temporarily?

While justification for a trade-though prohibition may diminish, the problems that it can create will not. In subsequent sections of this report, we address important issues such as the quality of price and quantity discovery. At this point, we simply note one problem that the regulation will create – it can unduly constrain a participant's ability to handle an order as he or she deems best. If a participant voluntarily trades through a displayed limit order, the price of the trade cannot be the only consideration that matters. All else equal, no one wishes to buy at a price above the best bid, or to sell at a price below the best offer. If a customer does so, other factors must indeed be involved, such as the speed of an execution, the customer's ability to control the order, anonymity, and the ability to trade in size. An unintended consequence of the trade-through prohibition is that it does not allow participants to take these other considerations into account when submitting their orders.

The Horns of a Dilemma

The imposition of any inter-market order execution rule such as a trade-through prohibition is a highly complex issue that places a policy maker on the horns of a dilemma. In recognition of this, the Commission writes, "The NMS thereby incorporates two distinct types of competition – competition among individual markets and competition among individual orders – that together contribute to efficient markets. Vigorous competition among markets promotes more efficient and innovative trading services, while integrated competition among orders promotes more efficient pricing of individual stocks."[4]

To highlight the conundrum involved, we state the tradeoff explicitly: competition within the order flow is more intense when the order flow is consolidated, but competition between different market centers is more vibrant when the order flow is fragmented. The trade-through rule may be viewed as a compromise solution – both of the alternatives presented by the SEC offer a partial intermarket linkage of prices but in other respects allow the environment to remain fragmented. The question is, how effective is the compromise?

[3] We note that, in any event, cross-border competition will continue to exist.

[4] Securities and Exchange Commission Release No. 34-50870 (December 16, 2004), p. 10.

Regarding intermarket competition, the Commission states, "Even if reproposed Rule 611 were adopted, markets likely would have strong incentives to continue to compete and innovate to attract both marketable orders and limit orders. Market participants and intermediaries responsible for routing marketable orders, consistent with their desire to achieve the best price and their duty of best execution, would continue to rank trading centers according to the total range of services provided by those markets. Such services include cost, speed of response, sweep functionality, and a wide variety of complex order types."[5]

Far more is at stake. We suggest that two broad measures of market quality be added to the list:

- The accuracy of price discovery.
- The completeness of quantity discovery.

We call attention to these two vitally important market center products and to the subtle interactions between them. Our major reservation concerning the trade-through proposals is that adherence to them will impair both of these dimensions of market quality.

Price Discovery

The Commission's reproposal mentions *price discovery* numerous times and wisely links price discovery with limit order placement. In a December 21, 2004, *Wall Street Journal* editorial, John Thain has directly underscored the importance of price discovery. Thain states, "Markets compete on the basis of order aggregation and efficient price discovery. This lowers trading costs and keeps our markets the best and most dynamic in the world."

With a trade-through rule, would different markets be able to compete on the basis of the quality of price discovery that they offer? They would not. A trade-through rule links markets in a way that perforce denies alternative market centers the ability to offer independent price discovery, a point that has been made by Schwartz and Francioni:[6]

> "…imposing strict price priorities across markets effectively prevents markets from competing with each other in terms of price discovery. There is irony in this. The flip side of U.S. public regulatory policy that has promoted competition is U.S. market

[5] Securities and Exchange Commission Release No. 34-50870 (December 16, 2004), p. 57. Reproposed Rule 611 refers to the proposed trade-through rule.

[6] Robert A. Schwartz and Reto Francioni, *Equity Markets in Action: The Fundamentals of Liquidity, Market Structure and Trading*, John Wiley and Sons, 2004, page 323.

fragmentation; the regulators have thought that intermarket linkages (e.g., the Intermarket Trading System, ITS) along with the trade-through rule counter the undesirable effects of fragmentation, but the trade-through rule itself undermines intermarket competition: how effective is price discovery competition between competitors who are required by rule to arrive at the same price?"

