

Connecting to Future Opportunities: Cross-Border Low Latency Connectivity

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EXECUTIVE SUMMARY

Connecting to Future Opportunities: Cross-Border Low Latency Connectivity, commissioned by NTT Communications and produced by Aite Group, analyzes new opportunities emerging from Asian financial centers and examines the benefits and challenges of tapping into major Asian financial centers, particularly with regard to connectivity and access. The study examines growing trading opportunities in Tokyo, Singapore, and Hong Kong, and how having access to cost-effective, low latency connectivity across these major financial centers can create new market opportunities for those firms looking to move beyond U.S. domestic markets.

Key takeaways from the study include the following:

- Over the last few years, expected competition from off-exchange liquidity pools and adoption of sophisticated trading tools have generated much excitement within major Asian financial centers.
- As Asian exchanges begin overhauling their IT infrastructures to align themselves with changing market microstructure, brokers and customers will need to focus on updating their trading technologies to keep up.
- Each major Asian financial center has its own unique set of infrastructure and regulations, which makes it difficult for small market participants to actively participate in Asia.
- With high frequency trading firmly entrenched in the U.S. and European markets, the Asian markets have become the next frontier of opportunities for most large high frequency trading firms.
- Operating in a trading environment in which every millisecond counts, firms with aspirations in the Asian market must build their overall Asian strategy on top of cost-effective and reliable low latency connectivity infrastructure.

Given the integrated nature of today's financial markets, an increasing number of market participants in the United States are looking for cost-effective ways to expand beyond their borders and find opportunities in rapidly changing Asian markets.

In today's marketplace, various outsourced vendor solutions offer not only reliable, low latency connectivity to all major financial centers in both the U.S. and Asian markets, but also options for colocation/proximity hosting and fully managed global support. With these essential infrastructure components in place, the fear of distance latency between the two major financial regions is no longer a major obstacle, allowing firms to focus on expanding their opportunities to capture alpha across the two regions.

INTRODUCTION

The dynamics within the global financial markets have changed dramatically over the last decade. Adoption of electronic trading across all major regions has opened up new competition as well as challenged the status quo. Phone-based manual traders have become relics of the past, and today's market is increasingly dominated by electronic trading firms relying on low latency infrastructure and microsecond trading strategies. The market makers of yesterday created a lucrative business leveraging information advantage; today's electronic market maker continues to grow leveraging technology advantage.

Consolidation of the global exchange market has the potential to fundamentally change how and where capital is raised. More importantly, however, the recent announcement of the potential merger between NYSE Euronext and Deutsche Boerse is a clear indication that major financial markets have become increasingly integrated and global in nature with exchanges seeking to gain an advantage over competition under the new market environment by combining their resources and coverage. It is no longer sufficient for a major market participant to focus on its insulated domestic market. Instead, global opportunities must be sought out, and technology will play a pivotal role in shrinking the global financial marketplace into a tightly intertwined virtual marketplace.

While U.S. and European markets tend to garner most of the attention when it comes to market structure changes and innovative IT adoption, one cannot simply overlook the vast opportunities that currently exist in the Asian markets. Following the paths of their counterparts in the U.S. and European markets, most major Asian financial centers are also going through fundamental changes, albeit in a more deliberative way. In the exchange consolidation front, the Singapore Exchange (SGX) launched a bid to acquire the Australian Securities Exchange (ASX) in late 2010. This bid faces many obstacles, including potential political backlash in Australia, but it also signals potentially the first salvo in a long-awaited exchange consolidation trend in Asia. In Japan, a recent news leak indicated a potential merger between the Tokyo Stock Exchange (TSE) and Osaka Securities Exchange (OSE), with a possible consideration of Tokyo Commodity Exchange (TOCOM) joining the mix, indicating willingness of domestic exchanges to work together to combat competition from abroad.

Overall, changes are gradually occurring at the market structure level throughout major Asian financial centers, and market participants are committing resources to develop high performance trading infrastructure. Foreign and domestic high frequency trading firms have also emerged in recent years in anticipation of significant opportunities.

Against this competitive backdrop, this study analyzes new opportunities emerging from Asian financial centers and examines the benefits and challenges of tapping into Asian financial centers, particularly with regard to connectivity and access. The study examines growing trading opportunities in Tokyo, Singapore, and Hong Kong, and how having access to cost-effective, low latency connectivity across these major financial centers can create new market opportunities for firms looking to move beyond domestic U.S. markets.

MARKET REALITY

With competition in both U.S. and European markets maturing, the Asian financial markets appear to represent the next frontier. Over the last few years, expected competition from off-exchange liquidity pools and adoption of sophisticated trading tools have generated much excitement within major Asian financial centers. Until recently, however, regulatory, IT, business, and cultural obstacles have hampered progress of impending market structure changes.

Still, changes are afoot; major market centers throughout Asia are making gradual moves toward greater liberalization of regulations and upgrades in IT infrastructure, signaling their willingness to participate in the global competition for liquidity and innovation.

This section briefly examines some of the key changes that have shaped the competitive environment within the U.S. and Asian financial markets.

