Restructuring Institutional Block Trading: An Overview of the OptiMark System

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Abstract

Financial markets perform many functions, but principal among them is to bring buyers and sellers together and provide a mechanism for price discovery. Information technology has had a number of significant impacts on financial markets, enabling enormous increases in volumes and more sophisticated trading techniques such as program trading and index arbitrage. Despite improvements, some large institutional investors identify shortcomings in today's markets that make the process of buying or selling large, block orders time-consuming and costly. To address these concerns, a new trading system, OptiMark, has been built around several innovations including (1) a graphical user front-end for depicting trading preferences, and (2) a back-end built on high-performance computers that process expressions of trading interest according to a price-setting algorithm intended to achieve superior outcomes for traders. OptiMark provides a means for more cost-effective block trading, and expects to contribute to regulatory objectives. This paper details the operations of OptiMark, examines its adoption potential, and assesses the impact it may have on block trading, broker-dealer intermediaries, and the equities markets.

1. Introduction

Financial markets bring buyers and sellers together and provide a mechanism for price discovery. Financial markets also allocate capital to businesses and government organizations, and offer a means for savings to be invested for potentially attractive returns and greater future wealth. Despite the operational improvements from market technology, many large institutional investors (e.g., mutual fund and pension fund managers) are increasingly critical of today's markets, in particular their inability to absorb large, block transactions without significant price movements in the absence of new information. Such concerns make the completion of large trading orders time-consuming and costly.

Although trading volumes in U.S. stock market are at record-breaking levels, liquidity — i.e., the market's ability to complete large buy and sell orders without significant price impact and without undue delay — is perceived to be a problem. Liquidity is widely regarded as the most important aspect of a market's attractiveness to investors [1][6]. To address the concerns about block trading liquidity, the OptiMark (OPTimal MARKet) system was developed by Bill Lupien, a 30-year veteran of the securities industry, and Terry Rickard, a physicist and engineer. OptiMark introduces two major innovations:

- Traders using OptiMark input their trading preferences graphically across a range of sizes and prices, and submit them electronically without disclosure to other traders.

- The system "optimizes" the matching of these OptiMark trading preferences and provides, in many cases, improvements on the traders' minimally acceptable price and quantity combinations.

These innovations are needed for several reasons. First, in existing markets, an investor phones a brokerage firm and communicates a "point order" to buy or sell a certain quantity at a particular price or better; it is rarely practical to convey a set of price and size combinations that are acceptable. The brokerage firm's block trading desk, after receiving an order, uses its contacts with other investors, and their knowledge of the market to begin working the order. In many situations, however, the broker may inadvertently leak details about the desired trade in a way that causes its price to move adversely before the transaction is completed. To mitigate these problems, traders today will typically conceal information strategically, such as the true quantity they are seeking to trade, or the highest price they are willing to pay if buying.

Auction theory suggests that only under restrictive sets of circumstances is honest revelation of supply and demand functions is optimal for market participants [7]. In actual securities markets, revealing a "reservation price", or the true quantity sought, exposes a buyer to opportunism and worsens his or her negotiating position. As a result, traders normally will not disclose this information. By providing for undisclosed orders OptiMark users, however, have an incentive to inform the system's algorithm fully of their trading interests. OptiMark's matching algorithm also encourages full submission since it seeks to match buyers and seller at

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prices better than their submitted reservation prices. Such mutually beneficial matches should occur to a greater extent than in today’s markets.

By providing for committed but "undisclosed" orders, and applying an algorithm to optimize over potential price improvements, OptiMark is a market institution that is substantially different than those in use in established stock exchanges. Despite competition and the changing needs of institutional investors, existing exchanges have made few attempts to develop truly innovative trading systems such as OptiMark.

2. Exchange Shortcomings and the Need for OptiMark
2.1. Trading Costs for Institutional Investors

The growing institutionalization of the market has concentrated growing quantities of assets in a small number of fund managers’ hands. For instance, the largest mutual fund, Fidelity's Magellan, had net assets of $63 billion in August 1997, and nine other funds had more than $20 billion in assets. The current liquidity and competition in most equities markets in the U.S. implies buying or selling several hundred, or even several thousand shares, will not require the buyer to pay a premium over recent trade prices, or force the seller to sell at a discount to the prevailing bid quote in the market. For large investors, however, desired transaction quantities in particular stocks can be several hundred thousand shares or more. Block trading, by definition includes trades over 10,000 shares, but such trades can be several million shares or more. Block trading, volumes are growing rapidly, and block sizes are increasing, and are now commonly between 50,000 and 100,000 shares [8]. The following data indicate the complexity and the importance of block transactions:

- 66% of the orders for stocks in one U.S. database are of a size greater than 50% of average daily trading volume in those stocks, suggesting that order flow has become extremely lumpy [12]