We suggest, in dealing with the trade-through issue, that the Commission pay further attention to the complexities of price discovery. Granted, the accuracy of price discovery is difficult to assess, but substantial evidence suggests that it is nevertheless a critical issue:

- The prevalence with which institutional investors slice and dice their orders for submission in smaller tranches over extended periods of time is one major factor that can put price discovery in disarray.
- Imperfect price discovery is manifest in the accentuated levels of intra-day price volatility that characterize our markets.[7]
- Imperfect price discovery is reflected in the instinctive distrust that institutional participants commonly have of prices established in our market centers, and in their desire to trade at "validated" values (as evidenced, for example, by the current popularity of VWAP, a statistic that we and a number of others otherwise find lacking).

We do not believe that a trade-through rule can have a beneficial effect on price discovery. On the contrary, with the rule, meaningful competition in terms of price discovery is denied and effective consolidation of the order flow is still not achieved.

Quantity Discovery

Facilitation of quantity discovery, an activity that is closely related to price discovery, is the other major service of a securities market. Unfortunately, this service also receives insufficient attention in the public policy debates. By quantity discovery, we mean the ability of participants (institutional participants in particular) to find each other and to buy or to sell the number of shares that their portfolio managers have instructed them to transact. The prevalence

[7] For discussion and further references, see Ozenbas, Schwartz and Wood, "Volatility in U.S. and European Equity Markets: An Assessment of Market Quality," *International Finance*, Volume 5 Number 3, Winter 2002, pp. 437-461).

of slicing and dicing by institutional customers suggests that their orders are portable in time and that much of their demand to trade is latent. The simultaneous existence of a latent demand to buy and a latent demand to sell is evidence of incomplete quantity discovery (trades could have been made if only the large buyers and the large sellers could have found each other).[8] Even if price discovery is reasonably accurate, quantity discovery can be in disarray simply because institutional customers do not reveal their orders fully to the market.

Further, institutional traders' timidity when revealing their orders makes accurate price discovery more difficult to achieve. The bottom line is, the rules, systems and protocols for order integration that enable major participants to step forward and reveal their desires to buy and to sell are vitally important for both the accuracy of price discovery and the completeness of quantity discovery. The advisability of a trade-through rule would best be considered in this context. Whether the rule will be beneficial or not depends on the impact that it has on order flow integration, the subject to which we next turn.

The Integration of Order Flow

Our discussion of the interaction between price and quantity discovery underscores the importance of the second type of competition that the Commission has noted – competition between customer orders. At issue here is the extent to which order flow is consolidated. Also important is the way in which different types of orders are integrated to make trades and to establish transaction prices. The powerful network economies of a securities market can be realized only when the orders from a diverse set of participants can meet, interact with each other, and be turned into trades.

Order flow integration is straightforward in a perfectly competitive, order driven environment where only plain vanilla limit and market orders are used, where all limit orders are placed on a single book, and where no single participant is large enough to have market power. In such an environment, orders could be executed with reference to strict price and time priority, and the orderliness that regulatory authorities are seeking can be achieved.

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[8] For further discussion, see Asani Sarkar, Robert A. Schwartz, and Avner Wolf, "Inter-Temporal Trade Clustering and Two-Sided Markets," working paper, 2005, available on request from the authors (Sarkar: Federal Reserve Bank of New York, Asani.Sarkar@ny.frb.org; Schwartz and Wolf: Zicklin School of Business, Baruch College, CUNY, Robert_Schwartz@baruch.cuny.edu, Avner_Wolf@baruch.cuny.edu).

But the world is not so simply structured. Some participants are huge and have market power. A multiplicity of order conditions and types exist – fill or kill (FOK), all-or-nothing (AON), not-held (NH), convert and parity (CAP), hidden (reserve or iceberg), and so forth. Different market centers compete in terms of the order types that they offer, and on the basis of the procedures they use for handling them. In this more complex environment, both of the proposed trade-through alternatives have network implications that are uncertain.