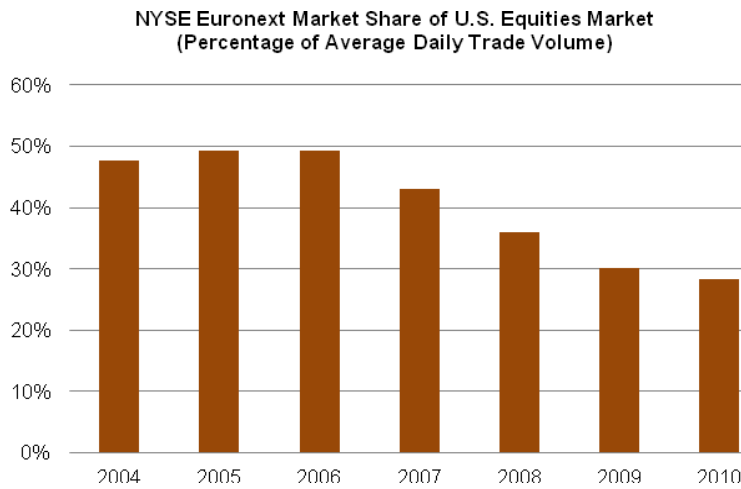
MARKET STRUCTURE CHANGES

INCREASE IN COMPETITION AND MARKET FRAGMENTATION

The U.S. equities market has undergone significant changes over the last decade, moving from a virtual duopoly to a market structure characterized by extensive fragmentation and high levels of electronic trading adoption. As a result, execution venues have had to fight for every single piece of market share, leading to aggressive pricing and information distribution to attract additional liquidity. This competition has led to creation of a more efficient and transparent marketplace. Competitive market environment and regulatory changes have also resulted in substantial tightening of spreads. At the same time, sourcing and interacting with liquidity has become more complex for buy-side clients, driven by proliferation of multiple execution venues and declining depth at public markets' national best bid and offer (NBBO).

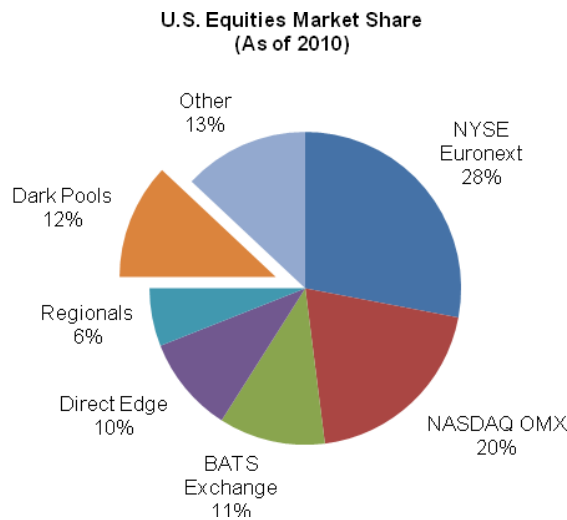
Nothing epitomizes the drastic change in U.S. market structure more than the rapid market share decline of NYSE Euronext; its market share declined from close to 50% in 2004 to 28% at the end of 2010 (Figure 1). While the combined market share of traditional exchanges, represented by NYSE Euronext and NASDAQ OMX, has declined substantially since 2009, exchanges have collectively recaptured market share. Most of the recent market share wins have come via leading electronic communication networks (ECNs) such as BATS and Direct Edge acquiring exchange licenses. Exchanges accounted for close to 75% of market share at the end of 2010, followed by dark pools, with 12%. Other displayed alternative trading systems (ATs) and wholesale market makers represent about 13% of total market share (Figure 2).

Figure 1: Shrinking NYSE Euronext Market Share



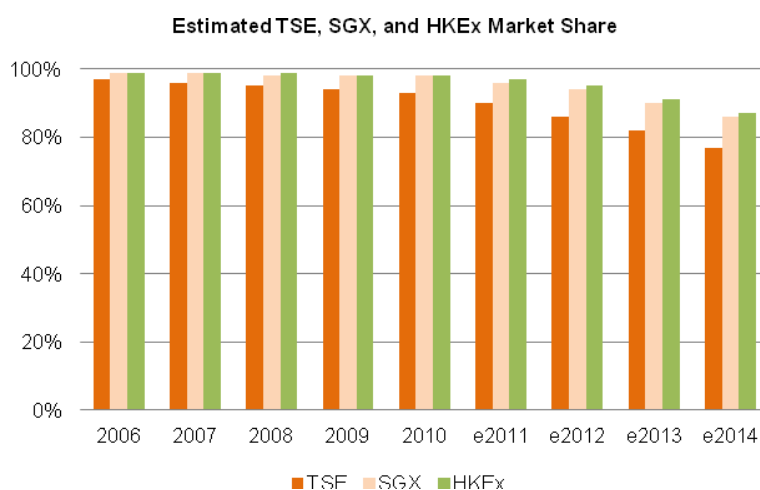
Source: NYSE Euronext, NASDAQ OMX, BATS Exchange, Direct Edge, Broker/Dealers, Aite Group

Figure 2: Market Fragmentation in the U.S. Equities Market



Source: NYSE Euronext, NASDAQ OMX, BATS Exchange, Direct Edge, Broker/Dealers, Aite Group

In Japan, Singapore, and Hong Kong, incumbent exchanges, TSE, SGX, and Hong Kong Exchange and Clearing Limited (HKEx), continue to dominate their domestic markets, each exchange accounting for more than 90% of its domestic market share in trading volume (Figure 3).

Figure 3: Current Reality in Major Asian Exchanges

Source: Tokyo Stock Exchange, Singapore Exchange, Hong Kong Exchange and Clearing Limited, Aite Group

The adoption rate of first-generation Asian ATSs, hampered by lack of pan-Asian regulations and robust trading infrastructure and coupled with low customer interest, has failed to live up to market expectations. Still, competition has been building over the last few years from independent alternative execution venues and global broker/dealers that are fine-tuning the crossing services they have designed for the Asian market.

