



Algorithmic Trading: Perceptions and Challenges

By Gordon Baker and Shashi Tiwari

November 2004

Abstract

Increasing competition in the algorithmic trading space and prospective phenomenal growth in Direct Market Access (DMA) have led to several challenges for the buy-side and the sell-side. After analysing the situation from various perspectives, it is interesting to observe the disparity in interests and perceptions of both sides of the industry. Perhaps is it the right time for broker-dealers to take a fresh look at their clients' needs and re-examine their strategies for order execution and/or business segmentation.

Algorithmic trading services are the latest innovation to be promoted by broker-dealers. Almost every month there is a conference on the subject, or the announcement of a major broker-dealer acquiring competitor service provider to build market share. Away from the news spotlight, broker-dealers have been frenetically hiring programmers and quantitative analysts to form the basis for algorithmic trading services.

In August, Merrill Lynch announced that ML X-ACT(SM), its premier algorithmic and computer-based equity trading service, is now available to institutional investors in the US through Bloomberg terminals. Though in Europe its strategies are accessible only to its institutional clients who have a direct connection via the Financial Information Exchange (FIX) protocol, Merrill Lynch has full plans to include other delivery channels and launch its algorithmic-trading capabilities in Asia during this quarter and the first quarter of 2005. CSFB started offering algorithmic trading through its AES service three years ago. Two major brokerage houses, Morgan Stanley and Goldman Sachs already allow for algorithmic trading through BXS and Goldman Sachs Algorithmic Trading respectively. Bank of America Securities has announced its ETS platform for algorithmic trading strategies. Lehman Brothers is extending its LEHMAX, historically the infrastructure supporting its proprietary trading desks, to its clients. JP Morgan is keeping up by offering its Electronic Execution Services for algorithmic trading. Citigroup's Alternative Execution suite and Bank of New York's DEX are also in the competition and giving their clients the choice of using algorithmic trading strategies.

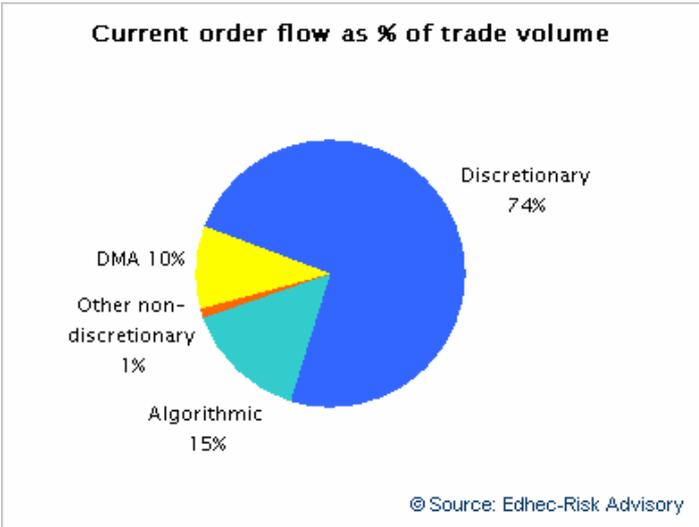
However, this space is not limited to traditional broker-dealers only; some broker neutral firms such as FlexTrade Systems, Aegis Software and Portware are already part of the club by providing algorithmic trading capability through Flex Trader, Athena Trader & Athena Gateway Server and Portware ASP & Portware Professional respectively. Last month saw NYFIX, a leading technology solution provider to the financial marketplace, launching Silent Partner, a suite of algorithmic trading programs to be integrated in the NYFIX Millennium ATS. ITG, an agency broker, provides trading engines through its servers to allow its clients to utilize algorithmic trading strategies. Most of the algorithmic trading systems are being offered for frequently traded equities. Portware also offers an automated trade management system for equities as well as futures, options and foreign exchange

With all of this ongoing activity, perhaps now is a reasonable time to ask whether these services are truly innovative and the right solution for a broker-dealer adjusting to today's market, namely one with a few global low-cost, high-volume banks; a limited number of highly liquid securities; and the imminent unbundling of dealing commission.

