Algorithmic Trading:
A Buy-Side Perspective

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Buying a car is one of the most important financial decisions an average American makes. So it is not surprising that there is significant consumer interest in customized car choices. But how could the massive and complicated auto industry manage to tailor its production to the specific requests of each customer who walks onto the dealership sales lot? Toyota—the second-largest auto manufacturer in the world—was able to accomplish this as the first carmaker to streamline the manufacturing process and thereby accommodate greater individual choice, fueling an incredible jump in its market share.

In this article we argue that algorithmic trading could benefit by a similar transformation to satisfy the increasingly sophisticated buy-side community. As context, we discuss the changing relationship between buy-side traders and brokers in light of ongoing commission compression, the increasing market share of electronic and computer-assisted executions, and the rapidly evolving landscape of equity markets and the industry.

EVOLUTION OF MARKET STRUCTURE

According to the TABB Group's research report *Institutional Trading in 2006* (Tabb [2006]), more than 53% of order flow is now directed away from traditional cash and block trading desks to algorithms, program trading, direct market access (DMA), and crossing networks.

Indeed, the proliferation of algorithms and other alternative trading venues has been remarkable. Furthermore, the more recent phenomenon of dark pools of liquidity in the form of new exchanges, continuous and discrete crossing networks, and broker-sponsored block trading facilities has taken electronic trading one step further. The current explosion of execution strategies appears to be similar to the proliferation of electronic communication networks (ECNs) such as Archipelago, Island, and NexTrade, between 1996 and 1998, following the repeal of the Order Handling Rules (SEC [1996], [1998]). (For more material on the subject, see the SEC Special Study at http://sec.gov/news/studies/ecnafter.htm.)

The number of available algorithms has grown exponentially, skyrocketing above 200, although clearly not every algorithm has been designed by a rocket scientist. Execution management and order management system providers find themselves in a constant race to offer the latest and greatest algorithm, while struggling to avoid cluttering their user interfaces with myriad options and overcomplicating their products. Beyond broker-provided algorithms, there are algorithms that come packaged with execution management systems such as FlexTrade, InfoReach, and Portware

at no extra charge, offering more experienced and motivated traders tools to create their own trading strategies virtually on the fly.

The introduction of Liquidnet offered unparalleled innovation for buy-side traders, threatening to completely cut out the middle man, but there is a clear limitation to this approach as liquidity remains scarce. During its January 23, 2007, conference call to members, Liquidnet reported matching over 14% of the orders sourced from buy-side trading blotters—but only 20% of those matches eventually hit the tape as actual trades. Similarly, participation in passive crossing networks can benefit the trader only if these venues offer sufficient liquidity on the other side. For example, while ITG's POSIT crosses have often facilitated trades in very illiquid names, to the benefit of the participants, historically they have provided matches on only 3% to 5% of submitted orders.

ECNs also brought another important market structure change: the pronounced move from a duopoly of order-based and quote-based market systems—NYSE being the traditional source of the former, and NASDAQ and its wide network of market makers representing the latter—to a predominantly order-based system across both listed and OTC securities. This change set the stage for the initial algorithms, with limit order logic at the core of their execution style, to flourish.

ALL ALGORITHMS ARE NOT CREATED EQUAL

However, as the initial novelty of algorithmic trading started to wear off, traders began to focus more on the actual performance of the "black box." As a result, transaction cost analysis (TCA) and similar tools have gained tremendous momentum in recent years—a clear indication of increased scrutiny not only by regulators and auditors, but by traders themselves.

Despite all the pre- and post-trade analytics available to buy-side traders, it remains increasingly difficult to select the appropriate algorithm. In a recent article in *Journal of Trading*, George Sofianos [2006] of Goldman Sachs raised an important point about the distinction between the execution benchmark and the strategy. Mr. Sofianos argued that even though the trader's benchmark might be an implementation shortfall, that does not mean part of the order cannot be executed using VWAP or other strategies.

