
SURVEYS AND CROSSOVER

This section provides surveys of the literature in investment management or short papers exemplifying advances in finance that arise from the confluence with other fields. This section acknowledges current trends in technology, and the cross-disciplinary nature of the investment management business, while directing the reader to interesting and important recent work.

THE ECONOMICS OF FLASH ORDERS AND TRADING

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Flash orders are marketable orders that an exchange momentarily exposes to a limited number of qualified low latency dealers when the exchange cannot otherwise immediately fill the order at the National Best Bid or Offer (NBBO). If a dealer is willing to fill the order at the NBBO or better, the exchange then executes the order. Otherwise it routes it to a market center with a better posted price. The limited order exposure and the failure to immediately route to better prices make the practice controversial. This paper discusses the characteristics and effects of flash trading, and offers recommendations for policymakers.



1 Introduction

The Securities and Exchange Commission's (SEC) Regulation National Market System (Reg NMS) requires that exchanges that receive marketable orders route these orders to other exchanges when they cannot execute them at prices as good as or better than the prices posted at other exchanges. To avoid routing these orders, many electronic exchanges¹ use flash order facilities to solicit trading interest among their local dealers when they receive marketable orders in

securities for which they are not posting the best available prices.

Flash orders are marketable orders that an exchange momentarily exposes to a limited number of qualified traders when the exchange cannot otherwise immediately fill the order at the National Best Bid or Offer (NBBO). Flashes occur when the NBBO is not offered at the exchange or when the exchange cannot fill the order at the NBBO in its entirety. During the flash period, the qualified traders can take the other side of the order by matching or improving the NBBO.

Flashes occur in fractions of a second. If a qualified trader matches or improves the NBBO,

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the exchange keeps the trade. Otherwise, the exchange routes the order to the better market or cancels it based on the customer's original instructions. Flash trading is possible only because electronic trading facilities allow these qualified traders to view and respond to flash orders in milliseconds.

Flash orders affect three types of traders: the traders who submit market orders to exchanges, the qualified dealers who respond to these orders through the exchange flash facilities, and the traders who make the best markets at other exchanges. Following practice established by the Chicago Board Options Exchange, we refer to these parties as Submitters, Responders, and Makers, respectively.

Submitters who send marketable orders to an exchange that does not presently offer the best price can allow standard intermarket order routing facilities to route their orders to other exchanges for execution. But for reasons discussed below, routing through exchange flash facilities may be a more attractive option. Flash facilities provide Responders with opportunities to fill these orders within short flash periods. If no Responder offers to fill an order during this interval, intermarket routing prevails (if permitted by the Submitter) and the exchange routes the order to an exchange where a Maker has posted the best bid or offer.

Flash facilities benefit the exchanges by increasing their execution rates and thus their revenues. These facilities also benefit the local dealers who may fill the flash orders, and possibly the traders who submitted the marketable orders. But they disadvantage traders at other exchanges who have posted better prices because flash trading denies them fills that they otherwise would have received from posting the best prices. Information gleaned from flash facilities also may provide the flash dealers with front-running opportunities.

The practice of offering and using flash orders thus is quite controversial.

Submitters can always choose to participate in flash trading facilities or avoid using them. Depending on the exchange, they can either mark their orders as flash-eligible or as flash-ineligible. The opt-in/opt-out option thus suggests that Submitters who permit their orders to pass through flash facilities generally value the flash option.

Flash facilities can benefit Submitters at exchanges that employ the standard transaction pricing model fee by allowing them to avoid paying higher access fees at exchanges that employ the maker/taker pricing model.² If Responders fill their orders at the best price or better, the Submitters receive better net prices.

When deciding whether to permit their orders to route through flash facilities, Submitters must consider the potential for front-running by Responders. Responders who see marketable trades may use this information to their advantage. For example, suppose that a Responder with a long inventory position sees a flash sell order. The Responder may decide to sell in anticipation of the expected price impact of the sell order. Worse, the Responder may sell to the Maker before the Submitter's order is routed to the Maker. In which case, the Submitter may ultimately obtain a worse price.

Since flash trading reduces intermarket order routing, it reduces the advantage that Makers gain from quoting better prices at other exchanges. Flash trading thus reduces the incentives to quote aggressively at secondary exchanges that do not receive as much order flow as larger exchanges. This issue may significantly affect public welfare if flash trading facilities cause Makers to submit less aggressive orders at secondary exchanges, which would cause spreads to widen, negatively impacting all traders. Moreover, the withdrawal

of Makers from secondary exchanges would impair secondary exchanges in their competition with primary exchanges for order flow, which could lead to higher fees at primary exchanges.