What are algorithmic trading services? The orders given to a broker-dealer may be discretionary or non-discretionary. Non-discretionary orders are to be executed immediately in a market; discretionary orders, or *not held* orders in the US, allow the broker-dealer to decide on the quantities, timing and method of execution. Direct market access (DMA) order flow is non-discretionary; the orders decided by the investor in effect go straight to the market. Algorithmic trading is discretionary, although the broker-dealer delegates the execution decisions to a machine.

Algorithms are designed to work discretionary orders within the realities of the market microstructure for securities. Trading volume and price spread vary over time; exchanges interpret orders slightly differently. Due to the variations in these factors, algorithms are promoted principally for highly liquid securities traded on electronic limit order books. The differences in features and packaging between algorithmic trading services obscure the similarities of their basic strategies: algorithms typically track an average price (VWAP, TWAP), participate in market volume within limits or execute to minimise market impact. Only a few algorithms are used in practice: CSFB offers eight tactics, yet they admit that their customers tend to use just two (participation and minimal market impact). Algorithms certainly utilise challenging analysis and technology but fundamentally they simply implement the best practice of human discretionary traders.

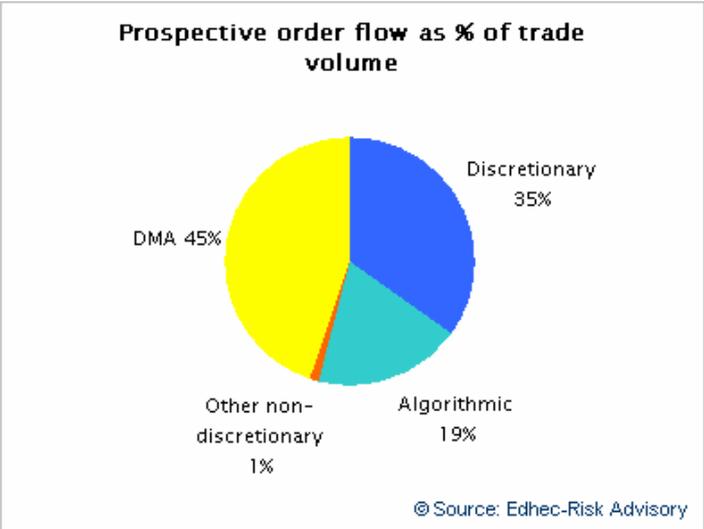
Trying to quantify the proportion of business executed with algorithmic trading is difficult, not least because the variation in services offered is so wide.



A survey of 150 European fund management firms, conducted by Edhec-Risk Advisory, reveals (opposite) the current breakdown of order flow across the market viewed from the perspective of a broker-dealer. Most orders are discretionary and are handled by human sales traders and traders. About 10% of the order flow is routed through DMA channels such as FIX connections or third party networks. In addition some 15% of order volume is handled using algorithmic trading strategies. This

figure is an industry average: few such broker-dealers currently offer these services.

Looking to the near future, the same survey further highlights that order flow through DMA will increase more than threefold from its current 10% to 45% of total order volume. This is a significant increase but can be substantiated through other sources. Tower Group recently estimated that a third of all US equity orders are carried on DMA channels, with Goldman Sachs and Morgan Stanley being the largest providers. In addition, some European asset managers have, for a number of years, executed 80% or more of their orders themselves through DMA channels, understood principally to be the GL network.



Future discretionary order flow can be extrapolated from a key constituent of this business, portfolio trading. A recent Financial News survey indicated 13% of total European order volume was traded as portfolios. Other sources put the level of portfolio trading in the US at nearly half the NYSE daily volume. Consequently, discretionary order flow should still represent a significant percentage of the total order flow into our average broker-dealer.