- In the U.S. in 1994, institutional trading accounted for 75%-80% of NYSE volume

Large funds often want to trade a significant proportion of the average daily volume of the stock, and in some cases may wish to buy or sell the equivalent of several days’ average trading volume in the stock at one time. In the existing market structure, the mere news that a large sell order is being "worked" can cause prices to fall, and large transactions frequently cause the prices to move against the trader before the desired quantity has been bought or sold. Scott Shellhamer, Head Trader, Pilgrim Baxter & Associates, describes the predicament: "You’re a real buyer, you put some volume on the tape, [the dealers] realize, holy cow there’s a real buyer out there, I’m not going to sell here — and everyone moves their market back up. So you’re lucky if you get 5,000 shares done." (in Wall Street Journal, June 5, 1997, p. C11)

Block trading desks at the major Wall Street firms try to minimize such "market price impact" by contacting potentially interested counterparties, executing the order in small parts, and often "positioning" some or all of the order in their own account. This means that block trading desks are often buying stock that their customer is selling, and selling stock to a customer when that customer is buying. A block trading operation generates revenues from commissions, which can be 5 to 10 cents a share, and from the trading profits when it trades as a principal with its customers. In principal trading, there is greater risk from price movement before the firm has "unwound" its position, but the block trader may be able to earn an eighth (12.5 cents) or more per share. Observers, however, have commented that brokerage firms' capital has not grown as quickly as the positions fund managers now trade, and that Wall Street trading firms are less willing to commit capital to customer orders.

Because block trading firms trade for their own account as well as advise and trade with clients, conflicts of interest can arise. Bob Kirby of Capital Guardian Trust in Los Angeles, remarked that "the people responsible for executing your order frequently take advantage of it to implement trading programs for their own account." [10] As a result, investors often disclose just a portion of their overall trading intentions.

Today's market conditions impose costs and constraints on institutional investors. A study by the Plexus Group of over 50,000 institutional orders indicates that a fund manager faces aggregate trading costs of about 41 cents to buy or sell a $30 stock [11][12].

| Table 1: Institutional Trading Costs (Source: Plexus Group) |
|-----------------|-----------------|-----------------|
| **Cost Component** | **% of Trade** | **Description** |
| Commission       | 0.13%           | Execution-only institutional brokerage commission |
| Bid-Ask Spread and Market Impact | 0.27% | Trade price relative to the midspread price at the time the broker is given the order. May be due to the spread, information seepage, or poor trading skill, and may reflect a selling discount or buying premium for large orders. |
| Timing cost      | 0.43%           | Price change when the undisclosed part of an order is held awaiting additional liquidity, or is being metered out into current marketebb and flow: the difference in the stock’s price at the time of the investor’s order decision compared to price at the time the order is given to a broker. |
| Opportunity cost | 0.53%           | Price movement on disclosed orders that are not executed. |
| **Total**        | 1.36%           | |

This 1.36 percent expense implies that returns from a round-trip investment — purchasing and later selling an
institutional-size holding — will be reduced by nearly 3 percent, a considerable proportion of expected annual real returns on U.S. equities of about 10 percent.

2.2. Exchange Trading Structures and Ability to Change

Some large institutional customers believe that they are poorly served by the existing exchanges and traditional broker-dealer intermediaries, and some industry participants believe that better alternatives for handling large institutional-sized trading orders are needed. Among institutional investors there is concern that the exchange’s market structures are limited and self-serving. The fundamental problems for existing exchange market structures are:

- Finding the "natural" counterparty for a trade is costly and time-consuming, and the process of looking itself adversely affects the attractiveness of the trade to the investor who initiated it. Simply trying to trade leads to adverse price movements: "It’s difficult to get information for trading a block without becoming information." (Richard Schenkenman, Instinet, Conference presentation, New York, NY, February 25, 1997)

- The volatility of today’s markets, and the growth of new trading venues for low-risk trades, have increased risks for block traders. This has made capital commitment for large orders uneconomic for dealer-intermediaries, and has caused many securities firms to scale back their block trading operations.

- Exchanges have not innovated as rapidly as many other providers of trading services. Lupien feels "Exchanges have a governance problem. They are consensus-driven and will react to the members that are least willing to adapt." (Personal interview, Durango, CO, May 20, 1997) For example, the London Stock Exchange (LSE) encountered significant delays and budget overruns as a new, fairly conservative market design was implemented that preserves the roles of the LSE member firms in facilitating trading.

