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Fast—and Furious?

The future of technology in Asia's capital markets

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Key Messages

Time runs out on speed. High frequency trading strategies that utilise low latency simply to execute trades faster will soon become things of the past, driven out by regulatory change, and desire among market participants to stop the 'arms race' of incessant technology investments to compete. Instead, Asia's low latency trading environment is likely to mature in a more subtle, more strategic era. This will mean that many of the electronic tools used to conduct trades by Asian players will be standardized (or even shared), and tactics will be based on gaining competitive advantage by using those tools to obtain deeper, holistic insight into market conditions.

Of hair shirts and handcuffs. The electronic trading industry engages in self-inflicted restraint on technology investment or industry practices that enforce restraint. In other words, whether players put on hair shirts, or a pair of handcuffs, that sense of equilibrium is still extremely challenging. There is debate within the industry as to which market participants bear the responsibility to moderate the industry. Some argue that exchanges themselves have a responsibility to enforce a balance in the market, between the advantages offered by technology, and the excesses it creates.

From Zero Tolerance to Zero Sum. The first era of low latency trading—where time to market, literally, was all that matters—is gradually evolving into a newer, more subtle second era. Proximity to exchanges remains a necessity for low latency markets, although in most Asian trading environments, this is just coming into focus. But while the distance matters, equally important is a trading firm's ability to gather, process, and act upon the information that trading activity produces. It is highly unlikely that low latency will become irrelevant—rather, the tools and tactics used to gain insight from market activity in a high-speed environment are evolving to become more subtle.



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In simple terms, capital markets and specifically, trading environments are speeding up. High frequency trading has become a commonplace component of the world's leading stock markets, and by extension, the quest for speedy transactions in deeply liquid pools of capital is forcing a degree of consolidation and focus on the industry, particularly in Asia. When the Tokyo Stock Exchange effectively merged with the Osaka bourse last month, it created the world's third largest bourse in terms of listed companies—and an estimated 30 percent of equity transactions there are already electronic. In some Asian markets, players have selectively embraced aspects of electronic trading. The Singapore Exchange's new Reach trading engine managed to shift some 30 percent of its derivative trading volume onto the high speed platform within a year of its 2010 launch, but practically none of its equity trading. In Hong Kong, electronic trading is still immature by global standards (although, as discussed below, a set of clarifying regulations from the market regulatory is designed to change that rapidly).

It would be wrong, however, to suggest that traditional exchanges are not necessarily on a one-way march down Electric Avenue. Recent Bloomberg reports based on estimates from US-based Rosenblatt Securities posit that while two-thirds of equities traded on US exchanges over the last five years were through high frequency mechanisms, this has now dropped to half, roughly 1.6bn per day. Part of this is due to the fact that high-speed trading has, at least partially, achieved what any IT innovation sets out to do: make markets more efficient. Trading volumes have been trimmed back now that market actions are more targeted, and the volumes of trades conducted in fishing exercises to discover prices are less needed with the 'normalisation' of market information (not to mention downright illegal activities like 'spoofing', activities which use high-speed trades to unduly influence prices and order books). Trading margins have slimmed as a result—although again, as in any technology-enabled market transition, this is an expected outcome.

When is High Frequency Low in Latency?

In the taxonomy of the Economist Corporate Network, this analysis of this paper broadly assumes that 'low latency' refers to a set of tactics and technologies that allow market participants to take advantage of a reduced time between an order entry and its acknowledgement. 'High frequency trading', considered in this context, is a broader set of activities around electronic trading.



Other data suggests that technology-enabled platforms are becoming tightly woven into the overall fabric of capital markets. The US Security Exchange Commission (SEC) laid out a market structure in an early 2010 paper, estimating that 25 percent of trading volume took place over virtual trading environments (such as so-called 'dark pools'). And as of mid-2013, Rosenblatt Securities estimates this has increased to over 36 percent. In other words, while the metrics used to measure the electronic trading activities suggest that the number of instances of these technology-fueled practices might be in decline, the overall utility of electronic trading is growing exponentially.