These concerns are mitigated to some extent by the fact that Submitters generally can route their orders to better quotes. Note, however, that brokers and sophisticated traders generally route marketable orders to the best net price as opposed to the best posted price. Net prices are equal to posted prices plus (for a buy order) or minus (for a sell order) any access fees that exchanges may charge liquidity takers. Many Submitters use flash facilities in an attempt to avoid access fees.

The remainder of this paper is organized as follows. Section 2 describes flash orders in more detail. Sections 3 and 4 present the benefits and

controversies, respectively. Finally, in Section 5 we enumerate recommendations for policymakers and conclude.

2 Flash Orders³

Flash facilities offer exchanges a way to match or improve better prices quoted at other exchanges. At some exchanges, Submitters must instruct the exchange to use the flash facility, in which case the orders are called flash orders (even if they are filled outside of the flash facility). At exchanges where flash handling is a default procedure, Submitters can still opt out by attaching an immediate-or-cancel instruction to their order, which would also prohibit conventional intermarket routing.

Upon receipt, flash-eligible orders are treated like all other orders. Exchanges attempt to fill them

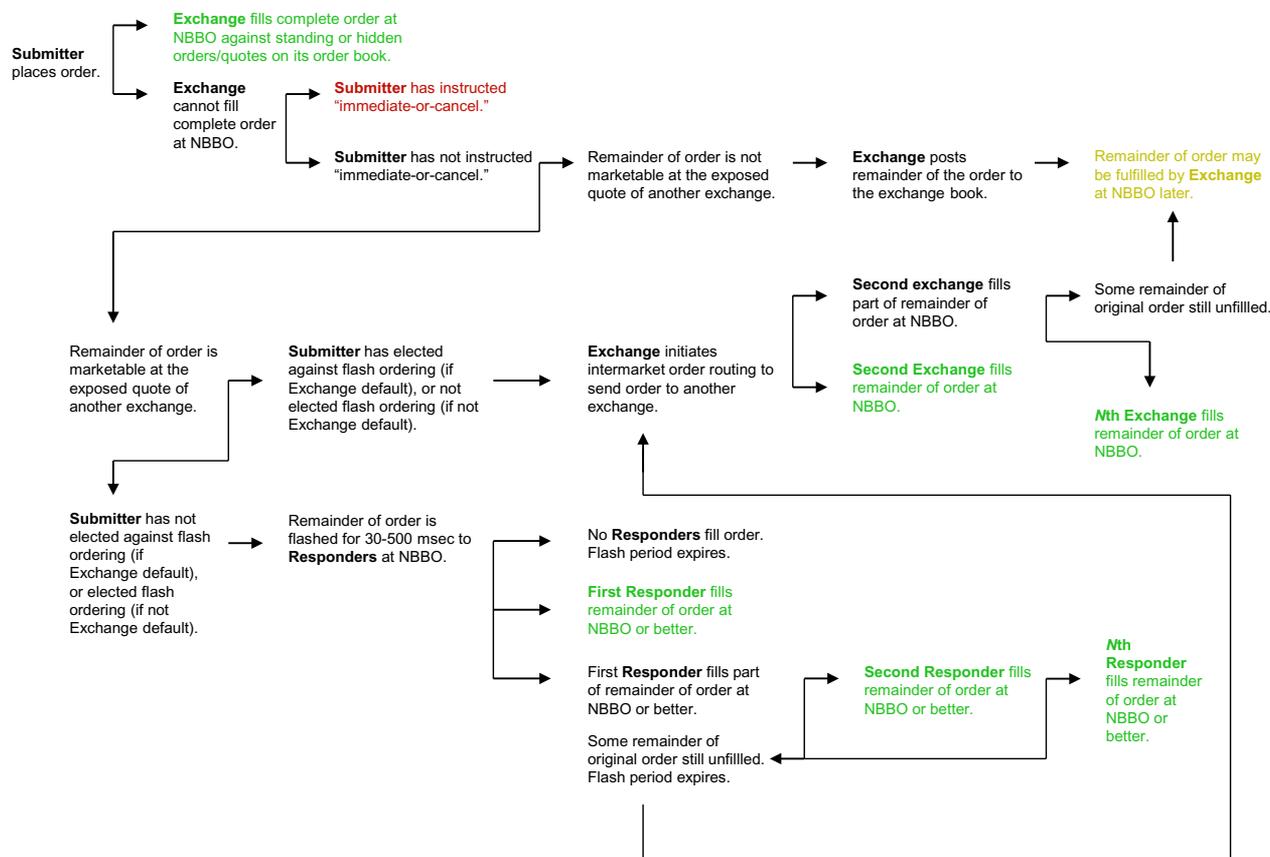


Figure 1 Schematic of flash orders and trades.

immediately against standing orders (exposed or hidden) in their order books if they can do so at prices equal to or better than the NBBO (subject to all other attached order execution instructions, e.g. limit, market, all-or-none).