The underlying question many of our colleagues struggle with daily is how to combine passive machine working orders with their desire to trade a block, particularly in a thin name. Is chopping up orders into minuscule pieces the best way to trade? When exactly is it safe for a trader to come out from the Gorilla jungle to put up a print on the tape? Do we continue to make market calls and decide when and how much to trade, or do we hide behind a VWAP slicer, spreading our trades thinly throughout the day?

CROSS YOUR FINGERS WHEN USING CROSSING NETWORKS

Electronic crossing platforms and various dark pools of liquidity came rushing in to provide anonymity and minimize the market impact of large prints. But, as we mentioned, liquidity remains the biggest challenge. Furthermore, most of the crossing networks lack mechanisms for price discovery, relying on the published national best bid and offer (NBBO) at the time of the trade. This clearly presents an easy opportunity for market manipulation and requires buy-side traders to be more vigilant about executions received from passive liquidity platforms. The SEC has already started to evaluate DMA, and we believe that we may be only months away from new SEC studies and potential regulations of other venues.

As Mark Beddis and Paul Hanson [2006] from Block Interest Discovery Service (BIDS) rightfully argued at the October 2006 Trader Forum, a fundamental change in the U.S. market structure will be required to consolidate the many networks—Liquidnet, Pipeline, ITG's POSIT, UBS's PIN, Credit Suisse's CrossFinder, Fidelity's CrossStream, Citigroup's LavaFlow, NYFIX Millennium, and the list goes on. Whether Instinet's Nighthawk or a similar firm can go beyond farming out orders and actually offer aggregated liquidity remains to be seen.

Another important issue is how to pick the right venue for an order. Lack of transparency in algorithmic execution, coupled with the inability to analyze specific trading destinations from the aggregated fill, presents a challenge for the buy-side trader. How does a trader decide which box to check when sending an order to a smart order router if data to properly assess the potential market impact and completion ratio of a given venue is largely unavailable? The paucity of answers to these and many other questions leaves traders "in the dark" when using dark pools of liquidity.

PARTNERSHIP OPPORTUNITIES

A decade of rapid structural changes in the market, including decimalization and proliferation of ECNs, led to significant changes in the business: a dramatic decrease in the average trade size, a new phenomenon of "pennying," quadrupling of market data volumes, and stunning animosity and rivalries between cash and program desks. With commission dollars declining, as depicted in the following graph (Sussman [2006]), many have predicted the end to the brokerage business as it exists today.

In fact, one theory has it that in a few short years, the buy side will completely adopt algorithmic trading, and the market will be transformed into an electronic battlefield with black boxes fighting black boxes for increasingly fragmented and invisible liquidity.

But we believe that the days of strong relationships between sell-side traders and their customers are far from over. Many traders who dove into the algorithm space surfaced with less than average execution quality and pulled back to rethink their strategy. They paused to lear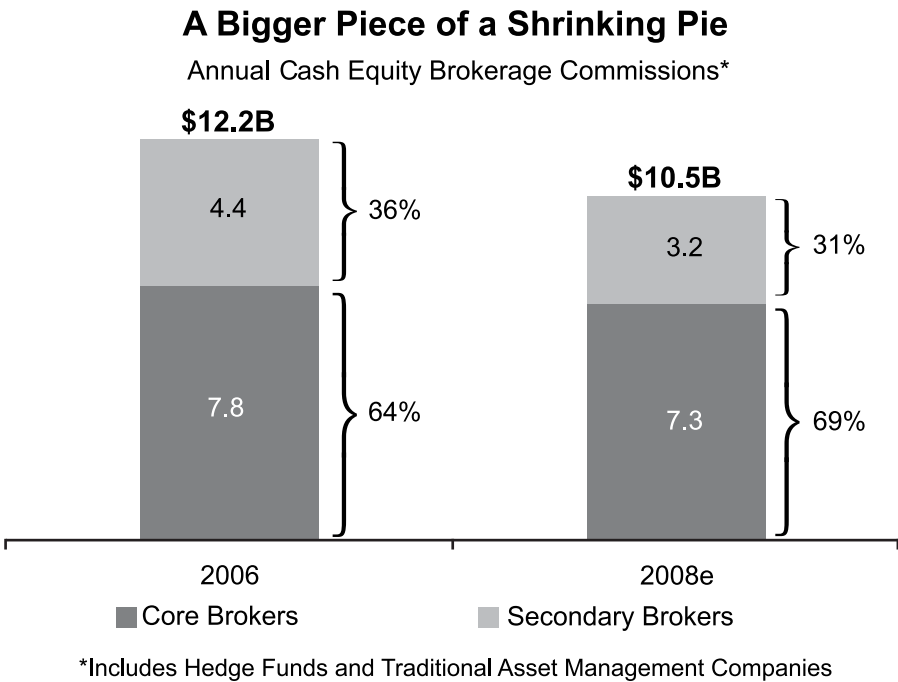n more about the differences between VWAP, TWAP, and implementation shortfall algorithms, and to reconsider the best application of available products to the current goals of their particular trading desk and organization.