Table A: Sample List of ATSs in Asia

Firm	Launch Date	Country of Operations	Ownership	Type
AXE ECN	N/A	Expected in Australia, New Zealand	NZX, Citigroup, CommSec, Goldman Sachs JBWere, Macquarie Bank, and Merrill Lynch	Displayed
BlocSec	2008	Hong Kong, Singapore, Japan	CLSA Asia-Pacific Markets	Non-Displayed
Chi-East	2010	Singapore	SGX and Chi-X	Non-Displayed
Chi-X	2011	Expected in Australia, Japan	Nomura Holdings Inc.	Displayed
Crosspoint	2010	Hong Kong, Japan	Tora Trading	Non-Displayed
Kabu.comPTS	2006	Japan	Kabu.com, Credit Suisse, Mitsubishi UFJ Securities, UBS, BNP Paribas	Displayed

Firm	Launch Date	Country of Operations	Ownership	Type
Liquidnet Asia	2007	Hong Kong, Singapore, Japan, Australia	Liquidnet Holdings	Non-Displayed
Monex Nighter	2001	Japan	Monex	Displayed
SBI Japannext	2007	Japan	SBI Holdings, Goldman Sachs, Rakuten, ORIX, CLICK, Credit Suisse, Merrill Lynch, etc.	Displayed

Source: PTS

- Japan:** While some of the earliest ventures into the alternative liquidity markets can be traced back to Japan, first-generation ATs (referred to as PTSs in Japan to denote their legal name, proprietary trading systems) typically originated from retail online brokerage firms looking to add trade volume during after-market hours. In recent years, however, SBI Japannext and Kabu.comPTS have attracted investments from global brokers and launched competitive services during TSE market hours.
- Singapore:** BlocSec is a crossing network for institutional investors looking to execute block trades of securities listed on the SGX. Having met with mixed results, BlocSec has retreated into CLSA, its parent company. The launch of Chi-East, a non-displayed pool joint venture between SGX and Chi-x, is being watched quite closely; it is the only example in Asia of an incumbent exchange working closely with a potential rival to create an alternative dark pool.
- Hong Kong:** The Securities and Futures Commission (SFC) in Hong Kong has allowed off-exchange trading through issuance of type-7 license (registration to operate Automated Trading Services, or ATs), but it has been quite selective in terms of approval, and all ATs must report and clear through HKEx.

In addition to these alternative pools, brokers have launched their non-displayed crossing engines across key financial centers in Asia. Sample brokers and their crossing capabilities across a few major Asian financial centers are highlighted in Table B.

Table B: Broker Crossing Initiatives in Asia

Broker	Crossing Platform	Australia	Hong Kong	Japan	Korea	Singapore
Citi	Citi Match	No	Yes	Yes	No	No
Credit Suisse	Crossfinder	Yes	Yes	Yes	No	Yes

Broker	Crossing Platform	Australia	Hong Kong	Japan	Korea	Singapore
Deutsche Bank	Deutsche Bank ATS	No	Yes	Yes	No	No
Goldman Sachs	SIGMA X	No	Yes	Yes	No	No
Instinet	CBX in HK and Japan JapanCross in Japan KoreaCross in Korea	No	Yes	Yes	Yes	No
ITG	POSIT	Yes	Yes	Yes	No	No
Merrill Lynch	MLXN	No	Yes	Yes	No	No
Morgan Stanley	MS Pool	No	Yes	Yes	No	No
UBS	PIN	Yes	Yes	Yes	No	No

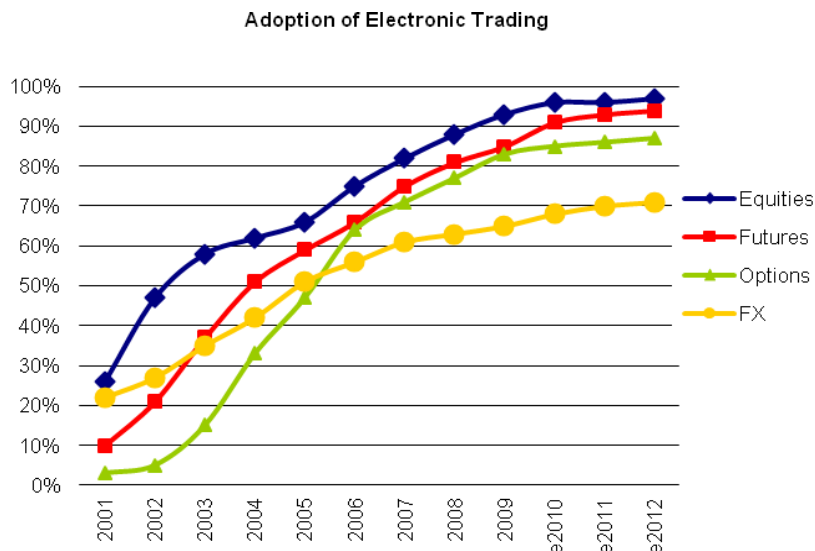
Source: Broker/Dealers

While independent ATSs faced with inflexible regulations struggle to begin operations, most broker/dealers have operated their own internal crossing platforms for a couple of years now, mainly focused on the Japanese and Hong Kong markets. As markets become more electronic and major Asian market centers begin to fragment, these internal crossing engines will enable broker/dealers to provide a wide array of liquidity services to their clients.

LEVEL OF ELECTRONIC TRADING ADOPTION

The rapid adoption of electronic trading is no longer an American phenomenon. All major exchanges globally currently operate electronic matching engines. While broker/dealers have led the way in development of sophisticated trading applications, various client segments globally have fully embraced the concept of electronic trading, including actively trading hedge funds and high frequency proprietary trading firms.