After this initial attempt at matching the order, any remaining size then is either cancelled, posted to the exchange book, or sent to the flash facility. The remainder is cancelled if the order has an immediate-or-cancel instruction attached to it. It is posted if it is not marketable at an exchange displaying a better price. Finally, if the order is marketable elsewhere, the remaining size is sent first to the flash facility where the exchange exposes it for a short period to Responders.

In the flash facility, Responders have a short fixed period (between 20 to 500 milliseconds, depending on the exchange⁴) during which they can offer to match the NBBO or provide a better price. Generally, the first Responder fills the order or some part of it. If the first Responder does not completely fill the order, the next will fill the remainder of the order or some part thereof until either the order is completely filled or the flash period ends. If the order is not completely filled by the end of the flash period, the exchange will route any remaining size to an exchange offering the best displayed price. Figure 1 contains a flow chart for flash orders and trades.

3 Benefits

Flash orders give Submitters who place marketable orders an opportunity to obtain cheaper, quicker, or larger executions, often at better net prices than those generated by intermarket order routing.⁵ When a flash order produces an execution, the potential benefits to Submitters are multifold:

- (1) Submitters may obtain improved prices relative to the better prices posted at other exchanges.
- (2) Submitters obtain better net prices when a flash execution at a traditional fee exchange allows them to avoid the access fee they would pay at a make-or-take exchange.
- (3) Submitters may obtain larger executions than they would if the order had been routed to another exchange.
- (4) Submitters obtain faster executions than they would receive if their orders were routed to another exchange.
- (5) Submitters avoid the risk that better quoted prices may disappear while their orders are in route from one exchange to another, which would cause the return of their orders for further processing, thus delaying their execution.

Responders may offer to trade for many reasons:

- (1) Most obviously, Responders hope to earn the bid/ask spread.
- (2) Some Responders may be willing to trade at the NBBO or better prices, but are unwilling to display their interest until they see the size of the orders that they will be filling. In particular, dealers who are short inventory may be reluctant to sell to large buyers but may be willing to sell to smaller buyers. They may also be unwilling to trade with large traders if they believe that large traders tend to be better informed than smaller traders. Flash facilities allow these dealers to selectively offer liquidity based on current market conditions and order sizes without committing to offer liquidity to any trader who arrives at the exchange.
- (3) Those Responders who are also exchange designated market makers may provide better prices to improve their order execution quality ratings.

Figure 2 summarizes the benefits to both participants.

Benefits to Submitters

Reason: Flash orders avoid access fees commonly charged for transactions via intermarket routing to make-or-take exchanges.

Better net pricing.

Reason: Responders may sweeten flash orders by improving on NBBO.

Responders may prefer to trade with retail Submitters instead of large institutional traders whose trades are big enough to move the market and thus impose losses. Responders avoid such losses by flash trading with Submitters.

Responders who offer firm quotes at exchange may suffer from an information lag when trading with high-speed institutional traders, but benefit from an information lag when flash trading with retail Submitters.

Larger executions.

Reason: Added liquidity provided by Responders often allows flash orders to be larger than those quoted by exchanges at NBBO.

Increased likelihood of fulfillment.

Reason: Quotes can disappear during intermarket routing. (Thus returning routed orders to the original exchange, where they are then filled as new orders.)

Faster executions.

Reason: Flash orders are often faster than interexchange orders because the flash period is relatively short. And in the event that they fail to execute and an interexchange order is needed, they add little to the cumulative time spent on the order.

Benefits to Responders

Figure 2 Benefits to submitters and responders.

4 Controversies

Many commentators have questioned whether flash order facilities promote fair and efficient trading markets. On September 9, 2009, New York Senator Chuck Schumer issued a critical response to Chris Hynes and Donald Luskin's August 27th *Wall Street Journal* op-ed piece "In Defense of 'Flash' Trading,"⁶ where they argued the benefits of flash programs to both individual and institutional investors. However, according to Schumer in "Flash Trading Helps Few, But Not the Whole Market," those benefits, which the authors list as increased innovation and competition, higher liquidity rates and price improvement, flash orders introduce an unfair advantage to the traders—usually institutional—with higher technological capabilities. The central problem then, according to Schumer, is not merely that flash programs allow traders to "front-run" stock

orders, but it is also that the opportunities to preview prices afforded by flash programs are limited to traders who already have significant advantages in the market. Indeed, Schumer's chief complaint is that flash facilities route orders away from the entire market toward the particular investors with flash order capabilities. "It defies logic," Schumer argues "to claim that going to 25 brokers provides more liquidity than going to the entire market, which includes those 25 brokers⁷." The key to effective markets, Schumer counters, is openness. Flash trading, by contrast, represent the "bygone era of paper certificates, 'upstairs' specialists and open outcry pits," which once worked to undermine traders' confidence in the fairness of markets.

