



Brian Sentance

Market Impact – Time for More Math in the Algorithm?

The growth in automated and algorithmic trading is never far away from any financial journalist's pen, but it is often difficult to cut through the press and marketing hype to get a clearer picture of what is really going on. **Brian Sentance** of Xenomorph has been speaking with some of the leading algorithmic trading technology vendors to get their views, and suggests that areas such as market impact modeling could become a new battleground for quants interested in this field

Behind the hype ...

I guess one of the most difficult aspects of keeping up to date with the market is to try to get past the marketing hype and industry specific abbreviations that inevitably follow each new development. With the possible exception of MiFID, nowhere in the market is this more prevalent than in all of the news and features around algorithmic trading. Automated trading terminology such as "Dark Pools of Liquidity" sound more at home in astronomy than in electronic trading. Whilst its importance to the market is undeniable, I also think we could all get very, very rich if we received a penny for every time "Low Latency" is mentioned in the press.

... is a fundamental change

This kind of industry terminology can be at the same time both illustrative and educational. Unfortunately, it can also create unnecessary confusion and cynicism around issues that are fundamental to the development of the financial markets. Algorithmic trading is one of these fundamental developments, and it is important to

understand the reality behind the hype. Financial markets will not eventually be run without *any* human involvement as the scare-mongering press would currently suggest today, but developments in electronic and automated trading are showing the way toward much less manual intervention in the automated, faster and more transparent markets of the future.

The vendors on the hype

It is difficult for any vendor to be very dismissive of the marketing terminology that they are expected to use as part of their business, although all four firms agreed that the importance of electronic trading to the future development of the markets combined with the relative newness of the sector has contributed to its current level of confusing terminology and general "over-hyping".

Dr John Bates, founder of Apama Products at Progress Software (www.apama.com), adds that "One of the challenges we find is that once firms go beyond very simple execution algorithms, many firms will not talk at all about their usage.

So the clients that would most validate the legitimacy of the market are sometimes the ones least interested in doing so – as they want to retain their proprietary advantages."

Coming back to basics, even the term "algorithmic trading" itself is often used to describe a whole range of activities, from electronic execution to any kind of trading with minimal human intervention. The overall market consensus seems to be that algorithmic trading is more specifically concerned with the automated and electronic execution of a buy or sell request from a client. So it seems that "algorithmic" trading is a subset of both automated trading and electronic execution, not the other way round.

Key market and technology developments over the past year

As with most markets, the first algorithmic trading "products" (*an algorithm as a "product"?* – yes, that is the way the brokerages want you to view them now) are now becoming much more commoditized as the market develops further. Steve Smith, CEO of 4th Story (www.4thstory.com),



Dr John Bates



Steve Smith



Stuart Adams

says that “competition within the tier one brokerage community for buy-side business is driving increased sophistication, especially as the first generation algorithms such as Volume Weighted Average Price (VWAP) have started to appear as standard capabilities within order management systems”.

Stuart Adams, Head of European Operations, Portware (www.portware.com) agrees with this, and added that “the market is now demanding technology that allows brokers to customize more sophisticated algorithms to specific client requirements”. It seems that the market is moving from standard to bespoke “tailoring” of algorithms, with the competitive battleground being on time to market, capability and usability of the algorithms being produced.

Bertrand Rasset, MD of EMEA Sales for Flextrade (www.flextrade.com), takes a different slant, focusing on the regulatory changes being implemented as part of MiFID in Europe and RegNMS in the US. Bertrand suggests the following three key implications that can be expected to arise from MiFID:

- Faster markets – MiFID effectively endorses fast (i.e. electronic and order driven) markets over slow (i.e. human auction and quote driven).
- Increased competition – MiFID unifies regulatory infrastructure for trading across all markets, regardless of where company’s stock is list-

ed for trading. This opens up and intensifies competition amongst market centers, forcing them to lower fees and simultaneously increase technology development.

- Democratizes access to markets – MiFID makes it easy for buy-side firms to gain access to the markets and execute trades themselves. If they are willing to invest in technology (and many hedge firms are) then they can execute as well as any broker. This obviously provides a huge incentive for buy-side algorithmic traders.

Bertrand adds, “With MiFID, we can end up with 15 separate market centers, all trading the same group of stocks. Sweeping technology and algos will effectively remove this fragmentation when traders wish to remove liquidity from the market.” These regulatory changes, the implications for the market and the advances in technology are all placing pressure on the sell-side for increased scalability and reduced head-count cost as commissions and spreads diminish.

