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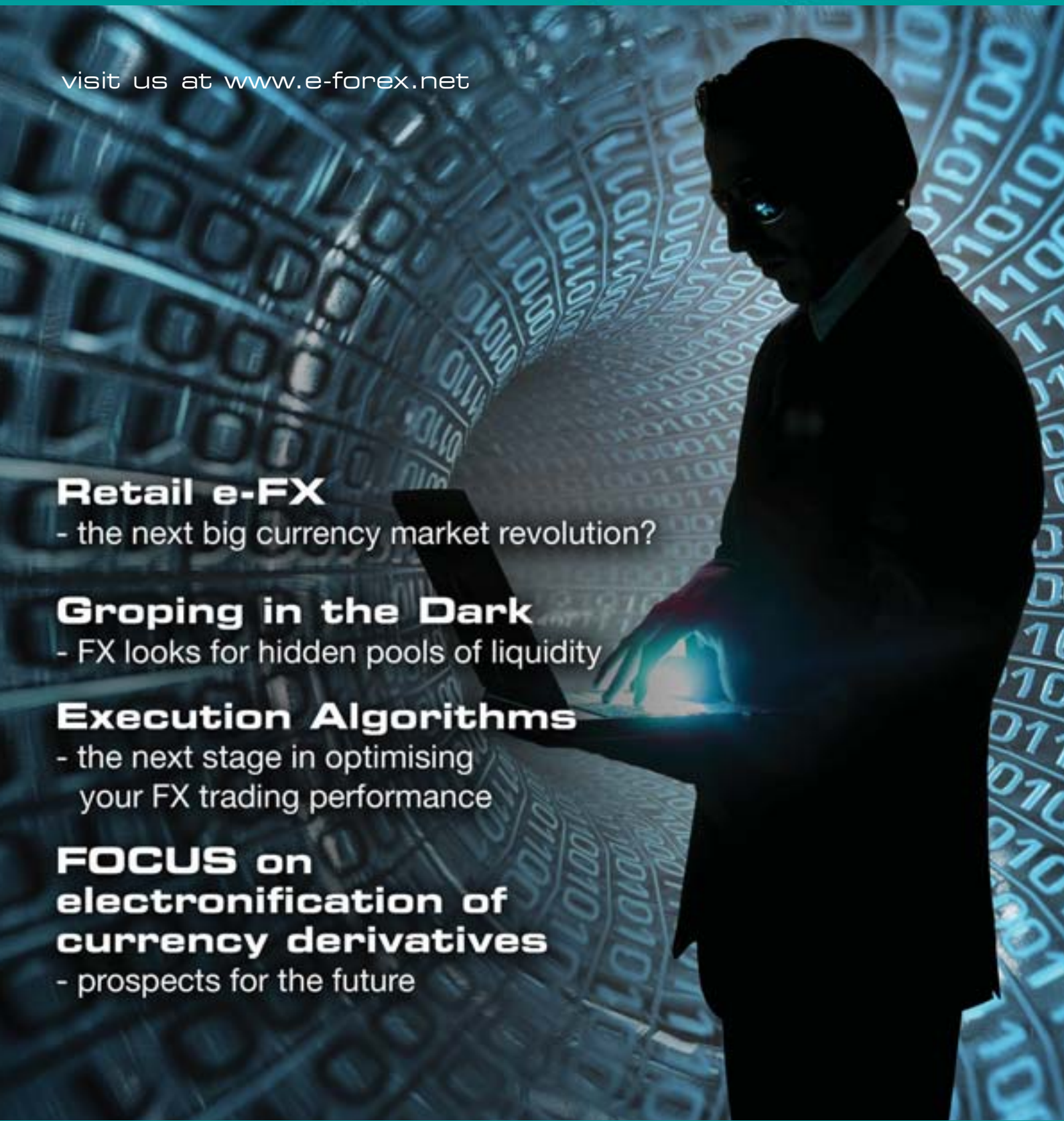

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Spring 2008

It's always difficult to predict whether you might be able to successfully mimic or migrate a particular trading style, technique or strategy across different asset classes. Although several of the articles in this edition have talked about how the equities market has been responsible for many of the most recent developments in FX, many commentators still believe the jury is out with regard to what form some of the most popular trading styles and techniques in equities might ultimately take when translating across to the FX space. What seems clear is that we can't expect a direct replication of techniques. It may be too early to say whether an exchange-style marketplace in FX will gain significant traction or if demand for anonymous trading will pick up in FX, but algorithmic trading has certainly started to make an impact.