The controversy over flash facilities revolves around the issues of front-running, fairness, competition within the national market system, and

Exhibit 1 Front-running and fairness controversies.

<p>Front-Running Controversy</p>	<p><i>Basis of Controversy:</i> When a Submitter exposes order to a Responder, a Responder can decline to fill the order but use the knowledge of the order to its advantage. Responders can go to other markets to take the liquidity that the Submitter would have obtained by intermarket routing. Submitters would be forced to fill their orders at inferior prices, possibly trading with the very same Responders who have front-run them.</p>			
	<table border="1"> <tr> <td data-bbox="252 390 954 533"> <p><i>Justification:</i> If Submitters believe that they are obtaining inferior executions from using flash orders, they will avoid doing so if it carries unwelcome transaction costs. Submitters may also choose to break orders into smaller pieces that would be of less interest to front-runners, who generally benefit from the arbitrage only on large trades.</p> </td> <td data-bbox="954 390 1504 655"> <p><i>Justification:</i> In a competitive market, other flash Responders might fill the Submitter's order before the front-running Responder could complete the arbitrage, leaving the front-runner with no profitable exit to its trade. Even if the flash period expires without another Responder filling the order, the front-runner still assumes the risk that the Submitter will refuse to trade at an inferior price, or that it will prefer to trade with another trader.</p> </td> </tr> <tr> <td data-bbox="252 533 954 655"> <p><i>Justification:</i> Regulators could prohibit Responders from taking liquidity on a trade they have seen exposed by flash order. This prohibition need only extend for some period longer than the flash period (e.g. one second).</p> </td> <td></td> </tr> </table>	<p><i>Justification:</i> If Submitters believe that they are obtaining inferior executions from using flash orders, they will avoid doing so if it carries unwelcome transaction costs. Submitters may also choose to break orders into smaller pieces that would be of less interest to front-runners, who generally benefit from the arbitrage only on large trades.</p>	<p><i>Justification:</i> In a competitive market, other flash Responders might fill the Submitter's order before the front-running Responder could complete the arbitrage, leaving the front-runner with no profitable exit to its trade. Even if the flash period expires without another Responder filling the order, the front-runner still assumes the risk that the Submitter will refuse to trade at an inferior price, or that it will prefer to trade with another trader.</p>	<p><i>Justification:</i> Regulators could prohibit Responders from taking liquidity on a trade they have seen exposed by flash order. This prohibition need only extend for some period longer than the flash period (e.g. one second).</p>
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<p>Fairness Controversy</p>	<p><i>Basis of Controversy:</i> Exchanges may only expose flash orders to designated Responders and not to the entire market. Even if flash orders are exposed to all, only Responders with the technological capability to execute them will be included in the marketplace.</p>			
	<p><i>Justification:</i> In non-electronic markets, floor traders were routinely allowed to fill orders not quoted on the exchange book. Intermarket routing ensued only when no floor trader would fill at NBBO or better, resulting in a "flash period," so to speak, of 15–30 seconds. Exposure to order information during this period was one of the benefits of exchange membership that compensated members for accepting responsibilities of membership such as public order precedence.</p>	<p><i>Justification:</i> Like any market advantage, the technological edge that benefits flash order Responders is one they have invested in. Competitors are free to invest likewise in development by purchasing or accessing third-party service technologies. Hypothetically, such a financial technology arms race could be detrimental to the economy as a whole, but many argue that reduced transactions costs prove the opposite.</p>		
	<p><i>Justification:</i> Exchanges that allow only designated Responders to flash trade have granted that permission because those responders have either paid for it, or have taken on some other responsibility for the exchange (e.g. market-making). This is consistent with advantages that exchanges have always offered dealers for providing liquidity.</p>	<p><i>Justification:</i> If Responders who benefit from a technological edge are prohibited by regulation from flash trading, they will inevitably leverage their superior information access in some other way. It is neither possible nor desirable to level all competitive advantages in a market; competitive advantage is the basis of market systems.</p>		

questions associated with competing standards for pricing exchange services. As a result, in September of 2009 the SEC announced that it would look at the practice, specifically considering if the exemption enjoyed by flash trades under Rule 602 of Regulation NMS should be eliminated due to the wide availability of automated trading technologies. Under the proposed amendment, the Commission would apply Rule 301(b) of Regulation ATS under the Exchange Act consistently to flash orders and would apply the restrictions on locking or crossing quotations in Rule 610(d) of Regulation NMS to prohibit the practice of displaying marketable flash orders.⁸ Nevertheless, serious

questions were posed regarding the possibilities for front-running, unfairness, and threats to competition and pricing standards. We address these issues in this section. Exhibits 1 and 2 summarize the discussion of the controversies.