A cause of the block trading problem is that exchanges handle specific orders, not more general expressions of intentions or willingness to trade across a range of contingencies. Innovative low-cost trading systems, such as OptiMark, could threaten the established stock exchanges and their traditional intermediaries, but many exchanges appear unable to respond. OptiMark’s founder, Bill Lupien is direct: "The exchange’s core is broken. They’re not a market for institutional trading. We have to create a new business with OptiMark." Traditionally, stock exchanges have provided a bundle of services including price discovery, speed and convenience of trade execution, and reliable trade settlement with a creditworthy counterparty. Over time, more of these functions can be provided via low-cost third party vendors’ computers and networks. Similarly, some of these functions may become more important to some investors or less important to others, requiring new market designs and new pricing strategies.

3. Block Orders: Current Practice and OptiMark

3.1. Current Order Handling Practice

Traders increasingly cite the difficulty of doing large trades without significant execution costs: "It is much more difficult to find liquidity in even primary names than it was a year ago", says Michael Weiner, stock-research chief for Banc One Investment Advisors. "A year or two ago, there were hundreds of stocks we could have bought in a day or two." Now, he says, "there’s only about 50." [11]

A fund manager’s trading alternatives today include:

- Convey full order to the market: A fund manager can simply enter a very large order that represents substantially all of their trading interest. This is not a good idea because the price will change adversely, and the quantity available at or near recent trade prices may not be sufficient, requiring the investors to pay a significant premium if buying, or to sell at a substantial discount to recent prices.

- Contact a dealer on a block trading desk: An institutional investor can seek a bid or offering for the full quantity from a block trading desk that will position the trade in their inventory and later seek to unwind the position.

- Shop the order: A fund manager may contact a number of firms or potential counterparties. The order may find a single, natural counterparty, or may be "worked off" in pieces, but the traders risks "slippage" which can occur if the market moves away from him or her before the order is completed.

- Slice the order: An institutional trader may trade patiently, by dividing the order into smaller pieces that can trade on the flow. This could be accomplished using limit and Not Held (NH) orders. NH is a supplementary instruction that affects the tactics and timing of the execution of a buy or sell order. An NH order permits the broker to use personal judgment in determining when and how to execute the order. The exchange member is "not held" financially responsible for missing the market if his or her judgment proves to be faulty.

- Use Instinet or another continuous order matching system. Instinet is a screen-based order matching system that accounts for about 20 percent of Nasdaq volume and 4 percent of NYSE volume. An Instinet order is visible to other traders, but is anonymously displayed. Because of its transparency and the attendant risk of displaying large orders, the average Instinet trade is only 1,700 shares, and its median trade is just 1,000 shares. Bloomberg’s
TradeBook, Terra Nova, and Island are other screen-based order matching systems that operate similarly to Instinet.

- **Use Posit, AZX, or the Crossing Network**: Posit, Reuters Crossing Network, and the Arizona Stock Exchange (AZX) offer crossing sessions in which offsetting buy and sell orders are matched at the middle of the bid and ask quotes, or at the day's closing price. Crossing at the midprice saves spread and market impact costs, but the fill rates are low (less than 5 percent of shares submitted are crossed), and the crossing systems do not perform price discovery.

Notice that these choices serve as patches built around the current market structure, and are not a solution to problems caused by fundamental changes in investors' needs.

### 3.2. What OptiMark Offers

OptiMark Technologies provides an anonymous, exchange-linked, order matching system that enables customer to describe their trading strategies and their pricing preferences in considerable detail. Traders will access the system on existing networks (e.g., Dow Jones Markets, Reuters, etc.), and submitted orders must designate one or more of the customer's Pacific Exchange (PCX) broker-dealer member firms. OptiMark has a non-exclusive partnership with the PCX. Consequently, users of OptiMark must specify one or more of the customer's PCX broker-dealer member firms to provide credit and clearing, and who will collect the commissions.

Traders communicating their block trading intentions using the OptiMark system will have access to three unique features:

1. In OptiMark, a trader works from a **graphical user interface** to develop a trading "profile" which is a three-dimensional rendering (price, quantity, satisfaction weight) that is submitted to OptiMark and indicates trading preferences. Rather than submitting a traditional order such as "Buy 5,000 shares at $50 or less" (a limit order) or "Sell 3,000 at Best" (a market order), an OptiMark user may indicate a willingness to buy, for instance, up to 10,000 at $50 or less, and up to 50,000 if the price is $49.50 or less (see Figure 1). An OptiMark user may also indicate a willingness to sell, for example, up to 25,000 at $52 (Figure 2).