To exploit available liquidity more fully and to better realize the potential of the broader network, any sweep would have to cover more than just standard limit orders. However, the displayed aggregate number of shares sought for purchase or offered for sale at any price cannot include orders with special conditions on them: (1) Hidden orders cannot be revealed because of customer instructions. (2) Other orders with special conditions (like CAP, AON, and FOK) cannot be included in the aggregate (and may not be subject to trade-through protection) because they are immediately accessible only when the conditions placed on them are met. In the appendix to this report, we illustrate the complexity of an intermarket sweep that includes an order with a special condition on it.

But a trade-through rule that applies only to limit orders will harm the quality of price and quantity discovery. Limit orders are not the only source of the liquidity that leads to price discovery. Account should be taken of the prevalent use of not held orders, other hidden orders, and orders with special conditions. NH orders on the NYSE represent a substantial pool of liquidity, and they should not be passed over or regulated out of existence simply because they are not “fast quotes,” but are “slow quotes” or no quotes at all.

While individual trading facilities have rules and procedures that address the complexities of integrating their own order flow, the trade-through proposal is an intermarket order execution rule. The complexities of order integration are compounded in the intermarket setting. We emphasize that any intermarket trade-through rule, with all its necessary conditions and exemptions, will be unduly restrictive. Moreover, recognizing that the pressure that competing markets place on each other is the benefit of having multiple market centers, we pose the following question. Why undermine these competitive forces by forcing all markets to closer unanimity with respect to price discovery?

Principal/Agent Conflicts of interest: Retail Order Flow

As previously noted, the Commission's reproposal focuses on two major motives for a trade-through rule. One is principal/agent conflicts of interest, and the other is free-riding on displayed prices. We address the principal/agent motive in this section and the free-riding motive in the section that follows. With regard to the principal/agent problem, the Commission is primarily concerned about the needs of retail investors.[9]

We too are mindful of the needs of the small investor. The retail order flow properly deserves special consideration with regard to the trade-through rule for two reasons. First, the retail customer is more apt to focus only on price as the dimension of a trade that matters. Speed is important to retail customers but, for most, in terms of minutes, not milliseconds (a customer likes to know the details of a trade while remaining on the phone with his or her broker).[10] Their need to trade in size is not relevant, and the retail customer does not need anonymity. Because these other attributes of a trade are not relevant, one would not expect the retail customer to have a personal motive for trading through a posted order and executing at an inferior price.

Second, retail order flow also deserves special consideration because of its important role in price discovery. While large institutional participants typically work their orders carefully over extended periods of time, the small retail orders can be easily integrated with the order flow. The ready placement of these orders helps to establish the prices at which other orders, including the larger blocks, may transact.

How important is price protection to retail customers? We address this question with regard to (1) non-directed market orders and marketable limit orders, and (2) posted limit orders. Concerning the first, for non-directed orders, brokers select the execution venue on behalf of their customers. Brokers have access to the complete book of orders and have a best execution obligation to send their customer orders to the market that has the best price. Their actions can be monitored using the SEC 11Ac1-6 broker reports that provide information on the routing of non-directed orders.

The primary obligation for retail best execution rests with the retail customers' agents, the brokers. If 11Ac1-6 is thought to be too porous, we think the wisest path is to address its shortcomings directly and to avoid using a trade-through prohibition as a means of backstopping

[9] Securities and Exchange Commission Release No. 34-50870 (December 16, 2004), p.38.

[10] Day traders, on the other hand, may have their own special needs for speed.

the rule. One might argue that an explicit trade-through prohibition is justified as long as opt-out provisions can keep it from being unduly restrictive. Previous commentary, however, has emphasized the difficulties in achieving workable opt-out criteria. Either with or without opt-out provisions, the rule's effect on the network properties of our markets is unknown, and its impact on the quality of the network is too risky.