Estimated adoption of electronic trading is predictably quite high across the major exchange-traded instruments, including equities, futures, and options. While it is an over-the-counter (OTC) product, the extremely liquid FX market also represents a truly global, electronic marketplace (Figure 4).

Figure 4: Estimated Adoption of Electronic Trading

Source: Aite Group

GLOBALIZATION OF MARKET PARTICIPATION

Beyond the obvious interests between the U.S. and European markets, financial markets in Asia are increasingly becoming important locations for global broker/dealers and their customers alike. As firms seek new opportunities across the globe, however, a few obstacles have become apparent:

- Potential for political and regulatory instability;
- Lack of consistency in IT infrastructure within emerging markets;
- Existence of protectionist policies to insulated domestic incumbent exchanges and financial service firms from external competition;
- Exorbitant costs of developing local presence; and
- Lack of viable third-party vendor community.

Despite these hurdles, globalization of financial markets will continue as firms look to diversify their risk and optimize their existing organizational and IT infrastructures.

REGULATORY REALITY

Regulatory pressures continue to rise, especially after the credit crisis of 2008. No market appears to be safe from regulatory scrutiny. In the United States, the entire market microstructure has come under the microscope in the exchange-trade markets, including equities, options, and futures. In the cash equities market, many regulatory discussions have

taken place over increasing market fragmentation, growing market share of dark pools, controversy around naked market access, and market clout of high frequency trading. In the OTC market, the focus has been on centralized clearing and increased transparency in the most liquid OTC products, including vanilla interest rate swaps (IRS) and credit default swaps (CDSs). There is also the proposal for the creation of Swap Execution Facilities (SEF) in the U.S. OTC market, where transactions of standardized swap instruments are expected to take place.

In Asia, Japan appears to be the most similar to the United States in terms of having a regulatory precedence for the existence of alternative execution venues. In fact, Japan has had PTSs operating for close to a decade. Within this regulatory framework, the TSE set in motion potential competition against various PTSs with the launch of arrowhead in January of 2010.

After years of regulatory frustration, Australia appears to be heading in the right direction with the approved handover of market supervision from ASX to the Australian Securities Investments and Commissions (ASIC). This change would pave the way for the eventual entrance of new competition in the Australian market, which is not expected until at least the second half of 2011.

Following a mixed reception of Asia's first local crossing platform, BlocSec, SGX is working with Chi-X to launch Chi-East, an exchange-integrated dark pool. Perhaps more importantly, SGX has launched a bid to acquire ASX in an attempt to create a powerful new Asian exchange, potentially paving the way for exchange consolidation in Asia.

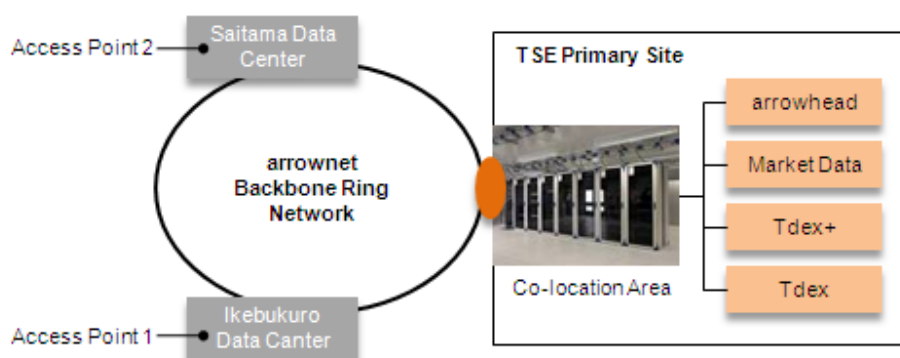
CHANGES IN DOMESTIC IT INFRASTRUCTURE

EXCHANGE TECHNOLOGY CHANGES

The massive changes in IT infrastructure within the U.S. financial markets have made it possible for the emergence of hypercompetitive environment over the last decade. All U.S. exchanges currently operate in hundreds of microseconds, and offer colocation and proximity access solutions to ensure they are able to accommodate the latency-sensitive customer base.

With the launch of arrowhead in January 2010, the TSE ushered a new wave of competition into the Japanese equities market. It also created excitement in other major Asian financial centers, providing a glimpse of what the future may hold in terms of Asian-wide market structure changes. By lowering latency, offering colocation options, and changing specific rules to increase trade volume and tighten spreads, arrowhead is expected to have a substantial impact on the overall development of the Japanese market, including increased high frequency trading flow, growing market competition, and declining execution costs.

TSE's recent agreement with NYSE Euronext to explore possible interconnection of their respective networks, arrownet™ and Secure Financial Transaction Infrastructure (SFTI®), indicates current market dynamism that requires cross-border low-latency solutions for investors in both markets.

Figure 5: Launch of arrowhead in Tokyo Stock Exchange

Source: Tokyo Stock Exchange

Not surprisingly, other Asian exchanges have followed suit in terms of committing substantial resources to launch new or upgrade existing exchange technology infrastructures. Table C presents brief descriptions of new IT initiatives within major Asian exchanges.