2. OptiMark can capture "odd" supply and demand curves that could in some cases closely represent investors' true trading intentions. While the standard demand curve in microeconomics is downward sloping (i.e., more is bought at lower prices), in OptiMark, a buyer can represent a willingness to pay more to purchase a larger quantity. For example, a buyer may be willing to pay no more than $50 for 50,000 shares, but may actually have an order to purchase 250,000 shares. To complete the entire order, he might be willing to pay $52 a share. This is an upward sloping demand curve. Although in a typical product market, price determines demand, in trading, the demand to hold the stock determines its price. This feature of OptiMark should lead to trades that otherwise would be unlikely to occur, given the hazards of disclosing large trading interests. For example, assume a market is $50 bid for 5,000 shares and 8,000 offered at $50 1/2, and a buyer above who wants to purchase 250,000 shares is willing to pay $52 (Figure 2). At the time, there may be a trader willing to sell 250,000 at $49 1/2. In the current market structure, neither will disclose their interest for fear of driving the price away, but both may be working the order in 5,000 to 10,000 share blocks to avoid impacting the price. If both investors submitted their full profiles for 250,000 shares to OptiMark, these trading interests could lead to a beneficial trade at lower cost and with less delay.
An OptiMark profile can show the users' degree of satisfaction or willingness to trade at each coordinate of the price/size grid, where satisfaction is expressed as a number between zero and one. These varying degrees of "trading preference" encompass the diminishing surplus a seller receives by selling at lower prices, and a buyer receives by buying at higher trade prices. Consider an OptiMark user seeking to sell (Figure 3). This seller could input a curve that showed decreasing satisfaction at lower prices: e.g., willing (1.0) to sell up to 100,000 at $22, but reduced willingness (0.5) to accept $21 if at least 30,000 shares could be sold. There are no widely accepted ways to express such orders in any stock market or screen-based trading systems. In the current market, the seller would not want to show his or her desire to sell 100,000 share, or willingness to accept a price of $21.

Figure 3 An OptiMark user can submit a sell profile that reflects less than full satisfaction to complete the sell order at lower prices. Here the user is willing (1.0) to sell up to 100,000 shares for $22 or more, but expresses willingness to accept a price down to $21 if at least 30,000 shares could be sold. However, the same trader would be unwilling to pay more than $50 for the first 50,000 shares for fear of driving the price up before the full order is completed.

OptiMark's pricing and matching algorithm seeks to improve upon traders' submitted "reservation" prices, and will match at that price only if nothing better if available. The system has discretion to create any positive satisfaction matches, but it first tries to execute potential matches between buyers and sellers expressing full (1.0) satisfaction at a particular price and quantity. OptiMark continues to create trades from expressions of positive, but less than full satisfaction. Section 4.2 describes the algorithm in detail.

OptiMark will be compensated with a transaction fee of one cent per-share from each side of a trade for PCX members' own accounts or for customer accounts. For trades in customer accounts, this fee is paid out of brokerage commissions. If one million shares trade a day in OptiMark (0.2% of the NYSE's daily volume), its annual revenues will be about $5 million. With these four features — non-disclosure, profile rendering, satisfaction levels, and an optimal matching algorithm — block trading intentions can be represented and processed with greater ease than in current market arrangements. As a result, profiles submitted to OptiMark may reflect previously withheld trading interest.

In spite of its promise, OptiMark needs to attract a critical mass of liquidity in order to draw trading volume away from existing markets and traditional block trading intermediaries. This will be explored in Section 6.

3.3. An OptiMark Example

Below is an example of trade preferences that could be represented in OptiMark. In today's markets, these would likely be "Not Held", undisclosed orders "worked" by floor brokers or upstairs trading desks.

- Assume the market quotes are $50 1/2 bid for 10,000 shares and 75,000 offered at $50 3/8.
- One seller is interested in selling, but only if a large enough quantity can be traded; he will accept $50 3/8 (below the current bid) if at least 75,000 shares can be sold. At $50 3/8 or higher he is willing to sell up to 100,000. This seller can be characterized as eager to sell, but only willing to accept a discounted price if sufficient quantity can be traded at that price.
- Buyer 1 would pay $50 1/2 for 50,000 shares, but is "All-or-None" at that price (i.e., not interested in buying less than 50,000 shares). Buyer 2 will pay only $50 3/8 for any number of shares up to 40,000. Buyer 3 is a regular limit order to buy 10,000 at $50 3/8 or below.

We can also characterize the buyers: #1 is hoping to acquire a large quantity without creating market impact, #2 is looking for a bargain from an eager seller, and #3 is hoping to buy a smaller quantity at the existing bid price.

Because of potential price impacts in existing markets, Buyer 1 and Seller 1 in this example would almost certainly not want to disclose these intentions. Unless the seller knew the intentions of all three buyers, a search for trading partners would be unfruitful for Seller 1. Inspection shows that the following trade is possible under OptiMark's algorithm:
- Buyer 1 buys 50,000 at $50 3/8 from Seller 1
- Buyer 2 buys 40,000 at $50 3/8 from Seller 1
- Buyer 3 buys 10,000 at $50 3/8 from Seller 1
In the case when buyer and seller prices overlap, as with Buyers 1 and 3, and Seller 1 in this example, multiple prices are possible. In arranging these matches and resolving the indeterminate prices, OptiMark applies an algorithm and the concept of an "aggregation attractor." The candidate aggregation attractors in this example are Buyer 1, Buyer 3, and Seller 1 because they are the most aggressively priced buy and sell profiles. In this example, OptiMark selects either Seller 1, or Buyer 1, or Buyer 3 depending on which was entered earliest. (Section 4.2 details the priorities used in the algorithm.) For equally priced orders on the same side of the market, the one with "standing" will become the aggregation attractor.