Progress Apama also emphasizes the regulatory influence both here in Europe and the US, but also says that interest in algo trading has been very much on the increase in other global financial centers, particularly in Asia. John also mentions that the front and back office functionality are converging, with real-time VaR calculations being used to assess trading limits before a trade is executed.

I think there is a big point here, in that this

reflects my own feeling that risk management and risk management technology is to some degree lagging behind the exposures resulting from intraday and algorithmic trading. This might be an area worth more discussion in future *Wilmott* editions!

Complexity and the battle of the algorithms?

The main route for the development of new algorithms seems to be from the proprietary trading desks of the tier one banks, followed by gradual filtration of these techniques across to each bank’s brokerage desk. This sell-side edge on algo technology and practice has also been challenged by the hedge-funds in recent years, and this is set to continue. There has been some concern that buy-side users of these broker-provided algorithms would be “front run” by the prop trading desks of the same firm. None of the vendors commented in any detail on this suggestion, but both Portware and 4th Story said that a key factor in the “take-up” of new algorithms by the buy-side is that they need to be sophisticated but also offer simplicity so that the client can comprehend what is being done and become confident enough to use the algorithm in the market.

John of Progress Apama puts forward that one of the drivers behind increased algorithmic complexity is that event processing technology is applicable to both optimized execution (i.e. algo trading in its tighter definition) *and* to generating signals to trade (i.e. the much wider defined automated implementation of a trading strategy). Here I think it is worth taking a breather, just to point out that the market itself needs to get better in its use of the terms “algo trading” and “trading strategy”. For me, a trading strategy is something that needs a signal or decision input to say “do this set of trades” and the algo trading piece can then take over to get the best execution of the resulting trades. Confused? Have a lie down or grab a large whisky ... (works for me!).

An additional interesting angle from Flextrade was that algorithms are now being designed to seek and counteract other algorithms



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being used in the market. So just like a battle, you have algorithms that are designed to have “stealth” to avoid detection in the market, but also to have the “offensive” aspects to recognize patterns from other algorithms and to benefit from them. Sounds like the basis for many more robotic and science fiction analogies! However could this interactive feedback loop between algorithms and the market form the foundation for some interesting research from a control theory or perfect markets perspective?

Back-testing and market impact modeling

The capability to automatically back-test a new algorithm is obviously vital in understanding its possible payoffs and risks. Steve of 4th Story says that combining back-testing with real-time simulation prior to releasing the algorithm to market is the best approach adopted by many of his clients using his solutions. He also suggests that

ensuring high quality data is used in back-testing, simulation and indeed in execution is another key aspect that has so far been underplayed in the market. Here it is the case of bad data in equals bad decisions out. This approach was also reflected by Apama, who emphasize that their clients are demanding more and more in being able “replay” markets over an algorithm, and to segment and name different market scenarios. Sounds to me like algo trading is reflecting scenario-based risk management, which I guess is not so surprising.

Stuart of Portware adds that “Back-testing and more detailed modeling is where the real differentiator between what is a relatively simple, generic

or template algorithm, and what is a much more complex custom algorithm, comes in. The former is subject to comparatively static data, as opposed to the more complex algorithms which may be provided by a broker who has employed considerable talent, be it quants or PhDs, to model in a much more rigorous manner. Portware is seeing increased demand from clients looking to integrate multiple external factors to test algorithms along with the ability to record market information and play it back to test out models.”

Bertrand of Flextrade puts forward that “Backtesting is valuable so long as it does not produce a fitted result that only works on the test data in question. Market impact – i.e. how the trades you execute move the market, and equally other factors such as implementation shortfall (i.e., the difference between the algorithm “decision” price and the final execution price) and transaction cost modeling are not to be ignored”. This desire to model how an algorithm may move the market has prompted a lot more client interest in obtaining “full-order book” information so that “market depth” information can fully be modeled. I think this could be a very valuable area of research and one that (on a quick search around) is due more academic research.