Table C: New Exchange Technology Initiatives

Exchange	Initiative	Launch Date	Details	Latency and Capacity
TSE	Launch of arrowhead	Jan 4, 2011	Next-generation low latency exchange trading platform with colocation service	Matching engine processing speed of 5 milliseconds, 4.68 million orders per day
ASX	Launch of ASX Trade	Dec 3, 2010	Next-generation low latency exchange trading platform for both derivatives and cash markets using NASDAQ OMX's Genium INET platform	Matching engine processing speed of 300 microseconds, 100,00 orders per second
HKEx	Planned upgrades to AMS	In progress	Plans to improve latency and capacity of its existing platform	Matching engine processing speed of 9 milliseconds, 30,000 orders per second
SGX	Planned launch of SGX Reach	Expected launch in Aug 2011	Next-generation low latency exchange trading platform for cash markets using NASDAQ OMX's Genium INET platform	Matching engine processing speed of 90 microseconds, 1 million orders per second
OSE	Launch of J-GATE	Feb 2011	Next generation trading platform using NASDAQ OMX's CLICK XT platform	Matching engine processing speed of 5 milliseconds, 12,000 orders per second

Source: Exchanges

- **ASX initiatives:** Leveraging NASDAQ OMX's Genium INET platform, ASX's next-generation trading platform, ASX Trade, provides drastic improvement in overall performance, handling 100,000 orders per second compared with 20,000 orders per second in 2008; ASX Trade also significantly reduces latency, averaging 300 microseconds today compared with 30 milliseconds in 2008. The new trading system has been launched in conjunction with expanded colocation facilities, rollout of ASX Net (low latency, fully managed network), and enlarged data center.
- **HKEx initiatives:** Aiming for end of 2011 as the deadline, HKEx is currently undergoing upgrades to its existing trading and market data distribution systems, Automatic Order Matching and Execution System (AMS) and Market Data System (MDS), respectively. As a result, the enhanced AMS will increase its overall capacity tenfold, averaging 30,000 orders per second and reducing average latency to nine milliseconds, which would be 16 times faster than the current average. AMS will also be able to display 10 levels of price rather than the current five. On the market data side, MDS will be able to double its data dissemination throughput to 2,000 stock page updates per second. In addition to system upgrades, HKEx will be offering low latency colocation services at its next-generation data center (NGDC) in Hong Kong's Tseung Kwan O Industrial Estate. The migration into the next NGDC is scheduled to be completed by Q4 2012.
- **SGX initiatives:** Committing US\$250 million to the project, SGX has begun an ambitious IT infrastructure overhaul of its existing platform. Leveraging NASDAQ OMX's Genium INET platform, SGX will dramatically lower its average latency level to 90 microseconds with the ability to handle 1 million orders per second. In addition to the new platform, SGX will be offering low latency, fully managed colocation services via its new data center at Keppel Digihub. In an attempt to attract greater cross-border flow, SGX will also establish presence in major data centers in Chicago, New York, London, and Tokyo.
- **OSE initiatives:** While TSE dominates the Japanese cash market, there are numerous derivatives exchanges in Japan, including OSE, Tokyo Financial Exchange (TFX), and TOCOM. OSE represents the largest derivatives market in Japan by a wide margin, with TFX and TOCOM ranked as the second and third largest respectively. OSE launched its new trading platform J-GATE, leveraging NASDAQ OMX's CLICK XT platform, dramatically lowering its order processing latency from 100 milliseconds to 5 milliseconds. The matching engine's throughput has also improved with the ability to process 12,000 orders per second. In addition, OSE has expanded its colocation environment and transitioned into a new integrated network, GATENET, to accommodate J-GATE's enhanced performance.

IMPACT OF ELECTRONIC TRADING IN IT PLATFORMS OF MAJOR MARKET PARTICIPANTS

As exchanges begin overhauling their IT infrastructures to align themselves with changing market microstructure, brokers and customers will need to focus on updating their trading technologies to keep up. Some of the areas for potential change include the following:

- Intense pressure on broker/dealers to upgrade IT infrastructure to compete in a low latency, potentially fragmented trading environment, including focus on direct market access (DMA), algorithms, smart order routing, pre-trade risk compliance, colocation, connectivity, and more;
- Increased use of self-directed trading technologies by customers in addition to continued support from brokers to better understand the changing trading environment;
- Growing importance of trading analytics to properly measure overall trading performance in pre-trade, intraday, and post-trade basis; and
- Need to discover cost-effective solutions to support increasingly global nature of their business, including trading applications, hosting, connectivity, and more.

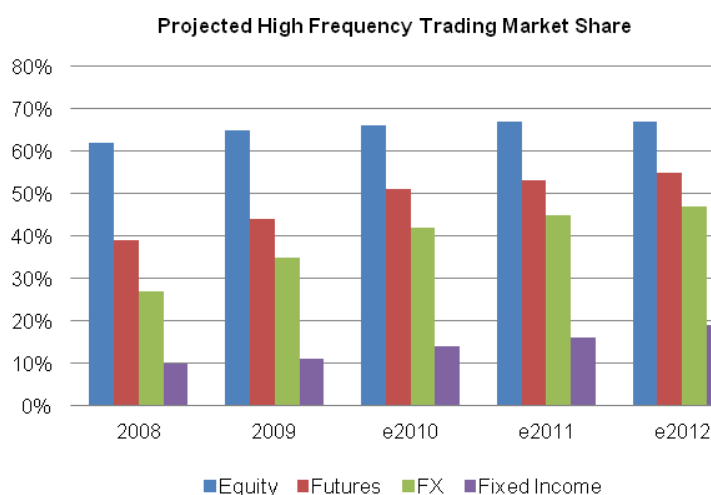
GLOBAL EXPANSION OF HIGH FREQUENCY TRADING

Undoubtedly, one of the major changes over the last few years has been the expansion of high frequency trading across major asset classes and regions. Attracted by markets that exhibit high levels of liquidity, market transparency, consistent regulatory regime, and inherent inefficiencies, high frequency trading firms have moved well beyond the U.S. equities market to become a major driving force for change and innovation worldwide.