If an order will accept any partial fills (i.e., trades that do not complete its entire order size), it has standing. An order with standing will not be "traded through", i.e., no trades at inferior prices can occur until orders with standing have executed completely. For instance, Buyer 2's order to buy any amount up to 40,000 shares at $50 3/8 or less has standing at $50 3/8 or less because incoming sell orders for fewer shares can execute against it. No trades can occur at prices less than $50 3/8 until all orders with standing at $50 3/8 have been completed. "Fill-or-kill" (FOK) and "All-or-none" (AON) orders are restricted to executing a particular minimum size (i.e., the entire order must execute.) Notice that Buyer 1, due to its AON restriction, does not have "standing" at $50 1/2 or any other price, nor does Seller 1 have standing at $50 3/8 or any other price. If Buyer 3's profile was entered earlier than Seller 1, then Buyer 3's profile would be the aggregation attractor (because among the buy profiles only it has standing at $50 1/2) and the algorithm will begin at 10,000 shares and $50 1/2. If other sellers had entered orders so that there was sufficient sell quantity at $50 1/2, Buyer 3's order would be filled, and other potential attractors would then be examined. In this example, but neither Buyer 3 nor Buyer 1 will succeed as attractors due to the size incompatibility with Seller 1.

As the most aggressive (and only) seller, Seller 1 next becomes the attractor at $50 3/8. The algorithm will begin at the coordinate 100,000 shares, and determine whether sufficient buy quantity is available at that price and at successively greater prices. Seller 1 will receive the highest price at which there is matching quantity to buy, which in this case will be $50 3/8. At this price, Seller 1 can aggregate the full quantity of 100,000 at $50 3/8 from Buyers 1, 2, and 3, but on testing the "improved" price of $50 1/2, OptiMark's algorithm would only come up with 60,000 shares to buy, which does not meet the 75,000 minimum of Seller 1.

In this case, if Buyer 1's size were larger (at least 65,000) then once Seller 1 became the attractor, the prices of the Buyer 1-Seller 1 and Buyer 3-Seller 1 matches would have been $50 1/2. If, on the other hand, Buyer 1 entered earlier with at least 75,000 shares, it would have succeeded as the attractor at $50 1/2, and would have received price improvement at $50 3/8.
4.2. Matching and Pricing Algorithm

When OptiMark runs its matching, it processes all submitted order profiles, and computes an optimal pricing and matching result for users based on their willingness to trade across the range of prices and sizes. Buy coordinates and sell coordinates with a full satisfaction value of 1 will first be converted to trades based on priority rankings of price, standing, time of entry, and size. Next, any remaining coordinates including coordinates with a partial satisfaction value of less than 1 (but greater than 0), will be matched, based on the joint mutual satisfaction value; that is, the product of the specific satisfaction values associated with the buy coordinate and sell coordinate. The algorithm has two parts, aggregation — which processes potential trades where the buyer and seller both have full satisfaction — and accumulation — which seeks to arrange beneficial trades with less than full satisfaction.

Aggregation Stage. The system first processes eligible coordinates with the full satisfaction value of 1 only. Its optimization algorithm considers aggregation attractors and potential prices. OptiMark selects prices that maximize the volume of mutually agreeable trades. At this stage of calculation, smaller-sized coordinates may be aggregated to build sufficient size to be matched with larger-sized coordinates to generate orders according to the following rules of priority:

1) Price aggressiveness. A coordinate with a more aggressive price (i.e., a higher price for a buy coordinate and a lower price for a sell coordinate) has priority over coordinates with less aggressive prices.

2) Standing. A profile that is willing to take partial fills has standing, but an All-or-None profile does not. Among the coordinates with the same price, a coordinate with standing has priority over all other coordinates without standing.

3) Time of entry. Among the coordinates with the same price and standing, the time of the entry of the profile determines priority, with earlier submissions having priority.

4) Size. Among the coordinates with the same price, standing and time of entry, priority for matching is determined by size, with larger sizes having higher priority.