As ever, the industry is at a crossroads, one from which Asian markets may be uniquely positioned to take the path towards greater market efficiency and competition. This is because the majority of exchange environments are not yet as 'electric' as their western peers, meaning that Asian players have the benefit of shaping their market environments using the west's best (and worst) practices.

This report argues that the high frequency strategies that have traditionally utilised low latency to be profitable (such as those which depend on acting before a time-bound trading opportunity disappears) will soon be a thing of the past, driven out both by regulatory change (such as limiting numbers of trades, or preferential access to order book). More importantly, this will occur because the very 'electrification' of capital markets will make this time arbitrage tactics irrelevant. Instead, Asia's low latency trading environment is likely to mature in a more subtle, more strategic era. This will mean that many of the electronic tools used to conduct trades by Asian players will be standardized (or even shared), but the tactics will be based on gaining competitive advantage by using those tools to obtain deeper, holistic insight into market conditions, and not simply being the first racer off the block.



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Lever, or leveler?

Between regulation and industry advocacy, the strategies that defined high-speed trading are losing their competitive lustre

The framing issue that the electronic trading industry faces globally is one of equilibrium. Each member of the ecosystem—financial firms, exchanges, trading platforms, information providers and network carriers—must seek its own point along the technology spectrum where it strategically deploys and sustains its own tactics and tools. This is due to the battle to obtain advantage in low-latency markets, which in turn, has set off a continuous cycle of investment in technology—the ‘arms race’, in industry parlance—which is now appearing unsustainable.

To stave off this encroaching instability, industry observers and participants are advocating the adoption of practices that curb or cap expenditure on infrastructure. These include employing shared infrastructure or services (not dissimilar to cloud-based models increasingly adopted across the ITC landscape). Observers further urge the imposition of level-field-playing standard practices around access to the electronic trading environment. Such practices would include limiting the number of times a firm trades in a session, or standardizing the length of fiber optic cables that connect the trading infrastructure of market players to exchanges.

Of hair shirts and handcuffs

However, whether the electronic trading industry engages in self-inflicted restraint on technology investment or industry practices that enforce restraint—in other words, whether players put on hair shirts, or a pair of handcuffs—that sense of equilibrium is still extremely challenging. How can the industry find a balance between the advantages offered by technology, and the excesses it creates? For instance, the wide-scale adoption of shared services, or standardized distances to exchanges would limit a trader's exposure to the crippling investment levels in capex and software needed just to keep pace. However, these restraining measures could also effectively neutralize the proximity advantage offered by co-location with an exchange.

The question that emerges, therefore, is whether the technologies enabling low latency trading serve as a lever—enhancing individual firm efficiency and competitiveness—or whether it serves to level the entire playing field, creating efficiencies overall. And this creates a struggle, a tension, in global capital markets, one that is particularly acute in Asian markets, where the first role of exchange market regulator is to simultaneously to ensure a competitive environment in essentially non-competitive markets.

Moreover, because of this collection of semi-monopolies in Asia's exchange environments, there is a growing sentiment that perhaps the exchanges themselves should bear greater responsibility in enforcing proper behaviour in electronic markets: “current regulation places most of the burden of responsibility on the traders and algorithm developers, but practically none on the exchanges—and they are the ones that have the greatest role to play,” says the Hong Kong-based director of electronic trading for a global investment bank.



Pushing the envelope

Electronic trading's emerging legal landscape

An old industry adage has it that “a telecoms company is simply a law firm with an antenna on top”—the implication being that companies, which generate business by leveraging the reach of new network technologies do so in a marketplace defined by what regulators believe is permissible. The same could be said for the financial services industry, and progressively so. Electronic trading—and specifically, high-frequency trading—is an area of the financial services industry increasingly enveloped by new regulations and guidelines, for two reasons. The first reason lies with the excesses made by financial market participants, which led to the 2008 Global Financial Crisis and also created a permanent state of heightened fear. Governments worry that wild bankers could again, and at a moment's notice, wreak havoc on the economy. Thus, their practices, products and tools must be properly contained by laws and pre-emptive legislation.

