

## ATP006 – Lehman Brothers Inc

**Announcer:** Voices in Business presents The Algorithmic Trading Podcast, sponsored by Sybase. Show number six.

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**Announcer:** Hello and welcome to The Algorithmic Trading Podcast, a series of interviews with leading practitioners and experts on algorithmic trading, brought to you by Voices in Business and sponsored and supported by Sybase.

On today's show, we feature an interview with Brian Fagan and Frank Troise of Lehman Brothers. Brian is a Managing Director and the Head of Program Trading and Electronic Trading Sales. Frank, also a Managing Director is the Head of US Equities Electronic Product Management at the firm.

In this interview Brian and Frank discuss algorithmic trading with Greg Grimer of Voices in Business and Sinan Baskan of Sybase.

**Greg Grimer:** So thanks very much for joining us today on The Algorithmic Trading Podcast, Frank and Brian. Could you give us a bit of background just quickly as to your career backgrounds in algo trading?

**Brian Fagan:** OK. So I'm Brian Fagan. I currently run Electronic Trading and Program Trading Sales here at Lehman Brothers. I have been in the business for about 20 years.

I spent the first 19 or so at Morgan Stanley with a similar function. Lastly I have a derivative and program trading background.

**Frank Troise:** Frank Troise. I'm Brian's partner in Electronic Trading. I'm responsible for the electronic trading products at Lehman. I've been specifically working in electronic trading since 1997.

Prior to Lehman I worked at ITG and I have been involved in front end execution products, algorithmic trading and customized strategy development.

**Greg:** The last couple of episodes we have had, we have focused on Europe. So maybe it's a good time to come back and tell listeners where the market is here and how it has developed over those 10 years. Because Europe definitely lags behind what you are doing over here.

**Brian:** Yeah, the mid-90s into the late 90s saw a great deal of regulatory and business change. Things such as Reg-ATS, decimalization, that really were the keynotes of the late 90s changed the way in which the markets traded, changed the way in which the buy side and the sell side thought about trading.

It began the growth of electronic trading in the marketplace as access became easier, technology and products became more developed. Order management vendors, execution management vendors became really more apparent, really proliferated in terms of product development.

In the early 2000s, algorithmic trading really started to take off as both the execution product for the sell side and what we were using internally. It very, very quickly became a product that was mass delivered to the buy side as well as more and more of the buy side became interested in taking on the trading of some of their order flow on their own as opposed to sending all their orders directly to the broker/dealers.

That being said, there are some clients on the buy side that have been trading on their own for many years, all the way back into when I started in the business. In the mid to late 80s we were delivering trading systems to clients then, very, very primitive at the time of course - mainframe-based and things like that.

But the concept of self trading has really been around for a long time. So, the last five, six years we have really seen a dramatic growth in both the client appetite for electronic trading and algorithmic trading products, the willingness for clients to take more of that trading burden onto their own desks versus outsourcing it to the sell side, and the demand for more and more sophisticated products.

In the US now we see the average hedge fund trading well over 50% of their own order flow and the average long only or mutual fund trading above 25%, 30%, sometimes even higher than that. So the numbers have become quite large.

**Greg:** So going forward then, who would you see the primary users being of an algorithmic trading strategy? Would you see it as institutional asset managers or hedge funds?

**Frank:** It can be institutional, a traditional institution to any type of hedge fund, being a long/short equity hedge fund, multi-strategy hedge fund or a quant hedge fund.

**Greg:** Do you think the hedge funds are likely to be more aggressive in terms of their pursuing of this kind of stuff and being more on the edge of complex structures and the asset managers slightly more conservative? Or is that not a fair picture?

**Brian:** I think it has been more about the types of order flow. Hedge funds have typically traded faster, shorter term alpha. They have tended to trade in and out of positions quicker and have had more of a demand for quicker access to the markets. So I think that's what really driven the hedge fund growth.