Accumulation Stage. Upon completion of the Aggregation Stage, the OptiMark System will consider potential matches between eligible buy coordinates and sell coordinates in the profile database where one or both parties have less than 1 (but greater than 0) satisfaction values. At this stage of calculation, all buy and sell coordinates that can be matched by summing across users' profiles with the same associated price and size may be matched to generate orders in accordance with the following rules of priority:

1) Mutual satisfaction. A potential match with a higher mutual satisfaction value (the product of the two satisfaction values) takes precedence over other potential matches with lower mutual satisfaction values.

2) Time of entry (based on the earlier profile). Among the potential matches with the same mutual satisfaction, the match with the earlier time of entry, as determined by the effective time of entry assigned to the earlier of the buy and sell profiles involved, has priority over other potential matches.

3) Size. Among the potential matches with the same mutual satisfaction and time of entry for the earlier profile, priority is given to one with a larger size.

4) Time of entry (based on the later profile) For remaining ties, the earlier effective time of entry assigned to the later of the buy and sell profiles involved has priority over other potential matches.

5) Price assignment. In regard to all remaining ties between potential matches, priority is given to the match at a price more favorable to the user whose profile has the earlier time of entry. For example, among the last potential matches remaining at the price of $10 and also at $10 1/8 between the same buyer/seller pair, if the sell profile is the earlier, then the match will take place at the price of $10 1/8.

The accumulation stage is intended to find additional matches of profiles that did not match in the aggregation stage. Accumulation is based on maximizing the product of the buyer and seller satisfaction values at a particular price and quantity under consideration. Thus, revelation of trading preferences should occur, since failing to indicate partial satisfaction may foreclose beneficial trade opportunities.

4.3. OptiMark Operations

OptiMark will be available to all members of the Pacific Exchange (PCX), who will be able to offer it as part of their services to non-member customers such as institutional investors and other non-member broker-dealers. OptiMark chose to link to PCX and ITS, and hopes to cooperate with multiple exchanges. Lupien considered this more advantageous than the alternatives: becoming a broker-dealer, or buying an exchange. Because it relies on some of
the existing PCX and ITS infrastructure, OptiMark's start-up
costs are about $40 million.

OptiMark subscribers will log in from their own com-
puter terminals and communicate over commercial information services and market data networks of their choice (e.g., Dow Jones Markets). Those users that serve as specialists and floor brokers on the PCX will communicate from floor-located computer terminals. The effective time of entry for any profile submitted by a PCX specialist representing proprietary trading interest in the specialist's designated security will be later (lower priority) than profiles submitted by any other user in that security. (In OptiMark, as with the NYSE's specialist market, the specialist has lower priority than public orders at the same price.)

Because the PCX is a participant in the Consolidated Quotation System (CQS) and the Intermarket Trading System (ITS), each other stock exchange (NYSE, AMEX, Boston, Philadelphia, Chicago, Cincinnati) will have a CQS profile with its relevant limit price and size with a satisfaction of 1 for those coordinates in the price/size grid. (The CQS provides the best bid and offer quotations for stocks traded on multiple U.S. exchanges, and the Intermarket Trading System (ITS) is a communication system for routing trade commitments when another exchange is providing a higher bid or a lower offer quote than the originating exchange.

OptiMark ensures consistency with the U.S. exchanges' intermarket price protection obligations under the ITS Plan. CQS profiles are generated from the relevant market's most current quotation prevailing at the time of commencement of an OptiMark cycle, but its effective time of entry will be later than that of any other profile submitted by a user. Thus, OptiMark users will always have time priority. When an OptiMark match involves a CQS profile, the PCX will submit an ITS Commitment reflecting the order and seeking execution on other market centers. Every ITS commitment will be sent in the sequence in which orders are generated. ITS commitments resulting from OptiMark will not be distinguishable from other ITS commitments.

OptiMark users may revise or cancel their own profiles at any time prior to commencement of the next scheduled processing cycle. In general, submitting a revised profile will result in a new time stamp, unless the only change made is a reduction in the maximum quantity of shares previously specified. Notice with OptiMark trades, brokerage firms still have roles in clearance, credit, research, advice, etc. OptiMark users will be responsible for any expressions of trading interest, and any other messages submitted to the system under their passwords and security codes.

5. Strategic Implications, Segmentation, Restructuring

Any innovation that profoundly alters the structure and operations of an industry will change the value of resources and strategies. Some new firms will emerge as winners. Other, established firms may lose out as their margins and market shares fall. Most firms will have to change. Before looking for the winners and losers resulting from OptiMark, it is useful to review the ways an institutional fund manager can trade a large position today. He can:

- Contact the "upstairs" block trading desk of a firm that specializes in such trades. The firm will quote a price ("we'll take 2 million shares down 1-1/2 points"), or a menu of prices ("we'll do the first 100,000 down 1/4, the next 400,000 down a half, and the rest down 2 points.")
- Use a floor trader giving him or her discretion to complete a sequence of trades over a period of hours or days. A skillful floor trader may realize a better price for the fund manager's shares, but the trade will be completed more slowly, and there is some risk that the market price will move against the fund manager.
- Use an in-house trader, who in turn has options. The firm's trader can divide the block into a sequence of smaller trades, much as a floor trader would, and enter them into an order matching system such as Instinet, or direct the trade to a crossing network such as Posit or AZX. Since orders in crossing systems execute at prices determined on other markets, there is no way for a trader to indicate his willingness to pay more or to accept less in order to complete a desired trade.