The situation regarding limit orders is ambiguous because price protection reduces one of two costs of limit order trading but increases the other. The two costs incurred by a participant who places a limit order are (1) the cost of not executing (known as *non-execution cost*) and (2) the cost of trading with a better informed investor (known as *bagging cost*).[11] If a limit order can be traded through, the risk is greater that the order will not execute within a trader's time frame (e.g., one day). Price protecting the limit order would help to contain this non-execution cost.

The opposite is the case with regard to the second cost. If a limit order executes because a market order has been submitted by a better informed trader, the limit order placer is actually better off if his or her order does not execute and can be repriced in light of current market conditions.[12] In relation to the cost of being bagged, we note that institutional participants are more likely to be informed than are retail customers, and that an institutional customer who purposefully trades through a posted bid or offer conveys a particularly strong signal that he or she is an informed player. Upon receiving this signal, a retail customer may indeed welcome the opportunity to re-price his or her order.

Free-Riding

As noted in the previous section, the Commission's reproposal also focuses on the free-riding of displayed prices. The Commission has stated that free-riding on price discovery "is at the heart of the need for inter-market price protection."[13] We note, however, that the most

[11] For further discussion, see Puneet Handa and Robert Schwartz, "Limit Order Trading," *Journal of Finance*, December 1996, pp. 1835 – 1861.

[12] In microstructure literature, asymmetric information has been taken to be a principle cost to a dealer or limit order placer. For discussion and further reference see Maureen O'Hara, *Market Microstructure Theory*, Blackwell Business, 1995.

[13] Securities and Exchange Commission Release No. 34-50870 (December 16, 2004), p. 60.

prevalent form of free-riding, off-market trades that are made within the spread, would be totally unaffected by the trade-through rule.

Free-riding does have a negative side. (1) From the perspective of a limit order placer, an order that has played an active role in price discovery can go unexecuted. (2) From the perspective of an exchange, trades can be made off-market at market discovered prices without the participants sharing in the costs incurred in the production of the price (e.g., order handling, information dissemination, and surveillance costs).

The negative view of free-riding gives primary weight to the *number of orders* that are traded through. The Commission reports that a large number of trades (approximately 1 in 40 trades in October, 2004 for both Nasdaq and NYSE stocks) did not get the best displayed prices.[14] An important statistic is not reported: the average number of *shares per trade* that have caused the trade-throughs. If 100 shares to sell in one market were posted at 40.00 at a time when 100,000 shares were bought at 40.01 in another market, 100,000 shares will have traded through 100 shares, for a ratio of 1,000. A large ratio casts a less negative light on the desirability of allowing trade-throughs. The Commission suggests that, for the NYSE at least, many of the trade-throughs are accounted for by block transactions that are reported in the over-the-counter market.[15] This indicates that the ratio may indeed be large.

Free-riding also has a positive side. As we have noted, quantity discovery is a major function of a marketplace. Interestingly, while a market center such as the NYSE may play the dominant role with regard to price discovery, an ATS such as Liquidnet, ITG's Posit, or an upstairs market maker can play a major role with regard to quantity discovery. These systems do so by enabling large buyers and large sellers to meet directly. An ATS's quantity discovery role can have a beneficial effect on price discovery for the broader marketplace:

- Orders may naturally segment, with small orders flowing predominantly to market centers where prices are discovered, and with some of the large orders going to an alternative trading system where quantity is discovered. If restrictions are placed on how large buy orders can meet large sell orders away from a primary market center, price dislocations can occur. That is, elephants that are not able to trade with each other can

[14] See Securities and Exchange Commission Release No. 34-50870 (December 16, 2004), p. 39.

[15] See Securities and Exchange Commission Release No. 34-50870 (December 16, 2004), p. 38.

upset the apple cart (or, some might say, the alpha cart) and cause a sharp accentuation of intra-day price volatility.