HIGH FREQUENCY TRADING IN MULTIPLE ASSET CLASSES

While the cash equities market still garners most of the publicity involving high frequency trading, major low latency players have moved into multiple asset classes:

Figure 6: Estimated Adoption of High Frequency Trading



Source: Aite Group

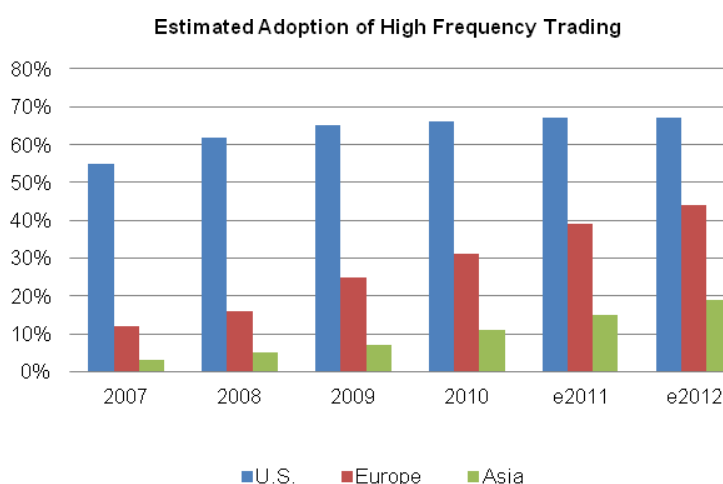
- **Listed options and futures:** Exhibiting high levels of liquidity and low latency market IT infrastructure, U.S. exchange-traded equity options and global futures markets have become popular markets for high frequency trading.
- **FX:** As one of the few OTC products to be very liquid, FX has been an active market for high frequency trading firms for the last few years. The market remains highly electronic, with competition for flow across multiple single bank, multi-bank, and interbank platforms. High frequency trading firms have become major players in FX, often accounting for more than 40% of average daily volume in major FX execution venues.

- **Fixed income:** While the fixed income market lags in terms of liquidity and transparency, active high frequency trading market does exist in the U.S. treasuries market, especially within interbank trading platforms such as eSpeed and BrokerTec.

GLOBAL ADOPTION OF HIGH FREQUENCY TRADING

Starting with the U.S. market, high frequency trading has spread across the globe in a relatively short period of time (Figure 7). While Europe has been slated for the next huge adoption of high frequency trading, the Canadian equities market has in recent years experienced a significant presence of high frequency trading flow, typically accounting for close to 40% of average daily trade volume.

Figure 7: Estimated Adoption of High Frequency Trading in Major Regions

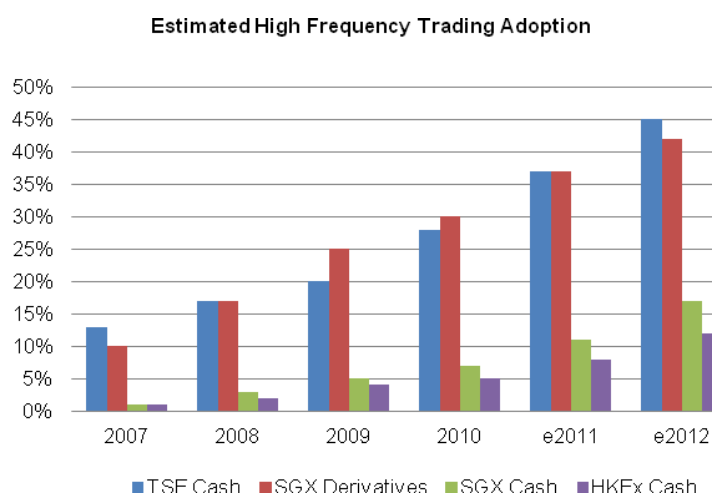


Source: Aite Group

- **U.S. market:** The U.S. market currently leads the world in high frequency trading adoption with approximately 65% of daily trade volume.
- **Europe:** With increasing market fragmentation and adoption of sophisticated trading tools, a growing number of high frequency trading firms have participated in the European equities market. High frequency trading in Europe currently represents about 30% of daily trade volume.
- **Asia-Pacific:** Unlike the other two major financial regions, the Asian market remains fairly insulated when it comes to high frequency trading, with certain financial centers being more open to accommodate the growth of high frequency trading. With the launch of arrowhead and related products and services that are attractive to high frequency trading community, TSE has been actively recruiting high frequency trading flow. As a result, more than 25% of daily volume can be attributed to high frequency trading volume. Within the SGX, the derivatives market has been a

popular market for high frequency trading, representing 30% of daily volume. However, the cash equities side remains under-adopted, with approximately 7%. In Hong Kong, high frequency trading in the cash market is even lower than Singapore with 5% (Figure 8).

Figure 8: Estimated High Frequency Trading in Major Asian Exchanges



Source: Tokyo Stock Exchange, Singapore Exchange, Hong Kong Exchange and Clearing Limited, Aite Group

IMPACT OF HIGH FREQUENCY TRADING

The various changes in market structure have made it possible for active participation of high frequency trading firms. As high frequency trading continues to grow across regions and asset classes, major financial centers globally have experienced fundamental changes across trading, IT, and regulatory environment.