Cross-asset trading

Trading multiple asset classes has effectively been around a long time, but wherever a market goes electronic (i.e. remote, electronic access combined with certainty of execution), then algorithmic trading will follow. Initially, cross asset trades might have resulted out of secondary hedging of an exposure resulting from a trading strategy. These days, with much stronger and well-understood relationships between markets, the profit motive to trade cross assets is an attractive one if margins are eroded within a single market. For example, I would suggest that there are much stronger (known and accessible!) relationships in recent times between the equity and fixed income markets that have been primarily driven by the growth in credit derivatives and credit theory.

Whilst electronic and algorithmic trading are used extensively in equity, futures, options, fx and are coming to the fixed income markets, the rate of increase is limited by the relatively slow exten-

sion of electronic venues for execution across multiple asset classes. Stuart of Portware suggests that even traditional money management institutions are aware of their own businesses need to be “cross-asset” capable if they are to compete with the kind of investment vehicles they can offer. Given that more trade and order book data is becoming available it is easier to back-test and simulate these strategies before going to market.

Steve of 4th Story also suggests that the management of multiple legs of a multi-asset strategy (i.e. execute all of these related transactions, or don’t execute any of them) is a key aspect that needs careful management. For me the analogy here is with committing a rolled-up set of transactions to a database, either do the lot, or don’t do any of them because otherwise the database will lose its integrity. As a result, execution venues are now starting to respond to this “all or nothing” need to execute a rolled-up set of multi-asset transactions and guarantee certainty of execution.

There has been a big uptake in applying algorithmic trading to both futures and foreign exchange (FX) markets over the past year, according to John of Progress Apama. Adding to our earlier discussion of market impact analysis, John says “Algorithmic trading in futures can allow institutions to utilize strategies and techniques that calculate market depth and can determine when people are taking orders in and out, which is a common occurrence. In this way, algorithmic trading can be used to spot patterns in the market.”

Bertrand of Flextrade points out an interesting case from the options market in the US: “Given that options spreads are a nickel – or higher – the market is dominated by market makers with spreads so wide that an execution against their markets effectively guarantees in many cases a P/L vs. their hedge. It is so bad that when I trade options *as an agent* my first action is to go the other way – that is, if I am a buyer, I offer the options to narrow the spread. As others join my quote, I cancel my offer and take theirs. Once options quote in pennies (a test is underway now), I expect the spreads to tighten up and to see more arb trading involving the underlying.”

The summary

Steve of 4th Story says that there is a lot of good

technology in the market, but when reviewing the available vendors DIY algo traders need to remember that “If the only tool you have is a hammer, you tend to see every problem as a nail.” Different systems were designed to solve different problems, and algo traders and developers need to match their capabilities and objectives well with the specific strengths of the vendors they are considering or they may find themselves force fitting a less than optimal solution.

Bertrand of Flextrade summarizes by saying that “Given the anticipated fragmentation of the marketplace, in part due to MiFID and part due to the costs of transacting business, a participant will not only demand better execution capabilities, it will be forced to have them to survive. Given Flextrade’s multi asset class capabilities, smart routing functionality and overall versatility in addressing the whole trading process we are well positioned to provide the solutions to the issues we have discussed. Ultimately Flextrade is effectively one of the cheapest agency brokers out there - but on your desktop.”

John of Portware puts forward that trader empowerment and time to solution was the key to success. He says “Perhaps a signal of the market’s future maturity will be when the focus expands beyond ‘feeds and speeds’ of performance and latency to what it really takes to deliver the algorithmic solutions that truly differentiate one offering from another. Unfortunately, perhaps not enough attention is paid to the latency associated with developing and deploying these systems. This is the real barrier to adoption – and a point that we at Progress have focused upon with the Apama product set.

Stuart of Portware says that electronic trading, of which algorithmic trading is a significant subset, is here to stay. In particular the rate of adoption and spend on execution technology is forecast to continue to rise sharply. He adds “Those firms that are shrewd enough to grasp early the advantages of utilizing technology are going to get ahead. They will be able to maximize the investment opportunities available and hence increase the desirability of their investment vehicles to investors. This can only be achieved if the technology they deploy has, like Portware’s, the flexibility and robustness of architecture to deliver today and in the future.”

For Xenomorph’s take on algorithmic trading see:

<http://www.xenomorph.com/wilmott>

My thanks to:

Steve Smith, CEO, 4th Story

Bertrand Rassat, Managing Director – EMEA Sales, Flextrade

Stuart Adams, Head of European Operations, Portware

Dr John Bates, Founder and Vice President, Apama Products, Progress Software