- A large trade made in an ATS or by an upstairs market maker can validate the price discovery of a major market via the price certification that a large print at a price implies. Even if the large print is outside the NBBO, price discovery for the broad market may be improved. Allowing an ATS to trade through the NBBO provides the flexibility needed to achieve both price and quantity discovery.

In its discussion of free-riding, the Commission states that, "To achieve the full benefits of inter-market price protection, all investors must be governed by a uniform rule that encompasses their individual trades."[16] We suggest that achieving an effective interaction between price discovery and quantity discovery is a more fundamental objective than achieving "the full benefits of inter-market price protection." We further stress that the imposition of "a uniform rule" can restrict the natural (network) operations of the broader U.S. marketplace. Sometimes it is better to have no rule at all.

Protection of Limit Orders

The Commission is wise to pay attention to limit orders as an important source of liquidity. Limit orders are the backbone of a pure, continuous order driven market. Such a market may be viewed as an ecology within which participants naturally divide into two groups that both require each others' existence. One of the groups submits limit orders and, in so doing, supplies liquidity; the other group submits market orders that are liquidity seeking and which thus enable the limit orders to execute. Handa and Schwartz, in analyzing limit order placement in the pure, continuous order driven market, have shown how this market can achieve an equilibrium balance between the placement of limit and market orders.[17]

An important argument set forth by the Commission in support of the trade-through rule is that the regulation will protect and thus encourage the placement of more limit orders, and that a greater supply of limit orders will in turn enhance the efficiency of price discovery. The

[16] See Securities and Exchange Commission Release No. 34-50870 (December 16, 2004), p. 60.

[17] Puneet Handa and Robert A. Schwartz, op. cit.

argument, in and of itself, is valid, but we suggest that it reflects an overly restrictive view. The fundamental problem is that our markets are not pure, continuous order driven environments.

The Commission's view of limit orders, as evidenced by several references in the Reproposal, relates price discovery to the placement of limit orders. One commenter pointed out that "limit orders are the building blocks of public price discovery and efficient markets."[18] Another commenter noted that "focusing solely on best execution of marketable orders...would miss a critical part of the equation for promoting the most efficient markets (i.e., the best execution of orders that supply displayed liquidity and thereby provide public price discovery)".[19] Statements from the staff include:

- "Displayed limit orders are the primary source of public price discovery."[20]
- "An increase in the use of limit orders and aggressive quoting should enhance price discovery..."[21]
- "Orders that execute without being quoted do not contribute to price discovery and price competition."[22]
- "The Commission preliminarily believes that the price protection provided by the reproposed Trade-Through rule would encourage the use of limit orders and aggressive quoting which would help improve the price discovery process."[23]

Our view diverges from that of the Commission in that we explicitly recognize that two orders meeting in a trade (perhaps a limit order and a market order) do not, solely by themselves, discover price. Rather, price discovery is a dynamic process that operates in the context of other transactions that have recently been made, current quotes, and a richer tapestry of the expressed and latent interest of a broader array of market participants.[24]

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[18] Securities and Exchange Commission Release No. 34-50870 (December 16, 2004), p. 12.

[19] Securities and Exchange Commission Release No. 34-50870 (December 16, 2004), p. 29.

[20] Securities and Exchange Commission Release No. 34-50870 (December 16, 2004), p. 59.

[21] Securities and Exchange Commission Release No. 34-50870 (December 16, 2004), p. 209.

[22] Securities and Exchange Commission Release No. 34-50870 (December 16, 2004), p. 234.

[23] Securities and Exchange Commission Release No. 34-50870 (December 16, 2004), p. 253.

[24] For further discussion, see Jacob Paroush, Robert A. Schwartz, and Avner Wolf, "Dynamic Price Discovery in a

Further, we explicitly note that limit orders do not dominate all other order types. The Commission should not focus on limit orders at the expense of other order types and conditions (e.g., the NH, CAP, hidden, FOK and AON orders noted above). Moreover, trade-through protection is not the only way to encourage a greater use of limit orders.