On the broker side, the gargantuan expenses in human talent and infrastructure required to develop algorithms at first provided a solid barrier to new entrants. As costs continued to skyrocket, while simultaneously commissions drifted lower into the subpenny territory, sell-side firms scrambled to find more users for their expensive tools.

From this came the white labeling of algorithms. A common practice of smaller brokers is to offer algorithmic and program trading services to customers, while licensing technology, often from bulge bracket firms, to provide executions. Nondisclosure agreements do not allow us to precisely identify the cross-selling statistics, although we have reason to believe that such relationships are on the rise.

Despite potentially negative connotations of reselling another firm's product, white labeling is not necessarily a poor business model. By offering customized algorithmic trading, a broker can provide a range of services, from simply being an extra pair of eyes and ears to monitor the

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A Bigger Piece of a Shrinking Pie
Annual Cash Equity Brokerage Commissions*

$12.2B

2006: 4.4 — 36%, 7.8 — 64%

$10.5B

2008e: 3.2 — 31%, 7.3 — 69%

■ Core Brokers   ■ Secondary Brokers

*Includes Hedge Funds and Traditional Asset Management Companies

Source: TABB Group estimate.

execution of trades (in essence serving as an extension of the busy buy-side trading desk), to providing advisory services for matching a client's trading style and specific names being worked to an appropriate algorithm.

TAILORING THE PRODUCT

Using broker advisory services in this way, however, requires buy-side traders to analyze and make decisions across multiple dimensions, and then to be able to articulate these objectives to the broker. The course of action will depend on the type of trade (transition, flow, rebalance, hedge, arbitrage, etc.) and on given market conditions. We face the following questions not only when we put programs together, but throughout the day:

- Do we need "to be done"?
- What is the ultimate benchmark?
- Should we put a print now or spread the trade across the day?
- Would we like to get ahead on buys, while throttling sells?
- Do we need to stay dollar- or sector-neutral, and what is our cushion?
- What is the cash constraint for a given account when sending orders to crosses?

The advantage we enjoy at Axa Rosenberg is portfolio optimization that updates throughout the trading day, as the model reevaluates every security in our U.S. universe of about 5,500 stocks relative to current prices. This optimization produces fresh recommendations for traders based on the goals of incremental expected alpha and reduction of risk across approximately 100 risk factors. Traders are given complete discretion in executing recommendations, especially in cases of high price volatility. Runaway stocks are easily replaced by the model with more beneficial names from the optimal risk-reward frontier.

In general, our trading motto "price before size" potentially allows us to minimize market impact and our overall footprint in the marketplace, despite growth in assets. The firm's systematic and scrupulous approach to pricing has allowed us to rank second in both listed and OTC securities for 2006 in the recent Elkins/McSherry study (Paulden [2006]). Excellent market impact numbers can translate into better returns for our clients, adding to the fundamental alpha generated by our Expert System's Valuation and Earnings Forecast Models.