Unlike in an exchange-dominated market like equities, the reasons for using algorithms in the unregulated and fragmented FX marketplace are substantially different and many popular equity algos may not make the transition. For example, widespread adoption of order working algos is unlikely in the FX market. However, there are still many potential opportunities for deploying FX algos and a real need for aggregation tools which will provide further stimulus for their development.

It will also be interesting to see whether the relationship between algorithmic trading and dark pool trading in equities will be mirrored in FX. In equities, there is talk of double digit growth in the use of dark pools and the proliferation of these pools has contributed to the growth of algo trading. We've tried to determine in this edition whether there's any similar expectancy in FX for the use of dark pool trading and what growth prospects it has. It is difficult to find consensus on the subject so we will be re-visiting this interesting topic during the course of this year.

As usual we hope you enjoy the magazine and look forward to seeing you next month at the annual ACI Congress which this year is taking place in Vienna, Austria.

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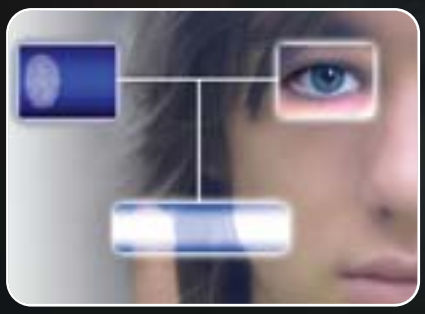

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Execution Algorithms -

the next stage in optimising your FX trading performance

By Nicholas Pratt

Many people feel that the term 'algorithmic trading' is much overused in today's FX market. Overused it may be but what exacerbates the frustration with this whole topic is that every time the algorithm term is used, there tends to be a different definition attached to it.

For example, some people in the market draw a clear distinction between algorithmic trading and algorithmic execution – the former referring to the algorithms used to determine the decision to trade, whereas the latter relates purely to the execution process that takes place once the trading decision has been made.

There are further distinctions to be made in the types of algorithms that are offered and used in the FX market and who is offering them.

There is also a range of potential customers from hedge funds building their own proprietary trading systems, banks building their own internal proprietary trading shop and also those banks that are looking to offer advanced execution algorithms to their FX clients in the same way that they have offered advanced execution algorithms in the equities market.

The vendors

Among the vendors there are a number of different motives driving the demand for FX-related algorithms. For John Bates, general manager for the Apama division of vendor Progress Software, the fragmentation of liquidity in the FX markets with so many new venues emerging means that clients are looking to use algorithms to find where the best trading opportunities lie. "So liquidity seeking and market aggregation is one of the first things that traders want to achieve with FX algorithms, if you would call that functionality an 'algorithm'."

John Bates
"So liquidity seeking and market aggregation is one of the first things that traders want to achieve with FX algorithms"

Once they have this handle on and visibility of the market, there are then a range of activities that traders may engage in, says Bates. "For example, a bank may want to supplement its very expensive spot traders with execution algorithms so that you are automating the more vanilla trades and leaving the spot traders to concentrate on the higher value or more complex trades. Or a bank may want to automate the whole FX trading process and use algorithms to not only hold positions but also provide automatic risk hedging with algorithms that will monitor positions and look for when certain risk thresholds may be broken and then auto-hedge those positions to attain a risk neutrality."