If OptiMark succeeds, it is likely to capture volume that now goes through "not held" orders of floor traders, continuing the process of IT-driven disintermediation of financial markets. Neither Instinet nor crossing networks provide the full capabilities of OptiMark: Instinet does not provide for non-disclosure, and neither Instinet nor crossing networks permit expression of variable pricing strategies or preferences. Therefore, if OptiMark succeeds, it may also capture volume from off-exchange order matching systems.

It should be noted that floor brokers on the PCX will have direct access to OptiMark. Therefore by adding to their skills the ability to craft OptiMark profiles for customers who may not feel comfortable in performing this function for themselves, the PCX floor brokers may actually see an increase in their market share.

OptiMark is likely to increase the role of internal traders in fund management firms, and should change how and where in-house traders direct their orders. A critic of traditional exchange structures described much of the floor traders' role as "Federal Express delivery person" and this role in particular is likely to be disintermediated.

Because they often take a portion of the block onto their own books, block trading desks' profits are determined by the quality of their pricing decisions. Understanding the relationship between the trading strategies of client institutions, who now pursue a wide range of investment strategies, will be crucial. Some managers are passive, following market indexes; others are more active, basing
trades on proprietary stock selection analyses [4]. Taking the contra position of an index-based trade is less risky than trading with an active information-motivated fund manager. If an active fund manager is correct, her trade is likely to presage a price change that is beneficial to the fund manager, but loss-making to firms that accepted the contra position. [3] These diverse strategies may lead to funds receiving one price for demanding immediate execution of a block, and a different price if they are willing to submit part of their order to OptiMark. Some upstairs trading operations are likely to see their profitability worsen as their pricing strategy drives away all but the most difficult trades. This process, "death spiral", has been documented in other industries. [2]

There will be second-order effects as well. OptiMark has a strategic relationship with the PCX; thus, any gain for OptiMark will increase the PCX’s liquidity, trading volumes, and fee revenues. Moreover, a significant fraction of the NYSE’s volume is generated by its members’ upstairs block desks; thus, OptiMark’s success would move volume away from the NYSE, reducing its liquidity, trading volumes, and fee revenues.

Of course, OptiMark’s success is not assured. The principal factor that determines the attractiveness of a market is its liquidity and market share — "order flow attracts order flow" [6]. Liquidity is the principal advantage of successful established markets, and lack of liquidity represents OptiMark’s principal strategic liability. We have demonstrated experimentally that lack of liquidity can be overcome, given the following [5]:

- **Cost**: The new market must have a sufficient cost advantage
- **Traders’ perceptions**: Potential traders must perceive the new market as offering an attractive balance between costs and risks
- **Traders’ perceptions of other traders’ perceptions**: Finally, for any new market to succeed, potential traders must believe that others will see the new market as an attractive trading venue

The cost of trading on OptiMark will be low. According to Lupien, "We will have the same price as floor brokerage (1/2 cent to 1-3/4 cent) but superior performance." (Personal interview, May 20, 1997) And by definition, all OptiMark trades will occur at prices that satisfy both parties.

### 6. Prospects for OptiMark: Open questions

The prospects for OptiMark hinge on a number of important questions:

- **Is OptiMark the right response** to the liquidity problems that block traders face? Is this the right time for OptiMark’s launch?
- **Why haven’t institutions demanded changes to exchange markets, or demanded something like OptiMark?**
- **Is OptiMark the right firm to offer a trading system?** Why will trades get done on OptiMark rather than other non-OptiMark exchanges?
- **Why haven’t established exchanges and broker-dealers already developed OptiMark-like features?** Is this due to exchange governance structures or other limitations on exchanges’ creativity? Or is it simply not what investors want at this time?
- **Will exchanges have a competitive response to OptiMark?** Will even an inferior response when combined with the exchange’s current advantage of superior established liquidity prove sufficient to preclude OptiMark’s success.
- **Is OptiMark’s design right?** Is it the right way to express trade interests and create executions? Do traders think this way, and will they render and submit order profiles that lead to OptiMark matches? Or, is the interaction of price profiles, price-quantity trade-offs, and levels of satisfaction too complex for attracting a critical mass of traders?
- **Can OptiMark users accept non-NYSE prices away from NYSE market?** NYSE prices often define the benchmark against which traders’ performance is measured. An NYSE trade or "print" is often consider to be a certification of a fair price, and buying above or selling below prevailing NYSE prices, which can occur in OptiMark, may be difficult for traders to accept.
- **Will the lack of pre-trade transparency hinder OptiMark’s use?** Will multiple prices in one matching cycle cause regret or resentment? For instance, if a cycle leads to matches at $40 and $40 1/4, will the users be content? That is, a user may have expressed an interest ex-ante to buy at $40 1/4, but the same user may experience ex-post regret after realizing that another trader bought at $40 at the same time.
- **There may be enhancements to OptiMark and unforeseen innovations in its use once it becomes active.** Would the development of automated interfaces to OptiMark impact the system favorably or unfavorably? For instance, how would "auto-pilot" trading systems programmed to submit the most favorable orders into OptiMark affect the system?