- **Increase in trade volume:** The most obvious impact has been substantial increase in trading volume. At the same time, overall messaging volume has spiked, driven by the active nature of high frequency trading and high levels of cancellation rates.
- **Tighter spreads and decrease in explicit execution cost:** As high frequency trading firms have become modern-day market makers, competition for flow has intensified, leading to much tighter spreads. While debates continue over potentially rising implicit execution costs related to market impact, there is no doubt that explicit execution costs have dropped dramatically for both institutional and retail investors.
- **Growing demand for high performance, low latency infrastructure upgrades:** In order to properly participate in a fast trading environment, IT infrastructures of all major market participants, including exchanges, broker/dealers, hedge funds, asset managers, and proprietary trading firms, have been under a tremendous amount of pressure for upgrades. Operating in a microsecond trading environment dictates that

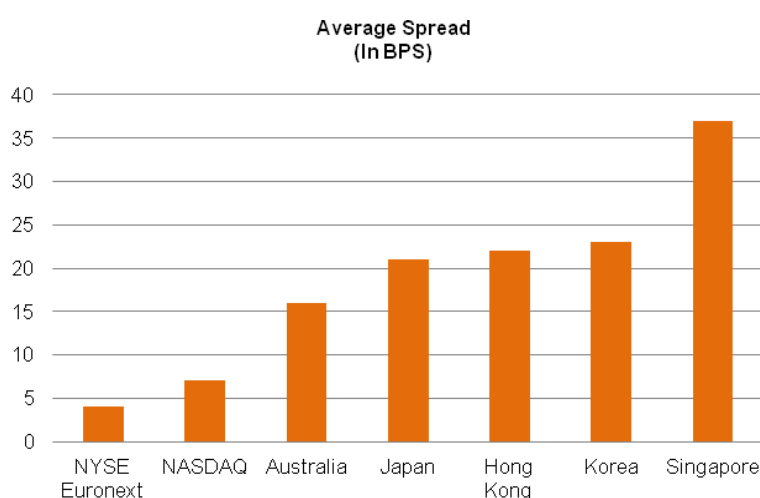
every precious second could mean the difference between millions of dollars of opportunities won or lost.

- **Increased regulatory scrutiny:** Unfortunately, as market clout of high frequency trading firms continues to increase, regulators have become that much more concerned about the ultimate impact of high frequency trading on the well-being of the entire market structure.

CHALLENGES AND OPPORTUNITES IN ASIA

Unlike in the U.S. and European markets, Asia lacks a single, pan-Asian capital market. In addition, compared to the leading exchanges in the U.S. market, all major Asian exchanges have a long way to go in terms of reducing transactions costs, which should lead to enhanced liquidity and volume. While both NYSE Euronext and NASDAQ OMX currently average fewer than seven basis points in terms of spreads, major exchanges in Asia are closer to 20 basis points, with Singapore exhibiting a significantly higher average spread of 37 basis points (Figure 9).

Figure 9: Comparative Analysis of Spreads



Source: Exchanges, Aite Group

Even though the prospect of cheaper executions is certainly appetizing, local buy-side customers are also hesitant about the potential trade-off of increased complexity in market structure and additional spending on their own IT infrastructure. While most domestic and foreign brokers have adopted advanced trading technologies, the local buy-side community still relies heavily on telephones and brokers to meet their trading objectives. Lack of understanding regarding sophisticated trading tools, coupled with a dearth of IT knowledge on the buy-side, adds complexity to driving adoption of advanced trade execution tools, including DMA, algorithms, and ATSS.

Despite the challenges, increased market competition looks inevitable, and the ability to scale for both market centers and brokers will be crucial to providing world-class service to a core customer base. Market structure changes are occurring across major Asian financial centers despite regulatory, infrastructural, and cultural obstacles.

THE NEXT FRONTIER IN HIGH FREQUENCY TRADING

With high frequency trading firmly entrenched in the U.S. and European markets, the Asian markets have become the next area of opportunities for most large high frequency trading firms. Certain regulatory and structural issues still exist across major Asian countries, including vertical integration of clearing facilities with existing exchanges, questionable depth of market and liquidity, wide spreads, and large minimum tick size, all of which still pose major obstacles for active participation of high frequency trading firms. Significant changes are occurring in major Asian financial centers, however, that have caught the attention of serious global trading firms:

- **Investments in exchange technology:** Major Asian exchanges, including TSE, ASX, SGX, and HKEx, have committed hundreds of millions of dollars to upgrade their existing technology platforms and offer colocation and proximity solutions to attract actively trading global market participants.
- **Active presence of global broker/dealers:** Sensing greenfield opportunities, global broker/dealers have already created significant local presence in multiple Asian markets, armed with sophisticated trading solutions, including DMA, algorithms, smart order routing, and cross platforms.
- **Continued development of alternative execution venues:** Despite the slow start, alternative execution venues continue to chip away at market share of incumbent exchanges. While the most progress has been made in Tokyo, the battle for market share is expected to intensify in coming years across the region, leading to increased market transparency, declining transaction costs, and ultimately changes in regulations to accommodate market competition.

The biggest hurdle for market and IT innovation has been the lack of a pan-Asian market; each country has its own set of issues and concerns, and local customs and beliefs dictate market practices. This deficiency has also meant the absence of a centralized pan-Asian regulatory body and harmonized market standards, prolonging the overall adoption cycle and forcing both buy-side firms and service providers to take a country-by-country approach. In general, most Asian markets discourage off-exchange transactions.

Depending on the country, clearing and settlement is another area of concern. In Hong Kong, Australia, and Singapore, the primary exchanges own the clearing and settlement organizations. ATSS view clearing and settlement that fall under the umbrella of the incumbent exchanges as a conflict of interest, representing another hurdle for ATSS to overcome and further delaying competition in the Asia-Pacific region.