At Aegis Software, another vendor providing algorithms for FX trading, there is an acceptance that sophisticated algorithms are still in a nascent stage, according to vice president Norman Friedman. However, many clients are using algorithms in their effort to aggregate the liquidity of the fragmented FX market. Friedman calls these "semi-automated strategies."

"Traders need algorithms to help them deal with a fragmented market," says Friedman. "They can't look everywhere, they can't click everywhere. Semi-automated algorithms help traders deal with the complexities, such as getting in and out of the market easily. An example of such an algorithm would be to sweep three bids and then put an offer out, all in one operation. We have customers who've implemented dozens of such strategies." Other customers, he notes, are looking to use algorithms in the same fashion as in the early stages of their appearance in the equities market, namely to move large positions with little market impact.

Norman Friedman
"Until the pricing gets down to the millisecond level, it may be dicey to use algorithms for 'real-time' arbitrage"

"There are a few Aegis customers engaged in arbitrage and trajectory trading, techniques more readily applied to other markets," he says. Friedman believes that these strategies are not likely to be widely used yet for two reasons: FX lacks low-latency pricing data and the deceptive quality of the liquidity displayed. In various venues, banks will post the same prices on a number of ECNs, creating the impression of greater liquidity than there actually is. "In other markets, such as equities or energy, it's all about co-location and minimizing latency," says Friedman. "But in the FX market, traders just want to know that the price they see is real. Until the pricing gets down to the millisecond level, it may be dicey to use algorithms for 'real-time' arbitrage." Ultimately, says Friedman, the FX market will become more efficient, prices will get sharper and the use of

algorithms will become more advanced. However, FX will never become a regulated, exchange-dominated market like equities and, therefore, differences will remain. “But,” he adds, “in terms of the analytics, the FX market need not remain so far behind the curve just because of these differences. Going forward, I think FX algos will start to track the way equity algos evolved. For example, a quant working in equities should be able to work in FX because, mathematics-wise, the two will look very similar.”

Pursuit of execution quality

According to Vijay Kedia, president of US-based vendor FlexTrade, the key driver for FX algorithm use has been the pursuit of execution quality and price improvement. He also believes the trading independence buy-side firms experience with algorithms is a major benefit over the traditional risk transfer means of execution. This independence, however, does create an added risk to buy-side firms in that they are taking on more responsibility for their trades rather than giving their orders to a broker for an agreed risk price. But as far as Kedia is concerned, the benefits far outweigh this risk, and to date, there is much lesser penetration of broker algos in the FX market.

Vijay Kedia
“a greater need for algos in FX because there is much less pricing transparency on the exchanges”

"In equities, most buy-side firms rely heavily on broker-provided algorithms," said Kedia. "With FX it's a different situation. Since most principals on the sell-side are a market maker on the trade, there is a much greater need for locally run algos. You see, each broker acts like a dark pool of liquidity in that they are not disclosing their bids and offers to the whole market. Since there are so many of these undisclosed liquidity pools in FX, the best way for buy-side firms to overcome this disadvantage is to run their own algos. In this way they can pick which broker to access at the point of their own choosing."

Lastly, Kedia maintains there is no reason why FX algos cannot grow to the same extent that they have in the equities market. "If anything there is a greater need for algos in FX because there is much less pricing transparency on the exchanges, as well as a real need for aggregation tools that can bring all the fragmented liquidity closer together."

The banks

Despite Kedia's assertion that broker-based algorithms have not made much penetration in the FX market, there are still a number of sell-side offerings available for FX traders. Investment bank Lehman Brothers has two algorithmic offerings – the main one being a suite of algorithmic execution tools which clients can use to execute trades with Lehmans over an extended period. “They are equity-style order working algorithms but the key point is that they are all principal-based rather than agency-based so we take risk on all of these algorithms,” says Martin Zinkin, managing director of FX e-trading at Lehmans.

