CELENT

16 November 2010

Global Trends of Trading

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About Celent

- Independent IT Strategy Research for Financial Services Firms
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  - Finance & Risk
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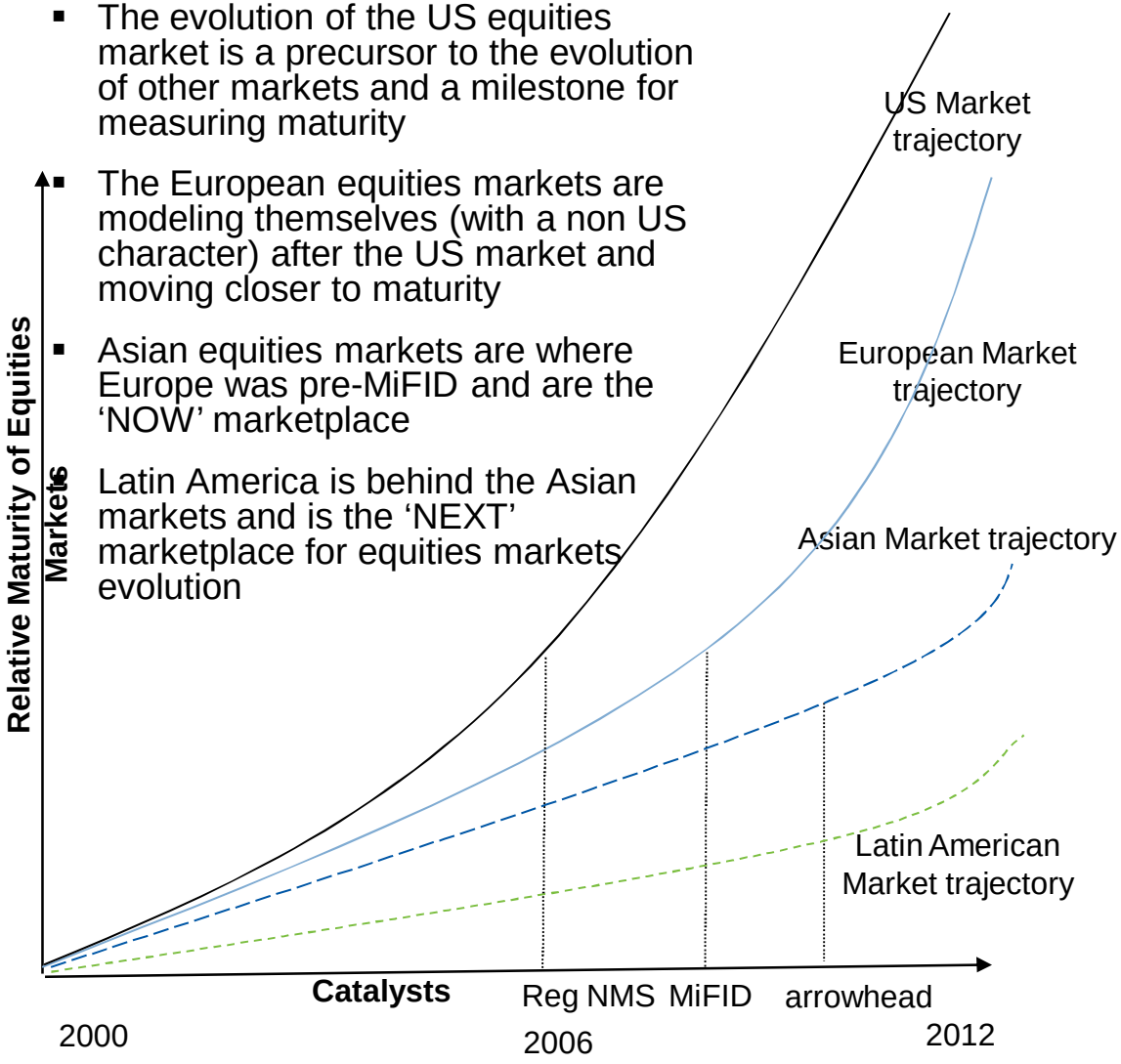
The Evolution of Equities Market Structure in Asia-Pacific