Another important way is to handle limit orders so that, like market orders, they may receive price improvement. We note two ways to achieve this. One is for a market center to offer block pricing rather than walk the book pricing. With block pricing, if, for instance, a large buy order executes at a price 10¢ above the best offer, all sell limit orders on the book that trade against that large order do so at the higher price. Hence all of the more aggressively priced sell orders receive price improvement. This contrasts with walk the book pricing where each limit order that executes does so at the price it was written at.

Another environment where limit orders generally receive price improvement is the call auction. In a call, orders are batched together for simultaneous execution at the single price that maximizes the number of shares that trade. All crossing orders execute at that single price, which means that all buy limits priced higher and all sell limits priced lower receive price improvement. Because the procedure offers price improvement, participants are encouraged to price their limit orders more aggressively.

We do not suggest that the commission require the use of block pricing or call auction trading. These are decisions that the markets should make themselves as they compete with each other for order flow. The important point is that a market center, if it wants to encourage the placement of more limit orders, has the ability to do so by the way in which it handles orders and turns them into trades. A market center may, however, focus on a broader array of orders that are liquidity providing.

Limit orders are prepositioned. That is, they are first posted and then subsequently executed if and when marketable contra-side orders arrive. With prepositioning, it is possible to identify the party to a trade that initially established a price, and the party that subsequently triggered the trade. Price is the primary rule of order execution in our markets (the most aggressively priced orders execute first). With limit order book trading, time can be used as the secondary rule of order execution (limit orders that are tied at a price execute in the time

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Divergent Expectations Environment," working paper, 2005, available on request from the authors (Paroush, Bar Ilan University, Ramat'Gan, Israel and Zicklin School of Business
Baruch College, CUNY; and Schwartz and Wolf: Zicklin School of Business, Baruch College, CUNY, Robert_Schwartz@baruch.cuny.edu, Avner_Wolf@baruch.cuny.edu).
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sequence in which they were placed). Time priority is operable, however, only for orders that are prepositioned.

But, not all orders are prepositioned, and the initiator of a trade (buyer or seller) cannot always be identified. Some trades are negotiated. The NYSE has historically been more of a negotiated market. On the NYSE, many orders are handled on a "not held" (NH) basis. When its trading floor and heavy use of NH orders are taken into account, it is clear that the NYSE is not predominantly a limit order book market (even though the Big Board will more nearly become one with its planned development of Direct+). Recognizing this, we note that the NYSE's secondary rules of order execution make only limited use of time priority. We question how efficient a sweep the book procedure will be in an environment where many of the orders are not prepositioned, where some orders have special conditions attached to them, and where time priority is not always used.

A recent development in the markets is the emergence of algorithmic trading. One view of early algorithmic trading is that it represents a set of strategies that seek to emulate brokers' handling of NH orders on a trading floor. As algorithmic trading further matures, it may well offer a wider menu of options based on orders that are not prepositioned in the traditional sense, that are not subject to the time priority rule, and that are not sweepable. As markets move further away from plain vanilla limit order book trading, a regulatory focus on limit orders will more likely produce unintended consequences.

Time priority is not suggested in either of the reproposed trade-through alternatives. While a time priority rule would protect limit orders from being traded through (not in price but in time), we agree that time priority should not be imposed across alternative markets. To do so would go further toward creating a virtual consolidated limit order book. With a CLOB, intermarket competition would be totally undermined.[25]

Conclusion

A trade-through rule will do little to improve the two dimensions of market quality that are of overriding importance: price and quantity discovery. On the contrary, we are concerned that the rule will harm both.

[25] Nevertheless, if a sweep extends to two or more different markets, some secondary priority rule (random chance, arbitrary selection, and pro-rata executions are three possibilities) is required to determine the sequence in which the books of different market centers are swept.