This post-GFC vigilance tends to be concentrated on those aspects of the financial services industry that are considered most disruptive, and which leads to the second reason regulation is increasing around electronic trading. Trading technologies involved—the software, algorithms, routers and amplifiers—contribute to market disruption simply as a result of speeding up transactions beyond (as it is euphemistically called in the industry) a “human-scale time horizon”. And this is the crux of the issue. In terms of the earlier analogy, the ‘law firms’ are in the market interpreting regulations at a “human scale”, while the ‘antennae’ on top of them are constantly being upgraded at much higher speeds.

Market participants themselves have raised concerns regarding technology-enabled trading destabilization in the industry, calling for increased oversight to prevent them. For the past half-decade, the industry has been periodically wracked by electronic trading-induced crises, which in turn has invoked greater scrutiny (especially in the US, which is bearing the brunt of its early adoption of trading technology by having to constantly endure the market damage that all this envelope-pushing causes).

A relatively recent clarifying crisis occurred last August, when an untested, reportedly hastily-developed trading programme launched by New Jersey-based Knight Capital began behaving badly, to say the least. Nearly 150 stocks saw their prices fluctuate widely on bad trade information, and within the day Knight lost more than \$400m and saw its own share price collapse. Within a week, it had to be bailed out and was merged into Getco, a competitor, before the end of the year. The blunder, fast on the heels of the Facebook IPO (semi-botched by technical glitches) accelerated the SEC's examination of risk compliance practices in electronic trading, and revived discussions of national and local commissions mandating ‘kill switches’—a protocol designed to shut down a firm's entire trading engine once it is perceived to have run off the rails.



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Policy-makers in Asia are thus faced with a number of conundrums as they attempt to establish a regulatory framework for electronic trading. Do they wade into the fray of electronic trading with stricter regulations to, in a sense, learn from the mistakes of the US, by limiting the volume of trading through caps, or through taxes designed to slow it down to more manageable speeds, or by mandating kill switches? The fear is that if Asian regulators do so, they will be further restricting growth in electronic trading in the region, which is still largely seen as far behind market leaders.

To square this circle, Hong Kong (notable for being Asia's biggest trading market, yet being particularly far back on the electronic trading adoption curve) has attempted to blend both the hair shirt and the handcuffs. In March 2013, the Hong Kong Securities and Futures Commission (SFC) concluded a consultation with the industry, which led to a set of regulations on electronic trading, set to enter into effect from January 2014. The regulations place the ultimate burden of risk management, and compliance with the SFC Code of Conduct on any trader whose activities are enabled by an electronic solution, whether or not they directly developed or deployed it. The assumption is that by decentralizing responsibility—making individual asset managers responsible for the tools developed by third parties—industry restraint will be distributed, and firm-level practices will help keep the industry in check.

The irony is that while the new waves of regulation in Hong Kong and elsewhere are largely in the service of fostering competition, some laws and policy stipulations may end up blunting the competitive edge that newer technologies are supposed to offer market participants. "The emerging regulatory view in Asia is one that promotes standardization and a level playing field," observes Ed Mangles, Regional Director, Asia Pacific, FIX Protocol Ltd. Therefore, while co-location creates an advantage for traders, those advantages may become 'capped' by regulations aimed at preventing the nanosecond advantages, which market players accrue by inching towards the exchange. Mangles cites a popular metric used in the electronic trading industry "for every eight inches that a fibre optic cable is shorter, a nanosecond is shaved off of the transaction time." Mangles, however, concedes that codes of practices and electronic trading regulations introduced in specific markets will ultimately have to face the test of whether they can rein in players physically resident outside the market: "A hedge fund based in the Caymans taking an algo-fueled run in Hong Kong may not feel that they need to abide by local codes of practices—simply because they cannot be chased down."



From Zero Tolerance to Zero Sum

The first era of low latency trading gives way to a newer, more subtle second era

Proximity to exchanges is a necessity for low latency markets, although in most Asian trading environments, this is just coming into focus. But while the distance matters, equally important is a trading firm's ability to gather, process, and act upon the information that trading activity produces. In turn, this increases the need for additional IT capabilities, which serve to enhance the 'edge' that proximity brings to high-speed trading. These include security, data management and redundancy, and big data applications. As a result, the ecosystem for low latency markets comprises more than just transaction partners, as they need to harness market insight through multiple sources, in order to interpret market conditions and execute trades.