4.1 Front-running

The exposure of flash orders to Responders may provide them with front-running opportunities. The high-speed trading technologies that Responders need to participate in flash trading also permit them to easily beat rerouted orders to other exchanges. In particular, upon seeing a flash order, Responders may race to other markets

Exhibit 2 Competition and pricing standards controversies.

Competition Controversy	Pricing Standards Controversy
<p>History: Submitters are encouraged to flash trade with market-making Responders at exchanges that can offer competitive prices because they attract high-order flow. This means that with respect to price competition among traders, flash ordering is pro-competitive. Yet, it also means that with respect to competition among exchanges in the national market system, flash ordering is anti-competitive. Market-makers are discouraged from offering liquidity at exchanges with lower order flow. Recent SEC policies reflect a greater concern about preserving competition between exchanges; high-tech routing systems are presumed to have an adequate effect on price competition. The National Market System regulations adopted in 2005 include rule 611, an "order protection" that obligates traders to make transactions at the market offering the best price. The goal is to provide an incentive for market-makers to add liquidity at more markets, including secondary markets. The rule also discourages brokers from trading against their retail customers' best interest.</p>	<p>Make-or-Take Pricing: Exchange charges Submitters an access fee for executing marketable orders and pays Responders a liquidity rebate for executing standing orders; the difference between these is its net fee.</p>
<p>Basis of Controversy: Because NMS order protection privileges intermarket order routing in order to give retail traders an alternative to brokers, or at least put them on better terms with brokers, the advent of flash trading means this protection may no longer be necessary.</p>	<p>Transaction Fee Pricing: Exchange charges flat transaction fees for arranging the trade to Submitters only. This fee is equivalent to the net fee in make-or-take pricing and therefore less than the access fee.</p>
<p>Justification: Retail traders can now access the best market without the broker or the intermarket routing. This raises the notion that improved regulation would discriminate between equity exchanges (where active order flow encourages public traders to post liquidity and encourages the exchanges to offer the best service and price to customers) versus options exchanges (where dealers provide liquidity and the public interest would be served by competition between dealers). The latter type of market is one in which the tendency towards consolidation typical of the flash trading structure would be beneficial rather than detrimental, which is why flash trading was developed in the first place.</p>	<p>Basis of Controversy: Another reason that flash trading was developed was to provide a stopgap solution to a problem created by the NMS order protection rule. When an exchange using transaction fee pricing routes to an exchange using make-or-take pricing, it must pay an access fee in excess of its transaction fee as well as a fee to its routing vendor; losses it either absorbs or passes to its customer. (Some customers are displeased by resulting fees, which can only be avoided by immediate-or-cancel ordering. Other customers take advantage of this structure to ride the exchange for free access.) Additionally, the difference in pricing sometimes results in narrower posted bid/ask spreads at make-or-take priced exchanges, since Submitters are drawn to the exchange for better pricing and Responders for the liquidity rebate. The actual spread is the same as it would be at a transaction fee priced exchange; the difference is baked into the prices. But because of rule 611, the narrower posted spread means the transaction cost priced exchange is forced to route the order to the make-or-take priced exchange, worsening its cumulative disadvantage as described previously. Thus flash ordering gives transaction cost priced exchanges a way to avoid some of the punitive consequences of mandated order routing.</p>
	<p>Justification: Though intermarket routing appears to narrow bid/ask spreads and reward makers for providing liquidity, this is an illusion created by the lack of transparency in pricing standards. In truth, make-or-take access fees and liquidity rebates offset the narrower spreads. Conversely, flash ordering appears to carry the danger of locking the market below NBBO because flash order quotes do not reflect access fees. Until the SEC creates uniform pricing standards, or modifies NMS order protection to reflect net prices including access fees, flash ordering allows transaction cost priced exchanges to avoid unfair disadvantage.</p>

to take the liquidity that the Submitters would have obtained by intermarket routing. Submitters then would be forced to fill their orders at inferior prices, possibly trading with the very same Responders who have front-run them.