Slow but steady

Asian equities market structure evolution & predictions

Trajectory of Market Evolution

- The evolution of the US equities market is a precursor to the evolution of other markets and a milestone for measuring maturity
- The European equities markets are modeling themselves (with a non US character) after the US market and moving closer to maturity
- Asian equities markets are where Europe was pre-MiFID and are the 'NOW' marketplace
- Latin America is behind the Asian markets and is the 'NEXT' marketplace for equities markets evolution



Mature market structure

- Markets highly fragmented with ATSs at >20%
- HFT significant % of volume (over 30%)
- Internalization and broker-dark pools
- Algorithms necessary to 'sweep' dark pool venues

Mostly mature market structure

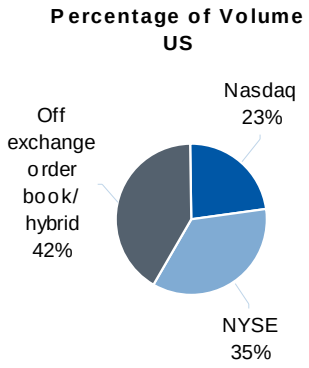
- ATS/MTFs attract less than 20% of liquidity
- HFT in its infancy at less than 30% of volume
- Crossing systems offered by brokers
- Basic benchmark algorithms

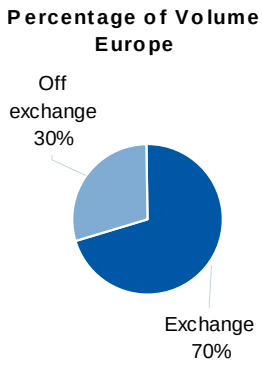
Immature market structure

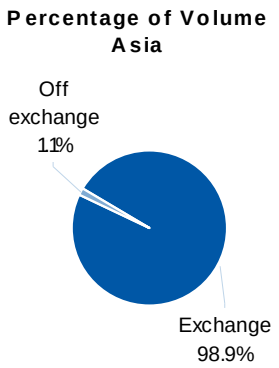
- Markets concentrated on national exchanges
- HFT limited by inferior matching systems and latency
- Crossing systems highly manual
- Algorithms in infancy and limited by more basic market structure
- Market entry limited by incumbent brokerage members

Asian markets are highly concentrated
Fragmented by geography

- 42% of US volume is executed off-exchange, while a slightly lower proportion of 30% is executed on European MTFs like Turquoise and Chi-X - Europe is expected to become more fragmented under MiFID with the rise of the new MTFs/EOBs
- The Asia Pacific region has a non-homogenous but nonetheless concentrated market structure with the majority of equities trading taking place on one flagship exchange per country.
- Due to exchange concentration rules and “regulatory protectionism” in many Asian countries, an overwhelming 98.9% of equities volume is conducted on exchanges
- Fragmentation is extremely low with about 5 to 8 ATSs/PTSs and HFT is estimated to be about 10 to 15% of trading volumes in the most advanced regional market for HFT - Japan
- Crossing systems are highly manual and advanced order types like algorithms are basic (e.g pure VWAP) and have low utilization rate due to slower market data feeds, higher latencies and lack of alternative execution venues.