Media and market data providers, social media platforms, customer information generated from the firm's own business analytics and other 'big data' resources—all of these need to be plugged into the low latency framework that the market player creates and manages to stay on top of deal flow and seize the opportune time to execute trades. But the rush to get closer to the exchange and to execute trades faster, have meant that the bigger challenge for market participants—perhaps the defining challenge for the future of the industry—has yet to even be addressed. Electronic market trading players have spent most of the last decade either gearing up to be the fastest or helping other players be the fastest. "The growth in low latency technology to date has been primarily driven by the client demand and the type of service they are looking for," observes Kam Leung, Vice President, Global MNC, Sales Division, NTT Com Asia. He further cites basic market competition that has defined growth to date: "If banks or traders do not meet client needs, they simply won't be able to compete in the market." Their attention now has to rapidly shift away from gearing up for speed, towards interpreting and acting on market signals sent by several similarly fast participants. And here, NTT's Leung sees how shifting market dynamics will change the technology procurement strategies of market participants accordingly: "You wouldn't buy a Formula One car to compete in a mountain rally race."

The first set of issues that market participants have had to overcome (as electronic trading becomes more interlaced with the overall fabric of global capital markets), is that low latency markets have also created new platforms for market malfeasance. 'Flashing' and 'spoofing' are the first issues that regulators have seized upon as punishable trading tactics. These tools use high-speed trading instruments and tactics to create misinformation in the market and to manipulate order books to their advantage. When this is added to the issue of machine-based trading failures a la Knight Capital, the response from regulators and the industry has been to create laws and practices that essentially design speed bumps to mitigate the damage caused by illegal practices or 'mechanical' malfunctions.



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That said, the consensus in global capital markets is that low latency trading is here to stay, despite potential changes to market regulation. This is largely because of the relentless need for players to innovate, both around technological and regulatory hurdles, as well as hardware that is being developed to support the industry (e.g. FPGA, reprogrammable hardware, which is particularly fast for certain classes of signal processing and parallel algorithms). Ironically, the endless pursuit of speedier trades has created a 'zero tolerance' for latency. Industry participants may be pushing market activity into a zero sum game. In fact, "low latency trading tactics were initially designed for front-running—picking up the pennies out front sooner than anyone else," says Stuart Kingham, managing director of Hong Kong-based machine-to-machine trading consultancy, Quantidential. But as mentioned, front-runners have a habit of running too far ahead of prevailing regulation, and use the advantage created by getting there first to create distractions and misinformation for those that arrive later.

Despite this, however, it is unlikely that low latency will become irrelevant—rather, the tools and tactics used to gain insight from market activity in a high-speed environment are evolving to become more subtle.

According to Kingham, the first era of technology-enabled trading has already come and gone, even if many Asian markets still have not yet reached the volumes of their western peers. "Some high frequency trading opportunities are removed from some markets, while others will replace them to circumvent the regulation changes. So the ability to use statistical machine-learning algorithms to predict the intention of other market participants would allow a particular trading strategy to form an opinion on the market depth without specific access to the order book."

And less we think that the 'arms race' is dead, Kingham points out that many of these newer, more subtle electronic trading techniques "are going to be even more computationally intensive. FPGA (field-programmable gate array) technologies (for instance) will be even more attractive" he adds, referring to the building of computing processing technologies that can be used to swiftly change algorithms and other programmes to reflect changing tactics. And for all this change towards sharper and nuances trading strategies, proximity will not become an irrelevant factor: "like their forebears, (newer HF traders) will still want direct exchange access."



Asia's electronic trading hubs come of age, as global discourse on greater speed accountability picks up

Understanding the different trading terms and systems will ensure that undue risks are not borne by investors

Panelists and attendees at the ECN's Fast and Furious meeting on the future of technology in Asia's capital markets remarked on how participants in the electronic trading market are moving away from a voracious appetite for "break-neck trading speeds" to one that is becoming more nuanced about the impact of speed and how it is employed. This isn't to say that speed is no longer essential. As Kam Leung, Vice President, Global MNC for NTT Com Asia observed, "There is still very much a demand, a need, and want" for speed. Co-location for example, shaves off vital seconds from the time it takes to process a trade, allowing high frequency traders to capture tiny amounts of profits.