Several issues mitigate these concerns. First, the potential profitability of front-running depends on the degree of competition among Responders. When many Responders compete to fill flash orders, the likelihood of front-running diminishes because Responders will obtain positions from which they are less likely to profitably exit. For example, if a front-running

Responder takes liquidity at another exchange while another Responder is simultaneously filling the Submitter's order, then the front-runner now cannot trade with the Submitter and thus will have fewer opportunities to exit the trade at a profit. Furthermore, even if Responders do not fill the flash order during the flash period, the potential front-runner may not be able to fill the Submitter's order at the next inferior price if other traders are competing to do so. The Responder also may cancel the order. These possibilities suggest that the front-running strategy is less attractive when Responders face significant competition on the same side of the market.

Second, large traders and brokers regularly monitor transaction costs. Submitters can stop using flash order facilities if they believe that they are obtaining inferior executions on average from using flash facilities. Furthermore, since large orders face the greatest dangers from front-running, Submitters may choose to flash only small orders, or they may break up their large orders into many smaller orders to obtain the benefits of flashing while minimizing losses from front-running.

Finally, regulators can outlaw the conditions that make front-running possible. By making it illegal for Responders to take liquidity on the same side

at an equal or better price than that of a flash order they have seen within the past second, regulators would effectively address the problem of front-running (one second simply designates a short interval that is nevertheless much longer than the flash period).

4.2 Fairness

Concerns about the fairness of flash orders arise because exchanges expose flash orders to a limited set of qualified Responders and not to other market participants. Even where access to the facility is easily obtained, only traders with fast enough technology can compete successfully.

Exhibit 3 The advantages and disadvantages of flash orders and trading.

Pros	Cons
<ul style="list-style-type: none"> ● Creates additional liquidity by attracting market participants who may not have traded otherwise. ● Increases the probability of executing a transaction. ● Can provide larger executions at the NBBO. ● Provides for faster executions. ● Allows exchanges to try to keep trades. ● Offers the benefit of choice to Submitters, who can decline the service with an immediate-or-cancel instruction to their order. ● Submitters benefit from lower fees by using flash facilities at a transaction fee exchange rather than at a make-or-take exchange, thus improving net price. ● Responders can avoid losses from trading with large traders whose trades may have negative market impact. As a result, Responders can provide more liquidity to Submitters. ● Responders may avoid offering liquidity to high-speed traders who possess better information. 	<ul style="list-style-type: none"> ● Lack of transparency and perception of a “two-tiered” information market can affect investor confidence. ● Potential for front-running by Responders. ● Possible reduction of liquidity at exchanges that do not have substantial order flow, thus reducing competition among exchanges.

Fairness is not an issue that economic analysis can decide. Fairness depends on each observer's values. Since values vary substantially across people, reasonable people often disagree about fairness issues. However, well informed opinions about fairness should consider the following three issues:

First, the function of flash facilities within electronic trading systems is consistent with practices that have always been accepted in floor trading markets. Floor traders routinely fill incoming orders when no other orders are on the book at the same price. U.S. floor-based equity exchanges routinely exposed orders to the trading crowd before routing them to better markets. Accordingly, flash order systems are similar to traditional trading practices. Though the flash period on the floor is typically 15 to 30 seconds, the notion of seeking additional liquidity from other participants in the exchange is essentially the same. Viewing exposed orders and deciding whether to fill them before they are rerouted is a widely accepted privilege of exchange membership that incentivizes traders to dutifully perform the responsibilities of their membership, among which is to maintain public order precedence—the requirement that at a given price, members must give way to nonmembers.

Second, traders have always used new trading technologies to obtain an edge over their competitors. Traders with the best technology have always obtained better access to the market. Those who lag behind can obtain similar technology by developing it in-house, by purchasing it, or by purchasing brokerage services from those who have these technologies. The claim that flash facilities are unfair to slow traders thus is equivalent to the claim that it is unfair that slow traders must invest to remain competitive. Anyone can obtain better trading technologies by paying for them.

Finally, some observers may believe flash facilities are unfair because some exchanges only allow certain Responders to offer liquidity to flash orders, and not all traders who have the requisite technology to participate in flash facilities. Yet, even at such exchanges, the traders granted access are those who either pay for the privilege or who assume other market-making responsibilities. The same question of fairness thus applies equally to all privileges that exchanges grant to designated dealers, most of which serve to encourage dealers to offer liquidity that they otherwise may not offer.

4.3 Competition within the National Market System

Since flash facilities reduce intermarket order routing, they reduce the incentives to offer liquidity at other exchanges. Flash facilities thus may reduce competition among exchanges, and thereby weaken the National Market System. But flash trading may also improve the competition for best prices because flash facilities incent Submitters to route their marketable orders to exchanges with the most order flow where they can arrange trades on better terms. Flash trading thus has opposite effects on the two competitions that characterize market microstructure: It degrades the competition among exchanges for order flow but promotes the competition among traders for best price. The tension between these two types of competition characterizes public policy decisions in market microstructure.