Enhancing OptiMark’s prospects, Lupien has over 30 years experience as a PCX specialist, a broker-dealer executive, and the CEO of Instinet up to the time of its sale to Reuters. Lupien feels the design and the possibility of multiple prices is not a drawback: "I don’t think we’ll have a problem with complex institutional orders at multiple prices. There are multiple prices now."

In the early stages, attracting a critical mass of activity will be crucial. Recently, an alternative trading system in London, TradePoint, had to be financially rescued to prevent its closure less than two years after its introduction. The system, while technologically advanced, has suffered from inadequate volumes and monthly losses of £450,000 for the
7. Regulatory Environment for OptiMark

Regulatory developments could affect OptiMark. The Securities Act Amendments of 1975 set as a top SEC priority the development of a "National Market System" (NMS) that is fair, orderly, transparent, and that protects investors. The NMS goals were set out in the Amendments to the Securities Acts of 1934, which were passed in 1975 by the U.S. Congress: (1) enhance the economic efficiency and lower the costs of transaction, (2) ensure fair competition among brokers, dealers, and markets, (3) ensure the broad availability of information on quotations and transactions, and (4) provide the opportunity, consistent with efficiency and best execution, for investors’ orders to be executed without the participation of a dealer. — OptiMark is confident that its operations support the NMS objectives.

Updates to the SEC’s market regulations are under consideration. The SEC “Concept Release” of May 27, 1997 describes how its is eager to see new markets flourish and to encourage greater competition in securities markets, but wants to ensure that new and growing alternative markets integrate into the NMS. The release proposes the creation of a three-tiered framework of exchange regulation.

The first tier — alternative trading systems, that are small or do not establish trading prices — would constitute the first tier of exchanges. These systems would be treated as "exempt exchanges", which are subject only to limited requirements according to their size and their role in the securities market. Minimal requirements such as an audit trail and the reporting of trades to a self-regulatory organization (SRO) could be imposed. As a result, these systems could be subject to fewer requirements than Instinet and Posit, for instance, now face under broker-dealer regulation.

The second tier is large alternative trading systems, i.e., those that have a high volume of trading and active price discovery. This tier might need to assume some SRO functions because of their size and role in the market. However, the SEC could use its exemptive authority to reduce or eliminate those requirements that are not compatible with the operation of for-profit, non-membership exchanges, or to propose new ways in which fully automated systems could meet their surveillance and other obligations.

The third tier would include the traditional exchanges, which could see a reduction in unnecessary regulatory requirements that make it difficult for them to innovate and remain competitive in a changing business environment. Because of its link to PCX, OptiMark may fall under the third tier, although this is not yet certain. Future regulations may of other third tier exchanges may permit the NYSE and others to innovate in a way that rivals OptiMark.

An early regulatory hurdle for OptiMark was cleared when the SEC News Digest of September 19, 1997 provided the approval of OptiMark’s proposed rule changes: "The Commission approved a proposed rule change submitted under Rule 19b-4 by the Pacific Exchange (SR-PCX-97-18) to establish rules for a new exchange facility called the PCX Application of the OptiMark System. (Rel. 34-39086)"

8. Conclusions

The institutionalization of investing has led to a vast change in market needs. New block trading needs and increasingly sophisticated investment strategies may have caused established exchanges to be poorly matched structurally to the needs of modern trading. However, exchanges could experience significant resistance to change. Recent regulatory proposals indicate that innovations in off-exchange trading will be encouraged, and this regulatory relaxation may create a real opportunity for OptiMark. While OptiMark offers a new trading environment for institutional traders, the response of the market remains uncertain, and there have been numerous failed attempts to create radical changes in trading.

9. Bibliography


Acknowledgement: The cooperation of OptiMark’s senior directors, Bill Lupien and Terry Rickard, was vital in preparing this case study. Assistance from Mark Bjerknes of OptiMark’s Chicago office was important for understanding the system’s operations.