I think that the larger institutions have begun to - I wouldn't say they are mirroring that style but they have definitely picked up the pace of their trading and have expanded the extent of how they may trade in the markets. Their portfolio management process hasn't changed all that much in terms of their alpha creations and things like that.

But the trading style of the desk has changed more I think in concert with the way the markets have changed. With the speed in which markets move and stocks move and things like that, traders have had to change the way they trade.

**Greg:** Right.

**Frank:** Various forms of electronic trading have been around for 20 years, really since the advent of DOT and super DOT. You asked about are the hedge funds the primary players that are driving electronic trading. At the turn of the millennium, they really were.

But if you go back 10, 15 years ago, it was the passive quantitative institutions that were really the early adopters of electronic trading as a way to efficiently and effectively trade portfolios. And they were early adopters of algorithmic trading.

It turned out that they, in addition to retail players drove the electronic market really through the 90s. And then the hedge funds picked it up at the turn of the millennium. Now it has become prevalent.

**Sinan Baskan:** So when you refer to the trading styles changing, is it a faster search for arbitrage opportunities?

**Brian:** Well I would say that the markets have changed. Right? The way in which equities trade, the pace of trading has quickened.

So the response time for a trader in responding to the way in which a stock moves, the demands have become higher. So intraday volatility has gone up in stocks. So traders have to be able to be much quicker and more nimble in the way in which they respond to that.

The days of stocks trading in quarters and eighths - the range of a stock in a day might be a half a dollar or three quarters of a dollar. Now you have stocks routinely trading in three dollar wide ranges. So the ability to see that occurring, act on it, look for your opportunity to buy when the stock is coming down or sell when the stock is going up - that access has become much more important.

**Sinan:** Do you have the customers coming to you essentially for new development of new trading strategies or are they just looking at your menu of algorithms and picking and choosing from what you offer to them that way?

**Brian:** Oh I would say the biggest growth area for us right now is really in customization of algorithms. As the buy side has become more sophisticated in understanding trading and how they want to trade in today's marketplace, more and more we are engaging with clients in customizing strategies, tuning them to exactly the way they want the strategy to work.

There is still a large basis of I'll call them canned or preset strategies that are available and still get a lot of use. The more sophisticated buy side traders now are really more

specific I think about the way in which they want a strategy to work. So that may mean adjusting a currently available strategy or building an entirely new strategy from scratch.

**Frank:** Yeah, many canned or what we refer to as canned strategies today have several parameters that can be tweaked and tuned even at the client desktop.

So really the evolution has been canned strategies to these parameterized strategies of tweaking and tuning to full on bespoke algorithms.

**Greg:** Technologically that's quite difficult to do though isn't it, because presumably some of the technology that underpins this, it is not easy to make those changes at a parameter level? Has there been a need to constantly revise the technology that underpins this from an application perspective?

**Brian:** Most definitely. So that is actually a differentiator in the market. At Lehman, we have spent a lot of time creating an underlying framework or foundation to rapidly be able to deliver custom algorithms.

If we had to go in and one-off build a foundation and build a framework, it would take us forever. That was really the origin of custom strategies, even five, six, seven, eight years ago – one-offs. But we have something called a “conditional auto trading framework”. It is basically a foundation that gives us the ability to rapidly deploy custom algos.

The framework to which Frank is referring I would say is a differentiator in our product in that it allows us to really have a much quicker turnaround time for a wider range of types of customizations, whether it be volume related, price related, relative measure related, urgencies, percentages of volume - things like that. It really allows us to take the number of factors that are out there that you could potentially use as a trading factor, piece them together and then turn that into a fluent strategy.

**Greg:** And what is the longest part of that cycle? I assume it would be testing would it?

**Frank:** Yeah, once again it depends on the sophistication of how many - is it going to be relative? How many steps, how many relative steps are going to be deployed and employed? Then after you get that together it is about testing.

**Brian:** I would add onto that that in many cases of these types of strategies, these customized strategies we go through revisions of them with the client. We build it. The client gives us the set of parameters.