Not all investors require such levels of speed to make a profit however, but institutional investors and other non-high frequency traders are forced to incur the unnecessary cost of adopting expensive machines, as they need the low latency just to keep up with the rest of the market. "No one wants to get left behind" points out one of our panelists and few serious investors can afford to lose out precious microseconds to a rival. As Leung puts it, "knowing the lottery numbers from last week is not as valuable as knowing the numbers for next week." Still, the advantage of co-location has started to deliver diminishing returns due to a crowded trading market, according to Greg Lee, Director, Head of Autobahn Equity Asia, Deutsche Bank. "As you move from seconds to milliseconds to microseconds and nanoseconds, the advantages plummet" since investors are making less while the cost continues to increase exponentially.

Ever since the US "flash crash" in 2010, the jury is still out as to whether high frequency trading is good or bad. Computer systems operating at such high speeds react too quickly, making them twice as susceptible to bogus messages, manipulation and algorithms "going wrong". In sophisticated machines like these, there can be 7 to 8m lines of algorithmic codes embedded into them, and if one code has an error, on-lookers in the market will be swift to take advantage of the mistake. Just a day before our event, an error within the Goldman Sachs system sent erroneous trade orders for 17 minutes to multiple exchanges, creating losses to the bank estimated at \$100m. Similarly, an August 16 incident cost China Everbright Securities a trading loss of \$31.7m after errors in its order-execution systems triggered a buying frenzy in the Shanghai Composite Index.

Software that allows algorithms to scan news feeds, social media platforms and blog posts are useful for helping traders quickly pick up on key words such as terrorist attack, as well as words based



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on market sentiment. But observers question the risks of high frequency trading when such software captures a bogus key word or phrase. The April 23 “Hash Crash” is such an example, where a bogus tweet planted into the Associate Press’ Twitter feed, reported that President Obama was injured after an explosion at The White House. And in turn, this caused the Dow Jones Industrial Average to tumble 143 points. “The computer decides to buy now and ask questions later” notes Hani Shalabi, Managing Director for Credit Suisse. He further adds that machines amplify the effect of the so-called “fat-finger” error.

The proliferation of dark pools is an added cause for concern, even more so because high frequency traders now have greater access to them. Dark pools are prevalent and fragmented in the US, making up about 30 percent of trading volume, compared to about 2 percent in Hong Kong. According to Ashley Alder, CEO of the Hong Kong Securities and Futures Commission (SFC), the kind of fragmentation that occurs in US markets causes problems with price discovery. As Shalabi highlights, “If you want to buy IBM shares, there shouldn’t be 50 places you can go buy it for a good price.” Alder adds that the regulatory approach between the US and Europe differs. In the US, regulators are more concerned with, among other things, system safety and prevention of potential market abuses, whereas in Europe, there is a political overlay as innovations such as dark pools and HFT are viewed by some to have no valuable social purpose.

In the exchanges, for the most part, everything is lit. But with dark pools, details surrounding the buyer, seller and purchase price are not publicly disclosed. With dark pools, the price of the trade is publicly disclosed to the exchange, just after the execution. Regulators are concerned with the extent to which high frequency trading can be used to commit market abuses on dark pools. For instance, high frequency traders could artificially create price differences between exchanges and dark pools, causing a temporary fall in the exchange-price of a share by selling a small quantity, and then placing a large buy order on a dark pool to purchase the share at the reduced price.