Our accommodative style of trading and Expert System optimization present an interesting integration challenge, as limit prices and quantities for orders change many times throughout the day. Therefore, static participation in any algorithm is not an option for us. However, we continue to collaborate with a number of algorithmic providers to develop custom strategies, fine-tuning and tailoring them to the unique needs of our trading desk.

Another important consideration is anti-gaming logic, which protects our model against adverse market behavior. The lack of a price discovery mechanism in most crossing networks led us to develop sophisticated analytics to avoid trades in securities linked to potential market manipulation or excessive market volatility. We routinely assess the quality of executions provided by various sources and keep specific market impact records for each trade.

More broadly speaking, we believe that an analysis of algorithmic trading value added is long overdue. There are clear advantages to automating part of the trading process, which include:

1. Reducing commissions to more competitive levels.
2. Increasing efficiency and the ability to trade a much broader universe of names.
3. Facilitating more systematic execution with less volatility in returns against the benchmark.

But do algorithms continue to fragment an already immensely fragmented market? Do they provide excellent performance or aim to be flat on the day? Are hype, fashion, and "herd effect" pushing more of us to use products we don't necessarily need? The answer is not entirely black and white. We believe that the best aspects of algorithmic trading are the ability of a buy-side trader to pick and choose the correct solution for a given trading need and the ability of the sell side to offer flexible and customizable strategies that address these needs. This is best served by a relationship-building exercise where both parties become intimately involved in attaining the goal of best execution.

CHOOSING THE RIGHT PARTNER

In selecting an appropriate broker for algorithmic trading, we have found that smaller agency-only brokers generally provide better anonymity and less potential

conflict of interest with proprietary and program trading desks. Using such smaller agency-only brokers may minimize information leakage and potential market impact, two key objectives of effective trading. A closer and more personal relationship brings the benefit of a dedicated development team to design custom solutions and to provide more comprehensive pre- and post-trade reporting and other analytics. However, it is becoming increasingly difficult for medium- and small-size brokers to locate liquidity in thinly traded names and put together a solid book for a large print.

Recent conferences have seen bulge bracket firms predicting increased need for capital commitments. However, we would argue that part of this might be self-serving, using deep pockets to put ever more pressure on smaller market players.

CONCLUSION

We believe that in the near future more and more clients will shy away from overly commoditized algorithms, instead demanding custom solutions to address the specific needs of their trading desks. The relationship between buy-side traders and the brokerage community will continue to strengthen, as we navigate through both newly created executing options and regulatory changes. Picking the right partner will become an increasingly more important and laborious task, as innovation continues at unprecedented speed, total commissions decline, and order flow consolidates to core brokers. There will be a growing need for human traders to guide the machine and provide color on algorithmic executions, venue selection, and market behavior. The global market structure will continue to evolve, putting more pressure on buy-side traders to stay on top of the changing landscape of the markets and the industry.

Despite radical market structure and industry changes, the fundamental need of buy-side traders remains unchanged: to achieve best execution while attempting to beat specified benchmarks. Those brokerage firms that succeed in developing flexible frameworks and in tailoring their products to meet this objective will undoubtedly rank higher with clients. As a result, like Toyota, they can be expected to experience a sharp rise in their market share.

ENDNOTE

REFERENCES

Beddis, M. and P. Hanson. Paper presented at Trader Forum, New York, October 2006.

Paulden, P. "Keep the Change." *Institutional Investor* (December 2006).

SEC. "The Quote Rule." SEC and NASD Rulemaking, 11Ac1-1, August 1996.

SEC. "The Limit Order Display Rule." SEC and NASD Rulemaking, 11Ac1-4, August 1996.

SEC. "Regulation ATS." SEC and NASD Rulemaking, December 1998.

Sofianos, G. "Choosing Benchmarks vs. Choosing Strategies." *Journal of Trading* (Winter 2006).

Sussman, A. *Chart of the Month*. TABB Group, November 2006.

Tabb, L. *Institutional Trading in 2006*. TABB Group, November 2006.

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