Sometimes the client gives very qualitative concepts around what they want the strategy to do. We build it. The client uses it and then comes back and says, "That's great. Let's tweak this. Let's do that." Then they will continually revise it until it gets exactly the way they want it to work.

**Sinan:** Do you find yourself provisioning data to the customer in this development and testing cycle?

**Frank:** No, we generally keep all the back testing data in-house. These custom algos though allow us to really take electronic execution services with the client to a different level. It allows us to really become more of a partner and become the execution consultant, as the term has been dubbed in the industry through these multiple iterations and cycles of algo development.

**Sinan:** What is the profile of the customer who wants custom development? Large buy side? Small buy side? Or all over the spectrum?

**Frank:** It runs the gamut.

**Brian:** It could be any and all. We've done customization work for two-person desks or funds running a couple of hundred million dollars to multibillion dollar, more billion-dollar complexes.

**Frank:** And it could be one trader at that multibillion-dollar shop. So that one trader has an idea.

**Greg:** Could you see this scenario going forward? At the moment customers are coming to you saying, "I want to trade. I want you to price, etc. etc." You're just doing it for the front office.

Could you see a scenario where customers came to you and said, "I want you to help me manage risk on my overall positions as well as what you're doing at the moment?"

**Brian:** I think that what we do today is we look to provide tools that help people identify those risks. I currently don't see on the landscape us being in the role of actually executing the risk management of that in an automated fashion without the client making a decision.

I still think that our role is one of adviser at the risk and analytical level and then executor at the execution level. We don't become the portfolio manager or the risk manager for the buy side. I don't see our products currently extending to that. I won't say there is a demand for it, number one. But I don't see us extending to that end of the spectrum in the near future.

**Frank:** I see that raising a bit of a regulatory question also. We provide implementation advice and implementation. But we are not investment advisors. So it starts to draw a fine line between investment decision-making and investment advisory versus implementation.

**Greg:** Well, I was thinking of a scenario where for example they had a thin client dashboard inside their organization and you effectively had the technological underpinnings, which they wouldn't necessarily want to afford and want to run.

So in effect you are providing a kind of engine that carries out their risk management plan through your system.

**Brian:** Well, we are white-boarding it. What you're talking about would be us providing analytical data services, which determine potential risks, right?

**Greg:** Yeah.

**Brian:** If a client then wanted to build on top of that the ability to actually execute off of that data, it sounds like something we would more engage with a client on a one off basis. Because it would be something that is more customized to integrate with their internal portfolio management systems and things like that, which we actually do today with our analytics tools where we provide data directly into some clients order management systems.

I think the execution of that type of hedge or risk management decision would still have to be driven by a portfolio management decision at the buy side client because ultimately those executions, those decisions are impacting their clients' portfolios. They are the investment advisor on those portfolios so they would have to be responsible for those decisions.

**Greg:** Going back to what you said earlier, you mentioned that over the 10 year, we called it a 10 year period from '97, you've seen obviously huge changes from what you described as quite primitive - by modern standards - systems, to today.

Where do you see the thing going forward and where do you see some of the potential technical bottlenecks for the development of this thing? Is it down to latency in the speed of light or - can you give us a feeling for where you see the challenges as being? Are they people related? Are they technology-related? Or are they just complexity related, kind of a combination of the two?

**Frank:** So if you go back to '97, '98 - the late 90s - you saw the advent of ECNs. And there was a lot of fragmentation of liquidity. That problem was solved with smart routers. So technology had to be built to go out to find the best bid, the best offer across all these market venues.

We then saw a wave of consolidation. ECNs consolidated. They were bought by exchanges. And now there is this blossoming of ATSS. So we are now in the next set of fragmentation due to Reg ATS and dark liquidity. What we see as technological issues are the surge of market data, especially around news events like FOMC events.

So that needs to be handled. That's a technological hurdle. Algorithms make decisions based on real-time market data, based on the aggregation of information in that real-time market data.