Order flow through algorithmic trading systems should also see an increase as a percentage of total trade volume, although this will be marginal as compared to the increase in order flow through DMA. On balance, automated trading through DMA and algorithmic trading systems looks set to become the dominant execution process. From the other perspective, discretionary trading, whether by the broker-dealer staff or machines, could soon shrink from the majority to around half of the order flow.

It is probably over-simplistic to draw conclusions from surveys, however, the trends illustrated above find supporting evidence from other moves in the market. We explore these below.

What is the key success factor for automated business?

For a broker-dealer, DMA carries non-discretionary order flow, although some are extending their DMA channels to carry algorithmic orders. These non-discretionary orders are the end-result of both an investment decision and a trading decision by the investor. Some fund managers, including the high trading frequency hedge funds, themselves automate these trading decisions, in the majority of cases completely independently of any technology offered

by broker-dealers. Some DMA orders received by the broker-dealer are the result of 'algorithmic' trading implemented by the investor.

With such a large proportion of future order flow, despite modest commission rates and modest prospect of offering value-added algorithmic trading, a DMA platform would seem a necessity for competition in dealing in liquid securities at least. The level of investment to make a good DMA platform is substantial: a global solution would have several hundred concurrent FIX connections; a presence on all the major third party order routing networks; and integration with the major buy-side order management systems, such as Charles River, MacGregor and Longview. If client connectivity is critical for the DMA provider, the attractiveness of DMA to the client is directly proportional to the breadth of markets that can be reached. Even for a European DMA platform this can require connections to 12 European markets.

The establishment and maintenance of this client and market connectivity takes significant investment and time, measured in years rather than months. Consequently, large broker-dealers are prepared to buy this connectivity as a competitive shortcut, witness the acquisitions of Sonic by Bank of New York and Lava by Citigroup mentioned earlier.

Could broker-dealer algorithmic trading services increase their market share?

The separation of investment decision from investment implementation is one of the more heated areas of debate between the buy-side and sell-side when algorithmic trading is discussed. Despite the offer of further analytics, the buy-side is clear that the investment decision is their responsibility and that algorithmic trading is a more efficient way for them to get that decision implemented. This is reflected in the sorts of algorithm that are popular with investors: typically the VWAP, participation and minimal impact algorithms that get the deal done at minimal cost (according to definition). This issue is also reflected in the implementation of automated trading systems at the buy-side: for the more frequently trading managers these systems are almost exclusively home-built, although many hedge funds are offered independent algorithmic trading solutions by their prime brokers.

Are algorithmic trading services incompatible with efforts to internalise order flow and the growth of proprietary trading?

There has always been tension surrounding the coexistence of agency and principal business within a dual capacity broker-dealer. The current controversy over the pre-hedging of portfolio trades shows the sensitivity surrounding banks using prior trading histories to 'facilitate' the order.

DMA facilities are offered under contracts which severely curtail the intervention of orders. Typically intervention is only permitted when orders submitted on the DMA channel would infringe market rules, for example during trading halts or trading outside of the permitted price range. Intervention with algorithmic orders is not so well governed. Indeed, were an algorithm to commit risk capital, or to internalise, information about the trade could easily leak to other desks inside the broker–dealer.

CSFB have recognised this and have committed to providing an independent audit of the order flow going into their algorithmic trading system. Complete segregation looks to be the safest route. But, given the proportion of automated business from the earlier charts, the prospect of finding some solution for coexistence looks remote.

Is algorithmic trading an option some broker–dealers can ignore?

The dominance of DMA and the preference of investors to own the intellectual capital of their investment decision process supports the comparative low proportion of algorithmic order flow arriving at our average broker–dealer (see charts). It also raises the fundamental question of whether broker–dealers who are not offering algorithmic trading services to their clients, and who perhaps may only have a limited DMA platform, should enter this business.