Which competition is most important to good public policy depends to some extent on the nature of the markets. In equity markets in which public traders generally provide much liquidity to each other, facilities that promote liquidity provision by public traders are particularly valuable. In contrast, in options markets in which dealers generally provide most liquidity to public

traders, facilities that promote liquidity provision by dealers are valuable.

Flash facilities thus would appear to be more appropriate for options markets than for equity markets. In options markets, dealers and the exchanges where they trade generally cooperate in their attempts to attract order flow. Flash facilities in these markets are simply another venue for competition. In contrast, in equity markets, exchanges generally compete with each other to attract public traders to supply liquidity. Flash facilities in these markets tend to thwart this competition and thus may not promote the public interest.

4.4 Pricing standards

The mandated intermarket order routing required by Regulation NMS creates special problems when exchanges price their services using different models.⁹ In particular, the traditional transaction fee model and the maker/taker pricing model produce different order routing incentives when two exchanges are posting orders at the same price. In general, traders (or the brokers who represent them) will route marketable orders to traditional exchange fee markets to avoid paying the higher access fees at maker/taker markets, and they will route standing orders to maker/taker markets to obtain the liquidity rebates if the orders are ultimately executed there.

The economic incentives to provide and to use flash order facilities depend on these differences as do the incentives of various parties to promote or prohibit these facilities. When a transaction fee exchange must route a marketable order to a maker/taker exchange, it must pay the higher access fee. Such exchanges thus have strong incentives to provide flash facilities to reduce such intermarket routing. The flash facilities benefit them directly if they have to pay access fees on routed orders, and they benefit their customers

if the customers pay the access fees. In contrast, maker/taker exchanges generally would oppose flash facilities for the same reasons.

5 Recommendations for policymakers

After the SEC announced in 2009 that it would examine the fairness issues surrounding flash facilities, BATS (2009) and NASDAQ (2009) announced that they would close their flash facilities while the SEC reviewed the practice. As of Spring 2013, the SEC had not yet proposed to regulate flash trading. The remainder of this section suggests how the SEC could permit flash trading while limiting its possible abuses. Exhibit 4 contains a list of exchanges that offer flash facilities.

- (1) **Voluntary flashes.** Submitters should not be compelled to use flash facilities. If Submitters or their brokers regularly measure their transaction costs and act to control them, they will determine whether flash orders are in their interest and act accordingly, either by opting in or opting out, as necessary. This regulation would codify current practice since traders at all exchanges offering flash trading facilities can avoid participating in the flash facility by appropriately coding their orders or by attaching immediate-or-cancel instructions to them.

Exhibit 4¹⁰ Exchanges that offer flash facilities as of June 2009.

Name of Exchange	% of Flash Orders	Overall Market Share by Volume
NASDAQ	Not Provided	Not Provided
BATS Exchange	1.25	10.72
Direct Edge	1.45	11.89
CBOE Stock Exchange	Not Provided	Not Provided

- (2) **Front-running.** The SEC should make it illegal for Responders to take liquidity on the same side at a price equal or better than the price of a flash order within one second of seeing that order. Responders who actually fill the flash order or are trading to fill another flash order should be exempt from this restriction. Although this restriction would impose some programming burden on Responders, it should not significantly affect their legitimate business models because in most instances, they make, rather than take, markets. Since Responders can take liquidity in correlated securities without restriction, a one-second delay in taking a market should prove minimally constraining.
- (3) **Flash auctions.** Exchanges should be encouraged to conduct a sealed bid auction among the Responders during the flash period to allocate the flash order to the Responder offering the best price. The bids should not be subject to any minimum price variations since they will be hidden. This regulation would have the effect of allowing slower electronic traders to compete effectively in the flash facility. At the end of the auction, the responder's offers would be allocated to the flash order according to price-time precedence. The resulting price improvements should benefit Submitters.
- (4) **Best execution.** Brokers should continue to route their agency orders on the basis of objective analyses of order performance, and face penalties if routing decisions are corrupted by agency practices that neglect best execution. Best execution standards should reflect the net prices traders pay and receive after adjusting for any access fees and liquidity rebates associated with the execution.
- (5) **Pricing standards.** The SEC should establish a common pricing standard for collecting exchange fees. By ensuring that price quotes

are comparable across exchanges, traders will be able to compare exchange fees easily, which promotes competition. The type of model used is ultimately not as significant as whether the model is common to all exchanges, and thus creates a level playing field.