There are several reasons for Lehmans taking this approach, says Zinkin. “FX has always been a principal market and, compared to the equities market, the risk appetite of major dealers is a very significant source of liquidity in the market. If you exclude that from client execution through an agency approach, then you are missing out on a large portion of liquidity. We also believe that traders can minimise their market impact beyond what would happen if they used agency-style algorithms because we are able to absorb a lot of the flow internally.” It is an example of the way in which the differences between the

Martin Zinkin
“The key point with our principal-based algo is that you are getting better execution in the sense of cheaper trading costs because you are not transferring all of the risk in one shot and will not be charged a full premium by the dealer.”

equities and FX markets have influenced the development of an algorithmic trading service, as opposed to the approach of taking what has worked in equities and then simply transferring the same product to the FX market.

"The motivation for using algorithms is very different in FX than in equities," says Zinkin. Whereas in equities it may be commonplace for a single order to account for 10% of the daily volume of that stock, the same can never be said of a Eurodollar transaction, such is the depth of the market. Secondly, equities has always been an agency business and buy-side firms do not have the option of executing a large order on a risk price at an excess spread of one or two basis points , unlike the FX market. "Because of the depth of the market and the small cost of risk transfers, the case for widespread adoption of order working algorithms is less compelling in the FX market," says Zinkin

However, this is not to say that there is not a niche for algorithms in FX and that there are not those who will benefit, says Zinkin but he is also clear that Lehmans is not targeting the FX dealers that base their strategy on their ability to time the market and are looking to use algos that will execute orders at specified times.

Instead Lehman's offering is primarily aimed at quantitative-based fund managers that are basing their trading decisions on a long-term view of the market or non-FX specialists that will be looking to an algorithm for a reduction in their trading costs rather than a specifically timed execution. "The key point with our principal-based algo is that you are getting better execution in the sense of cheaper trading costs because you are not transferring all of the risk in one shot and will not be charged a full premium by the dealer."

Impact - It's all about timing & execution

This is a relatively new approach in FX even though there are principal trading algos offered in equities where the dealer simply assumes the tracking error risk relative to a benchmark for an increased fee. "This is where we differ in our model because we are choosing to take the risk onto our books and not simply passing executions into the market," says Zinkin.

Market impact

There are significant risks involved in the use of algorithms for both buy and sell-side, particularly if the liquidity in the market is not there, says Zinkin, meaning that there will either be large market impact or a failure to complete the order, leaving the trader worse off than if they had adopted a traditional risk transfer in the first place.

The risk of algorithm use is exacerbated by the relatively vague understanding that many FX traders have of market impact, says Zinkin. They are not used to dealing with market impact because all of their trading costs are normally represented by the risk price that the dealer gives them and it is then up to the dealer to assume any market impact. Consequently there are some unsophisticated views on market impact among fund managers.

"For example, many of them may think that simply slicing an order into small chunks will save them trading costs. If it is done right this may be the case but it is not necessarily the case. It will usually result in a smaller average spread cost but this may well be more than outweighed by greater market impact and information leakage"

As the misconceptions around market impact suggest, engendering a widespread adoption of algorithms in the FX market will first involve changing the mindset of many of the traditional FX professionals, not least those that believe their market edge comes through their timing and execution, says Zinkin. "We don't see a great deal of evidence that this is true but this is a significant shift for clients - you are telling them that what they think is their edge is not really an edge."

Ultimately, says Zinkin it is up to individual clients to take a quantitative look at their FX execution desk and decide which individuals or execution strategies are adding value and which ones are not. "Where clients really do feel that they are adding value, we are happy to provide risk pricing for them, so in essence we are agnostic as to their execution methods," says Zinkin.

"There are a lot of misconceptions and offerings that probably don't add much real value in the market," says Zinkin even if they will appeal to a small section of the market. Similarly, Zinkin is not getting carried away with how widespread the adoption of algorithms may become. "Algos will grow but I think order working algorithms will remain a relatively small percentage of the market compared to equities."