Then also another area that is a technological issue is just basic networking and latency. If you look at what buy side traders do, how they add value to the investment process, it's basically determining whether or not to place a limit order or a market order. If they place a limit order it's at what price.

Handing that limit order over now to the new sell side tools to access all the liquidity in the market, a new factor in that limit order model or that order placement strategy needs to be destination as a factor, where latencies are incurred by going after liquidity in different destinations. So really I think that two of the biggest technological issues that we are facing now and continually grappling with are latency and market data.

**Greg:** And of the two, if there was a magical solution in a box, if you could have the six months and your competitors couldn't have, what would you want, let's say for a six month holiday?

**Brian:** You have to look at it from the perspective of alpha. So, different managers have different alphas. There is a whole set of managers out there who don't even think in milliseconds. The portfolio manager doesn't think in milliseconds. The trader doesn't think in milliseconds. No one thinks in milliseconds.

They think in minutes, hours, days, weeks, months. There is a very defined set of managers that only think about milliseconds. And that largely being what we call the statistical arbitrage type world.

That type of management and that type of trading has definitely grown significantly as the technology has enabled it to grow and allowed managers to trade in shorter and shorter frequency to extract more and more alpha at those short time frames.

There is a limit. Yeah, we would assume there is a limit to the amount of alpha and the amount of milliseconds that you need to extract alpha out. So there is probably a floor to where that matters. In my view I think that the thing I wish we could take a holiday from for some period of time would be the increases in market data.

That has to me been the biggest, I would say struggle that the industry - it's not just the broker/dealers, but the exchanges, the ATSS, everybody that's involved has really struggled with is that the increases in market data have become so severe since the implementation of Reg NMS that every time we hit a market event, an emergency Fed cut or something like that, market data increases not 1x, 2x, 3x but 5x and 10x in a day. And then it seems to set a new plateau where it doesn't come down much from there.

Until the next market event, and then it actually goes off again from there. And these events seem to be happening in shorter and shorter timeframes. So the line of the number of market data messages that we are dealing with on a daily basis is going parabolic on us. And it is becoming - that's a real tax on the entire industry because there is a lot of money and technology that is being spent just to keep up with that.

**Sinan:** Do you have other uses for that data that somehow adds value or insight to your business? And the other related question is, do you know what level of granularity of that data is sufficient? So I don't know if you can actually filter some of that noise out, if it is indeed noise.

**Frank:** We capture all of that data. And we use that to tune our models - so to tune our order placement logic and to tune any volume profiles and our algorithmic models. So we take all that data, the depth of the market by symbol. All that data is very valuable.

**Brian:** It really helps us to understand how to improve our performance, how to model the markets especially for smart order routing and things at that level. But even at the algorithmic scheduling level, to understand how volume patterns have changed in the day, how volatility changes during the day, how spreads changed during the day - all of these are very impactful for understanding how to reduce slippage.

Even things as simple as VWAP algorithm - how to continually reduce that slippage or reduce slippage in an implementation shortfall type algorithm - all of these things have an impact on that. So understanding it and utilizing that data is very important.

The hard part is the fact that the rate of change has been so fast and continues to increase. The entire industry in the US all the way down the chain from the broker/dealers, the exchanges, the ATSS, the clients - everyone is dealing with the same problem.

You see this even on the buy side where many of the order management vendors can't keep up with the pace at which we can send algorithmic fills back to the client. So we have to bucket them. Their order management system can't take all the real-time fills coming in because we can trade in such small increments in our algorithms and do so many trades so quickly they can't take that many messages. So we have to bucket them and then send them through in batches.

**Greg:** Do you see data hitting a ceiling or do you think there's a Moore's Law thing where it is just constantly going to double and double and double?

**Frank:** Right now there is no end in sight.

**Brian:** There doesn't seem to be one.

**Frank:** What it implies though is the drive for low latency, the need and necessity to house all this data. The implications really are that you need to run a scalable operation with heavy investment and technology as a minimum ante just to play. So those are the implications.