Opposition to standardizing how exchanges collect their fees has mischaracterized proposals as fee-setting activities that are deleterious to competition. But setting a pricing standard is not the same as setting fees. Setting common and sensible standards enhances rather than stifles competition, because it allows participants to compete on the same basis. Whether an exchange collects its revenue from a fee for transactions or from the equivalent difference between an access fee and a liquidity rebate, its revenue will be the same.

Exhibit 5¹¹. Flash trading timeline.

- January 13, 2004 – SEC Rule Filing – Boston Options Exchange (BOX)
- January 26, 2006 – CBOE Regulatory Circular RG06-15, Hybrid Agency Liaison (HAL) Rollout
- September 3, 2008 – CBOE Regulatory Circular RG08-101, HAL on the Opening (HALO)
- May 2009 – NASDAQ and BATS
- July 2009 – Equity markets that offered flash orders were CBSX, Direct Edge, BATS, NASDAQ, and NASDAQ OMX BX; Options markets were BOX, CBOE, and ISE
- August 2009 – CBOE Rule 6.14A, Hybrid Agency Liaison (2nd version), Adoption
- September 2009 – BATS, NASDAQ and NASDAQ OMX BX discontinue offering flash order
- September 23, 2009 – *Federal Register*, Volume 74, Number 183 published proposing bans on flash order

- June 2010 – CBOE Rule 6.14A, Hybrid Agency Liaison (2nd version) Amended
- October 27, 2010 – 4 Options Exchanges use flash mechanisms at this time; CBOE, ISE oppose bans on flash trading; NASDAQ OMX, NASDAQ OMX PHLX, and NYSE Euronext support prohibition; Maker Taker exchanges would most likely receive more order from PFOF exchanges, benefitting them while cutting into PFOF exchanges
- July 2012 – CBOE Rule 6.14A, Hybrid Agency Liaison (2nd version), Amended
- April 2013 – CBOE Rule 6.14A, Hybrid Agency Liaison (2nd version), Amended.

We favor the traditional fee model because it produces greater price transparency, eliminates the appearance of kickbacks, and does not generate agency problems in order routing. Eliminating access fees would ensure that quoted spreads represent the actual costs of trading marketable orders and not indications of cost that traders must adjust by adding access fees to arrive at actual costs. Eliminating access fees would also cause securities markets to conform to common agency law, which prevents agents from collecting fees (kickbacks) from participants seeking to do business with their clients. Finally, eliminating access fees and liquidity rebates would stop brokers from routing client orders based on these fees instead of on information about where their client orders would best execute.

If the SEC does not address the exchange pricing standard problem in the abovementioned ways, it should require intermarket order routing rules to require routes based on net prices inclusive of access fees rather than only on quoted prices. If the SEC is unwilling to take either action, then it should continue to permit flash facilities to operate so that traders at transaction fee exchanges can improve prices for their clients.

Failing to address the pricing standard problem will only result in continued misdirection to traders who receive quoted prices that do not reflect economic realities. Such decisions are inconsistent with the best execution principles that the SEC promotes and with fair competition among exchanges.

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Notes

- ¹ Exhibit 3 contains a list of exchanges.
- ² Exchanges that employ the transaction fee model collect a small fee from the seller or from both the buyer and the seller for arranging their traders. In contrast, exchanges that employ the maker/taker fee model charge a high fee to the taker—the trader who initiates the trade—and rebates a portion of that fee to the maker—the trader who posed the standing limit order. For example, a transaction fee exchange may charge the seller 10 cents per 100-shares traded whereas a maker/taker exchange may charge the maker 30 cents per hundred and rebate 20 cents to the taker, for a net fee of 10 cents per hundred.
- ³ For a history of flash orders, see Skjeltorp *et al.* (2015).
- ⁴ As of this writing, there is no regulated maximum flash period.
- ⁵ Skjeltorp *et al.* (2015) use a sample of data from the NASDAQ to show that flash order do improve liquidity and increase competition among liquidity providers.
- ⁶ Hynes, Chris and Donald Luskin. “In Defense of ‘Flash’ Trading.” *Wall Street Journal*. Dow Jones & Co. August 27, 2009.
- ⁷ Schumer, Chuck. “Flash Trading Helps a Few but Not the Whole Market.” *Wall Street Journal*, September 4, 2009.
- ⁸ See Securities and Exchange Commission. “Elimination of Flash Order Exception From Rule 602 of Regulation NMS; Proposed Rule.” *Federal Register* 74.183. U.S. Government Printing Office. September 23, 2009.
- ⁹ The main inputs in the cost/benefit analysis are the effective spread, make rebate, take fee, routing fee, and delay

cost. Footnote 3 in Skjeltorp *et al.* (2015) provides a numerical example.

¹⁰ Mehta (2009).

¹¹ Courtesy of the Chicago Board Options Exchange (CBOE).

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