"We shouldn't forget that this is an evolution," adds Robert Fleschler, managing director for FX e-distribution at Lehman Brothers. He argues that the central issue in the development of algorithms will be the control that traders have over their orders as the process and the decision making become more automated. "One of the reasons that algorithms came into existence is that they allowed the executors of the orders to trade in a different way yet still remain in control of the trade. As algorithms evolve, however, they will have to decide if they are willing to cede this control over their orders."

Robert Fleschler
"One of the reasons that algorithms came into existence is that they allowed the executors of the orders to trade in a different way yet still remain in control of the trade"

Achieving Best Execution

For Eddie Wen, managing director of global FX e-commerce at JP Morgan, there is an onus on bank offering algorithms in the FX market to demonstrate that

they are achieving best execution. "How do you measure the cost of execution? There is no de facto standard. It would be interesting to see whether these algos are actually executing at the 'best price'."

There have been some initiatives to address this but, unlike the equities market where the exchanges play a supervisory and governing role in the market, there are no equivalents in the FX market, meaning that any attempt to establish execution standards will take that bit longer.

The other aspect that may affect the take-up of algorithmic trading would be the actual service itself and how it is being given to the customer, says Wen. "Currently there is no standard way in which these services are offered so it is difficult to compare services."

Does this lack of standardised comparisons between different algo services mean that buy-side firms will simply go with their preferred bank rather than the most suitable algo? "Buy-side firms will ultimately go with what they feel most comfortable. Historically they used risk transfer-based execution where they would have known exactly the worst possible price they could obtain and they also maintained the sales relationship with the bank. Switching from that mode to algorithmic execution is a big change – players would essentially be giving away some certainty of execution rate in favour of a more efficient execution. The certainty that comes with traditional risk

Eddie Wen
"How do you measure the cost of execution? There is no de facto standard. "

transfer may still be desirable for many market participants." Consequently Wen believes the FX market could be split into those advocates of algo trading and those that prefer to stick with the traditional risk transfer approach rather than be subjected to the market risk that comes with algorithms. "For example there will be players who are less concerned about the cost of their FX transactions and are more interested in the executed price and knowing it promptly," says Wen. "For them, the use of an algorithm for execution may be limited."

On the other hand, use of algorithms for some buy-side firms may be beneficial. "It depends on the strategy. Some buy-side firms that traditionally employed execution traders may find the use of algorithms more efficient than discretionary traders' judgment. Furthermore, for a leveraged fund that needs to make trades on very large positions, algos can be an effective way to parcel out risk in smaller pieces to reduce market impact and disguise order flow. For firms that have multiple strategies running with opposing views, parcelling of risk may induce greater chance of internalisation."

Risks

In terms of the risk faced by the buy-side users of sell-side supplied algorithms, Wen says that some of it will come down to trusting the sell-side to protect the confidentiality of the order flows and to a sufficient amount of obfuscation to avoid reverse engineering. The other implied risk lies in the volatility and inconsistency of execution as it will not be guaranteed at a specific price.

There are buy-side firms that may not want to rely on algos provided by banks and choose to develop their own in-house algorithms or buy them directly from vendors, such as FlexTrade, but there is a trade-off involved, says Wen. "They get added security through the confidentiality but they miss out on the benefit of better 'fills' – where clients' orders are left on the dealer's platform to be filled rather than sat waiting on a proprietary platform where there is far less visibility."

For the sell-side, the risks lie in the flow information that they will lose as more clients use algorithms to hide their flow. There is also the additional investment needed to not only develop their algorithms but also in funding the effort to prove or demonstrate that these algos are the optimal tools they purport to be. It is a costly

business for these banks and one full of difficult choices. For example, how much investment should a bank put into developing and marketing complex algorithms? Algorithms that are too complex may be difficult to prove its value, but algorithms that are too simple are easily replicated and commoditised.

Nevertheless, despite these difficult choices, Wen anticipates a continued uptake of algos in the FX market but does not see it becoming a dominant means of execution. "The FX market will always remain fragmented because of the heterogeneity of the market participants. I expect algorithmic to encounter the favour of some FX market participants as it brings an element of innovation but it will not be for everyone."