**Greg:** Presumably from a data perspective, you have got to stay on the absolute cutting edge of whatever is managing the data because it's not just the sheer volume of it. It's getting in and out of the systems to be analyzed that is really your biggest issue.

**Brian:** Data storage, data capture - it ends up being the MIS and the ability to massage and analyze that data to continually performance tune the algos. So there are a number of aspects to the data. And then historical order and execution data just for regulatory and compliance purposes.

**Sinan:** Where do you see the pricing power shifting in terms of commissions?

**Brian:** Well clearly there has been a pressure on both traditional and electronic commissions over the last 10 years, but I would say specifically in the last five.

I think that we have definitely seen a series of rounds of pressure, which seem to have at this point abated to a certain extent. Certainly on the high touch side of the business, I think that we have found a new, relevant range. On the electronic side, the drive downward on commission prices has definitely let up to a certain extent as we have found some sort of equilibrium.

I think there is still some drive lower but it doesn't seem to be as broad across the spectrum of clients. I think some of the higher frequency type traders are still looking for that because it's a much bigger piece of their alpha. But for the longer term alpha players, who have other resources and commitments that they utilize from the sell side, I think that we have started to see that part of the commission base kind of steady.

**Sinan:** How are you planning to adjust for that change?

**Brian:** Well I think at one level it is a margin question. So our drive toward reducing our cost of execution is a significant piece of our business. Being able to reduce what it costs us to execute through smart routing, through better internalization, through all these things that we can do to reduce the actual cost of execution is a major factor and something we spend a tremendous amount of time on.

**Frank:** Sure. If you look at the components of electronic trading, DMA and algorithmic trading are two revenue products. Routing and crossing are about driving efficiency and margin into the operation.

**Greg:** Just one last question then to round it off - in terms of asset classes. Obviously, this whole industry started out with equities, what growth do you see in other asset classes like fixed income and other products growing in this automated trading space?

**Frank:** Well we have already seen tremendous electronification of the futures market and that's basically a 24-hour market. I think with the exception of 15 minutes a day that thing runs 24 hours.

The options market is a market that is becoming more and more electronic. Over the last few years that's really started to take on the same form as the equities markets. Regulatory changes, penny pricing pilot, some new pricing mechanisms adopted by exchanges - so ARCA on the PCX has gone to a maker/taker model.

If that attracts more liquidity providers, the New Age market maker, that will only create the snowball effect.

Additionally there are more tools that the sell side - either de Novo technology entrance or traditional full-service sell side broker/dealers are delivering to the buy side to take advantage and capitalize on that electronic liquidity. And that's across the spectrum of execution management systems, DMA and even options algos.

**Brian:** I think when people talk about different asset classes and we think about equities, options, futures, those are all still things within the equities grander asset class if you think about equities, fixed income, currencies, and commodities.

A lot of people like to talk about fixed income in terms of that because that is such a large market in terms of absolute dollar size of the assets that are out there. I think we have seen less movement in the true fixed income products because of the nature of the products themselves. There are no centralized exchanges. It's largely a principal market.

I think we have actually just seen in the last few years the beginning of more electronification of the order delivery and entry in those markets, especially for some of the more commodity type products like government bonds and some corporate bonds and things along those lines. But those markets are still a little bit further away just due to the structure of the markets.

You do see the FX market however becoming a natural for more electronic access, given the way that that market trades. It's very much similar to the electronic futures markets - 24 hour markets, very standardized contracts or very standardized exchanges that you can do. So that's much more of a natural.

There may be a little bit more work that has to get done before some of these other products in the fixed income space and the commodities space and things like that come online because of the nature of the actual products.

**Greg:** Thank you very much Brian. Thanks very much Frank. I have enjoyed the talk today. Thank you.

**Brian:** Thank you.

**Frank:** Thank you.

**Sinan:** Thank you very much.

**Announcer:** That was an interview with Brian Fagan and Frank Troise of Lehman Brothers.

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