A basic economic principle is that price and quantity discovery go hand in hand. In a frictionless environment, both are given by the solution of two equations (supply and demand) in two unknowns (price and quantity). Our equity markets, however, are not frictionless environments. To achieve anything like the perfect economic solution, a marketplace must operate effectively as a network. An effective network must embrace a set of participants who vary greatly in size (from small retail to huge institutional), whose motives for trading are diverse (news, research that generates private information, liquidity needs, technical analysis, and so forth), and who commonly send their orders to different markets. Some participants demand immediacy and are seeking liquidity; others are patient and supply liquidity. Some are willing to reveal their orders; others want virtual invisibility.

In light of these realities, order flow is difficult to integrate, especially across markets, and reasonably accurate price and quantity discovery is not easily achieved. The success of the network depends on a marketplace's structure and the regulatory environment within which it operates. Any regulatory rule should be assessed in terms of the consequences it is likely to have for both price and quantity discovery. With regard to the proposed trade-through prohibition, we stress that:

- The rule, by focusing too exclusively on limit orders, imposes undue constraints on the network.
- Limit orders are not the sole source of the liquidity that leads to reasonably accurate price discovery.
- Robust limit order placement does not guarantee reasonably complete quantity discovery. Limit orders reflect only part of the broad market's desires to buy and to sell shares. Also important are NH orders, hidden orders, and orders with special conditions on them.
- At any point in time, much demand to trade is latent because large, institutional participants are reluctant to reveal their trading intentions to the market (instead, they break up their orders and work the pieces carefully over time). The rule itself does little to encourage traders to reveal their orders.
- The regulation restricts the freedom of markets to define their own rule books. As a consequence, it undermines the vibrancy of inter-market competition.

Security markets will forever be complex institutions. It is unrealistic to expect that a perfectly efficient market will ever be achieved. In a fragmented environment, limit orders can be protected across markets only by government fiat. But limit orders are not the only source of the liquidity that leads to price discovery, and protecting them across markets has undesirable consequences. Based on the costs and benefits involved, we advise elimination of the trade-through rule. Without the rule, order flow will be freer to integrate naturally. This integration will result in the fuller achievement of two broad market center services that are of overriding importance: price discovery that is reasonably accurate and quantity discovery that is reasonably complete.

Appendix

To exploit available liquidity fully, any sweep would have to cover more than just standard limit orders. In this appendix, we present an example that illustrates the complexity of an intermarket sweep that includes orders with special conditions on them. We consider the inclusion of an order with an instruction either to execute all of it or none of it if the order can be executed only in part (i.e., and AON order).

Assume, for a stock, that two market centers, A and B, have both set the national best bid of 32. At this price, let market center A be showing a 300 share limit order to buy, and let market center B be showing a 500 share limit order to buy. Assume a 600 share AON buy order priced at 32 has also been delivered to market center A. Let the trade-through rule with a sweep the book feature apply, and let the AON order be sweepable. What might then happen if a 1000 share market order to sell arrives?

- If the sell order is first directed to market center A, 900 shares will execute in market center A (300 against the limit order and 600 against the AON order), and 100 shares will execute against the 500 share limit order in market center B. The executions will all be at a price of 32.
- If the sell order arrives first at market center B, 500 shares will execute in B, but only 300 shares could execute in A because the condition on the 600 share AON order would not be met. The remaining 200 shares of the sell order would then extend the sweep to an inferior price (presuming that another 200 shares to buy are on the book below 32).

The example shows some of the realities of order interaction in a multi-market center environment. Even though the prices in market centers A and B are linked, the two markets are imperfectly integrated. The point of entry of an order into the broader marketplace (market A or market B) matters. The entry point determines the effectiveness with which an order with special conditions on it (in the example, the 600 share AON order) is integrated into the executable order flow. Further, the market order trader is incented to go first to the market that is most apt to have orders with special conditions and types that cannot be shown on the book (in the current case, market center A).