The buy-side firm

US-based Tactical Asset Management and its related companies have been running pure-play, in-house designed algorithms since late 2003, says managing director Josh Levy. "Our entire trade life-cycle is 100% automated. We connect via FIX APIs to our providers who stream executable streaming prices which we analyse and synthesize to generate trade signals. When a signal is generated, a trade message is automatically sent out. After the confirmation returns, our positions are electronically managed."

Before setting up Tactical, Levy was an FX trader for Goldman Sachs as well as Valhalla Partners, a buy-side proprietary FX trading operation which he joined forces with to found MatchbookFX, the seminal FX ECN which is widely considered the pre-cursor to Hotspot FX. Because of his experiences as a trader, Levy has come to appreciate the advantages of automated trading. "It is hard to deny the disadvantages of trading on a discretionary basis. When there is human involvement, the trading process is always vulnerable to unavoidable

errors. The impact of human nature and emotion - the enemy of reason - on the trading regimen cannot be overlooked."

Algorithmic trading may have arrived in the FX market via the equities market but according toLevy, not all the traits of equities-based algos enjoy the same relevance in the FX market – particularly the liquidity-seeking or smart order-routing features. "Unless you are an exceptionally large pension or real-money fund, I don't think liquidity seeking execution-strategies are as relevant to FX as they are in equities since FX is already a pretty liquid market and in most cases, participants can have executable prices streamed to them in their full amounts. We don't do anything overly complicated in our execution approach because often the more complicated your execution strategy, the more FIX connections you require and therefore more problems you encounter. When our prices are streamed to us with an acceptably tight bid/ask spread and size, we simply execute on them."

Levy says that his team will re-examine and revise the algorithms as needed, however he stresses that the key to success when trading with algorithms is patience. "If you have a model that you feel has proven itself over the long run you need the confidence to stick with it during draw-downs to adhere to the strategy. Of course, the true challenge is knowing when to sit-tight and let the mathematics play itself out and when it is appropriate to step in and make changes, however minor or fundamental"

This is not to say that Algo FX trading is any panacea. There are certainly a whole host of other potential risks in using algorithms. "Technology risks, software glitches, hardware failures, application-latency, dropped-server connections, internet latency as well as loss management risks abound. When you move from discretionary trading to algorithmic trading, life does not

magically become problem-free – you simply exchange one set of problems for another."

One area that Levy feels has garnered a little too much attention, at the expense of more substantive issues, is that of execution speed. "Only for arbitrageurs – or perhaps those that trade very aggressively or opportunistically when detecting an off-market price - is message latency mission-critical. We do not trade that way. Our models are purely predictive and not dependant on instantaneous execution. Of course, with execution and message transfers the quicker the better, but it is not core-critical to us. We just need a reasonably acceptable return time." The issue of latency and fast execution has been so overdone that Levy feels many may now be overlooking the point of algorithmic trading: pursuit of profits. Finding the quickest speed with which to execute is secondary. "If we are not profitable when we trade, it will not matter how fast the execution. Conversely, if we consistently buy at 10 and sell at 90, it won't matter if we executed in 20 milliseconds or 95 milliseconds."

Evolution of Algorithmic FX

In terms of how algorithmic trading will evolve, Levy shrugs his shoulders. "Who knows? All I know is that lately, everyone and their cousin now wants-in on algorithmic trading so I think there may be a misconception that you have to be trading 'algorithmically' if you want to be successful. Many may not truly understand what algorithmic trading really is." Nevertheless Levy anticipates growth as more players enter the algorithmic trading market in different capacities and with different strategies. "Some may well be market-making algorithms while others will be arbitrage-driven. There will be long term, short-term, trend-following momentum and counter-trending, but I see the market evolving just as it has in the past – through common sense. If there is efficiency to be gained from algorithms or process automation then there will be development in this area."