Potential changes in Japan will be essential for further changes across other Asian markets. The opening of horizontally integrated Japan Securities Clearing Corporation (JSCC) to clear executed trades from PTSs will be another important piece of the puzzle in increasing market competition in Japan. Once Japan has been confronted with increased fragmentation and competition, other markets—Australia, Hong Kong, and Singapore in particular—should be the next financial centers primed for change. Before massive changes can occur, however, each financial center must meet certain conditions:

- Regulatory acceptance of off-exchange, ATS trading;

- IT infrastructure in place to support electronic trading and expected increase in overall messaging volume;
- Horizontal integration of clearing and settlement infrastructure to support multi-venue competition; and
- Exchange rule changes designed to foster trade volume, including decreasing minimum tick size and lowering trading costs.

CHALLENGES IN ACCESSING ASIAN MARKETS

For large global market participants, accessing key Asian markets could mean simple resource allocation and a redirection of certain budget items to actively participate in the Asian markets. For most other firms, there are many challenges to participating in the next Asian electronic revolution:

- **Too expensive to create local presence:** Not many firms globally have enough scale and budget to build local presence across all major Asian financial centers.
- **Concern for built-in distance latency:** For those firms based in the United States and looking to participate in either Tokyo or Singapore, serious concerns arise regarding competitive disadvantage due to distance latency given the emergence of low latency trading flow in those markets.
- **Potential for multiple vendor relationships:** Development of a highly effective trading infrastructure in Asia would require, at minimum, colocation/proximity option, low latency connectivity, market-specific strategy development, smart order routing, and market data platform. For those firms with a focused Asian strategy, securing reliable, low latency access into the various Asian financial centers might lead to the creation of multiple layers of vendor relationships and thus to much higher costs and compatibility issues, which could negatively impact time to market.

OUTSOURCING LOW LATENCY CONNECTIVITY TO ASIA

An obvious lesson from the 2008 credit crisis has been that major financial markets are truly intertwined; the ability, then, to take advantage of opportunities globally remains the only viable strategy in today's hypercompetitive marketplace. With Asian markets continuing to grow rapidly, U.S. market participants have been actively looking for ways to incorporate key Asian markets into their portfolio. Attempting to build out a low latency connectivity infrastructure internally would be cost prohibitive for most firms. Fortunately, many vendor options currently exist, which firms could leverage to outsource the entire operation.

Operating in a trading environment in which every microsecond counts, firms with aspirations in the Asian market must build their overall Asian strategy on top of cost-effective and reliable low latency connectivity infrastructure.

KEY COMPONENTS OF LOW LATENCY CONNECTIVITY IN ASIA

In order to develop a fully integrated global trading operations focused on Asia, the following components must be addressed, whether internally developed or vendor-provided:

Figure 10: Cross-Border Linkage Connecting U.S. and Asian Financial Centers



Source: Aite Group

- **Low latency connectivity to all major Asian financial centers.** With opportunities emerging across multiple Asian financial centers, building low latency connectivity to all major locations is the most basic requirement for any firm with Asian aspirations.
- **Colocation and proximity options.** In addition to connectivity, the ability to colocate or leverage a proximity facility provides a clear competitive advantage to those firms trying to overcome issues associated with distance latency.
- **Reliability and consistency in connection.** For those firms without local physical presence, the reliability and consistency in connectivity to major exchanges and execution venues in Asian financial centers enables them to employ their various trading strategies with utmost confidence.
- **Availability of managed operations.** Most firms do not have a large in-house IT staff that can be leveraged across the globe to maintain their trading infrastructure. Vendors capable of providing a fully managed, hosting services with low latency connectivity to multiple Asian financial centers enable firms to focus on finding profitable trading opportunities while keeping their global infrastructure overhead affordable.
- **Global customer support.** In a global trading environment, global customer support is essential and should include ability to provide ongoing support regardless of the client's time zone.

BENEFITS OF OUTSOURCED LOW LATENCY CONNECTIVITY IN ASIA

Once a robust and fully scalable low latency connectivity infrastructure is in place, firms can begin developing trading strategies linking various Asian and U.S. markets together, and looking for those hard-to-find trading opportunities that may exist for only a split second. Other important benefits of an outsourced low latency connectivity arrangement in Asia include the following:

- **Cost-effective way of creating a trans-Pacific presence:** Leveraging the infrastructure of a vendor whose sole purpose is to maintain and constantly improve the performance of the connectivity solution, a fully managed outsourced solution enables firms to focus on developing trading strategies that can cost-effectively capture opportunities in Asian and U.S. markets.
- **Harmonizing trading infrastructure to participate in multiple markets.** Leveraging a single vendor relationship, firms can gain instantaneous low latency access to multiple markets in both Asia and the United States, making it easier for firms to simplify their trading infrastructure and streamline their vendor relationships.
- **Diversification of risk:** The ultimate goal of global trading is to capture new revenue opportunities while simultaneously diversifying the risk inherent in focusing on a single market.

LOOKING AHEAD

Over the last decade, key market structure changes and innovations in technology and financial products have created a truly global financial marketplace. Given the integrated nature of today's financial markets, an increasing number of market participants in the United States are looking for cost-effective ways to expand beyond their borders and tackle opportunities in rapidly changing Asian markets.

With ongoing market structure changes and an influx of high frequency trading firms in Asia, those firms interested in capturing higher returns in Asia must look to leveraging low latency connectivity platforms to ensure that those opportunities are not missed. Getting access to such an infrastructure once meant multiple vendor relationships across many Asian financial centers, and dedication of in-house IT staff resources to ensure reliability. This approach was more often than not only possible for the largest global firms.

In today's marketplace, various outsourced vendor solutions exist that offer not only reliable, low latency connectivity to all major financial centers in the U.S. and Asian markets, but also options for colocation/proximity hosting and fully managed global support. With these essential infrastructure components in place, the fear of distance latency between the two major financial regions is no longer a major issue, and firms can focus on expanding their opportunities to capture alpha across the two regions.