Can broker–dealers who choose an alternative competitive strategy afford to ignore algorithmic trading technology? It seems not, at least for liquid securities. Many dealers in Europe now admit to operating at a disadvantage to the current population of machines trading the major stocks. With the advent of penny pricing in the US, quotes change faster than a human can react to them. And this is without the intent of some broker–dealers to automate the majority of their order flow: CSFB envisage some 50–80% of orders passing through their algorithmic trading system; portfolio trading desks in many houses are already at the 90% level. Even some specialist dealers are looking to automation to provide a lower cost execution platform with more even execution quality.

Here the far–sighted broker–dealers are already adapting to a world where execution commissions, after unbundling, are likely to be significantly less than ten basis points. Unrealistic? A survey by Financial News earlier this year found that investors thought the current fair price for an execution service comprising advice, execution and capital commitment would be 7–9 bps or less. Portfolio trades are, of course, already substantially cheaper than that.

Conclusion

In our analysis, automated trading through DMA and algorithmic trading systems are set to become the dominant execution process. However, it is not clear if the interests of the buy-side and the sell-side are properly aligned. The buy-side does not seem to perceive the same value as claimed by the sell-side. It also remains to be seen whether broker-dealers new to this business, after looking at the significant investments for offering automated trading services, will take a fresh look at their clients' needs and re-examine their strategies for order execution and/or business segmentation. We believe that the sooner this is done the better it will be for both sides of the industry.

About Edhec–Risk Advisory

Edhec–Risk Advisory is the consultancy arm of the Edhec Risk and Asset Management Research Centre. The firm has been positioned as a unique provider of expertise serving the “buy–side” community and is assisting institutional investors, investment managers, insurance companies and their service providers with respect to implementing infrastructures for measuring, controlling and managing financial and operational risk.

Edhec–Risk Advisory has offices in Paris and London and operates with clients all over Europe to assist the program managers and management teams of some of the largest financial institutions, such as the Fonds de Réserve pour les Retraites, Euronext, Sogéposte, Petercam and the Alternative Investment Management Association.

Based on a strong team of established professionals with significant experience acquired in the financial industry, Edhec–Risk Advisory has developed a specific offering related to best execution services and our consultants have been engaged in various related assignments such as:

Strategic Positioning

- Strategic study on the use of Exchange Traded Derivatives in the context of active fixed income portfolio management.
- Development of a Prime Brokerage blueprint, market and competitive analysis.
- Strategic positioning of software and data services targeting the hedge fund industry.
- Definition of the entire service offering of a UK brokerage firm with regards to Direct Market Access and Algorithmic Trading capabilities.

Operations & Organisation

- Development of an Operational and Technology blueprint for providing administrative services to hedge funds, development of the implementation roadmap.
- Selection of an independent organisation for controlling execution costs.
- Development of an Operational and Technology blueprint for servicing hedge funds.
- Development of a framework for assessing brokerage services and allocating execution flows.

Systems

- Design and specifications of a system for controlling execution costs post–trade and allowing for automated pre–trade routing decisions.
- Support for implementing an advance Value at Risk system for pre–trade risk analysis and ex–ante tracking error analysis.
- Design of an operational dashboard for wholesale services.
- Development of a set of requirements related to the implementation of a state–of–the–art risk management infrastructure for a fund of hedge funds.
- Design and implementation of a central Transaction Database aiming at consolidating trades intra–day and providing an instant snapshot of exposures for risk management purposes.

Proprietary market studies

- European survey on Best Execution.
- European survey on buy-side attitude towards algorithmic trading.
- European study of investors' needs with regards to cash and collateral management.

Information: advisory@edhec-risk.com

About Edhec

With 100 permanent professors and more than 3,700 students spread over two campuses in Lille and Nice, the Edhec Group is in fact the largest of the major French business schools.

Established in 1906, Edhec has been one of the top five business schools in France for several years. Edhec is one of the few European business schools with the triple accreditation AACSB, EQUIS and AMBA.

Edhec's financial research laboratory, the "Edhec Risk and Asset Management Research Centre" (www.edhec-risk.com) carries out major research programmes in the areas of asset allocation and risk management in both the traditional and alternative investment universes.