But as nefarious as they may sound, our panelists agreed that they are incredibly useful, providing discretion to market participants trading large volumes of stock. They also acknowledged that the real concern is about the potential for dark pools to do damage and it is essential to manage this potential. Leung adds that “certain technology is good for certain traders and it is up to the person that uses it to decide whether to use it for good or bad intentions.” Similarly, speed is not the problem, but how it is applied. Observers fear that market participants will waste no time in profiting from the mistakes made by high frequency traders or technology glitches. Lee notes that “This fear is a good thing as it forces market participants to make a better effort to gain an understanding of the tools, so that they can use them in the right way.” It essentially creates an incentive to take more responsibility to understand the trading tools, and implement adequate testing procedures before the trade goes out.

Our panelists proposed that exchanges should think hard about using circuit-breaker algorithms and fail safe software that will trip when trading becomes erratic.

Alder said that a huge amount of thought has been put into the regulatory approach to electronic trading internationally. He noted that in Hong Kong, the SFC’s position is that intermediaries must have appropriate policies, procedures and controls in place to ensure that their electronic trading



activities which encompass direct market access (DMA) and algorithmic trading will not pose undue risks to the market.

He explained that under the SFC's electronic trading regulatory regime, which will come into effect in January 2014, brokerages are required to implement risk management and supervisory controls to monitor orders and trades by their clients via DMA, such as establishing automated pre-trade controls to prevent "erroneous orders", as well as to conduct due diligence to assess whether each client meets the minimum requirements before granting an individual client DMA access. He also said that intermediaries are required to take steps to ensure that the electronic trading systems they acquire from external/third-party technology vendors are up to standard. This is undoubtedly an additional burden but is inevitable given the risks posed by the adoption of sophisticated - and vulnerable - technologies in electronic trading.

Hong Kong's "last mover advantage"

Could Hong Kong become an electronic trading regulatory innovator due to its late mover advantage? The gap between financial platforms in Asia and those in other leading hubs is great, and will continue to be so for some time

Hong Kong's electronic trading sector is relatively less developed when measured against counterpart financial capitals, including London, New York and even Tokyo. Compared to the US for example, which has a significantly high percentage of high frequency trading – some say as high as 80 percent or so of volumes in cash equities, Hong Kong's remains conservative. It operates only one public exchange, the Hong Kong Exchanges and Clearing Ltd, which imposes a 0.1 percent stamp duty to stocks to slow down trade, and throttles (an inconvenience for high frequency traders) to tame price volatility.

Tokyo and Singapore on the contrary, have a healthy appetite for high-speed trading. Singapore's exchange operates amongst the world's fastest systems (trading arbitrage indexes). In Japan, high-frequency trading has grown in the past three years to around 50 percent of the market, according to Leung. Other emerging markets in Asia including Thailand and Indonesia, are keeping up with the Joneses. For the most part, their markets are hampered by low liquidity volume and outdated infrastructure, including telephones, and fax machines, but are seeking to attract high frequency trading, and are taking steps to revamp their infrastructure. They are mainly seeking to attract higher trading volumes and foreign investment, but one begets the other.

On dark liquidity, Alder notes that although the volume of trades executed in dark pools in Hong Kong are steadily increasing, they are still significantly less than more developed markets. Moreover, as of last year, the Hong Kong stock exchange imposed the mandatory flagging of dark pool transactions to enhance post-trade transparency. Alder notes that Hong Kong can benefit from a "last mover advantage" as it sits in a unique position where it can learn from the experiences of other more developed markets that have actively embraced alternative trading venues but are now struggling with how to regulate them. With this in mind, the SFC has conducted a review concerning the licensing and supervision of dark pools with the objective of developing a consistent and clear set of standards, to which all dark pool operators in Hong Kong will have to adhere, according to Alder. He added the SFC plans to consult the public about these standards shortly.



Conclusion

According to Alder, Hong Kong needs to make the most of its last mover advantage based on answering a single question “what are the optimum ways of using trading technology to increase efficiency whilst ensuring market integrity and safety?”. Hong Kong could serve as a regulatory platform from which other emerging economies in Asia can learn in consolidating their own markets moving forward.

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Economist Corporate Network (ECN) is The Economist Group's advisory, briefing and networking service for Asia-based senior executives seeking insight into economic and business trends in key growth markets. Through a tailored blend of interactive meetings, high-calibre research, and private client briefings, ECN Asia delivers country-by-country, regional, global and industry-focused analysis.

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