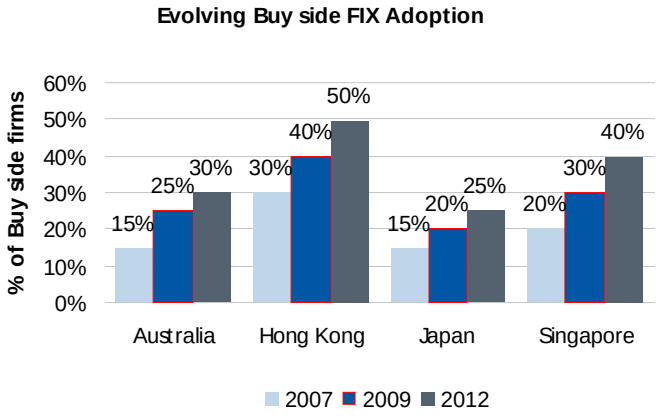
Source: Securities & Exchange Commission (SEC) Rule 605 data, Celent analysis, Oliver Wyman; Note-data may underrepresent some market centers, such as dark pools or crossing systems, which specialize in large orders (such as orders >10,000 shares)

Market Structure Drivers
Regulation

- Regulatory Developments
  - As a result of more heavy-handed regulation, equities market structure in Asia will be slower to evolve than pre-MiFid Europe.
- Australia
  - The Australian equities market has been a regulatory stop-start for the last three years
  - In 2010, regulatory decentralization is expected with the self-regulated Australian Stock Exchange (ASX) to share authority over the securities landscape with the Australian Securities and Investments Commission (ASIC)
  - Previously, crossing rules restricted off-exchange trading as only orders over $10 million were allowed to be matched on alternative execution platforms and printing/clearing has to be done on the exchange
  - Prior 10 second ruling for quotes has now been changed and hence this will enable greater opportunities for internalization and off-exchange crossing.
- Japan
  - TSE's revised regulations on their Remote Trading Participant System to allow overseas financial firms without domestic branches to directly trade in Japan - removing the need for Investor IDs.
  - Off-exchange clearing is to be introduced in July 2010 with JASDEC - a revolutionary step in the region to facilitate more alternative liquidity venues and growth in PTS volumes (currently at less than 1%).
  - Ongoing discussions on unbundling of commissions (ie. CSAs - commission sharing agreements) in Japan, which is already a significant trend in US/Europe and has taken on steam in Asia
- Hong Kong
  - With regards to greater fragmentation, there hasn't been significant signs or plans by the Hong Kong Securities and Futures Commission (HKSFC) to relax off-exchange crossing and reporting rules
- Singapore
  - The Singapore Exchange has allowed banks in Singapore licensed by Monetary Authority of Singapore (MAS) to participate as clearing Members of its securities market
  - On the fragmentation front, MAS has relaxed its position towards crossing networks and in fact with the recent dark pool partnership between SGX and Chi-X to form Chi-East, further off-exchange crossing is promising

Market Structure Drivers
Technology

- Buy Side E-Trading Levels
  - Australia, Japan, Hong Kong and Singapore being the most developed automated markets
  - Decline in 2009: Hong Kong 35%, Australia 20%, Japan 30%, Singapore 22%
  - 2012 buy side electronic trading levels are expected to grow: Hong Kong 55%, Australia 40%, Japan 45%, Singapore 40% of fund volumes
  - Positive electronic trading trends are fundamental to supporting and facilitating the demand for advanced execution tools like algos, SOR, DMA and low-latency connectivity.
- Electronic Trading Trends in Asia
  - Electronic trading levels (CAGR from 2004 to 2007): HKEx 71%, ASX 43%, TSE 25%
  - Decline in GFC in 2008/2009: HKEx -30%, ASX -30%, TSE -39%
  - Decline in EOB trades as % of overall share trading value (2007-2009): ASX -5.4%, TSE -23.4%
- Buy Side FIX Adoption
  - Over the last 3 years, FIX has seen marked growth in adoption, particularly in Singapore and Hong Kong, as hedge funds realized the need to adopt automated trading tools like direct market access, and prepare for future trading developments including smart-order routing and algos
  - 2009: Hong Kong 40%, Australia 25%, Japan 20%, Singapore 30%
  - 2012: Hong Kong 55%, Australia 40%, Japan 45%, Singapore 40%

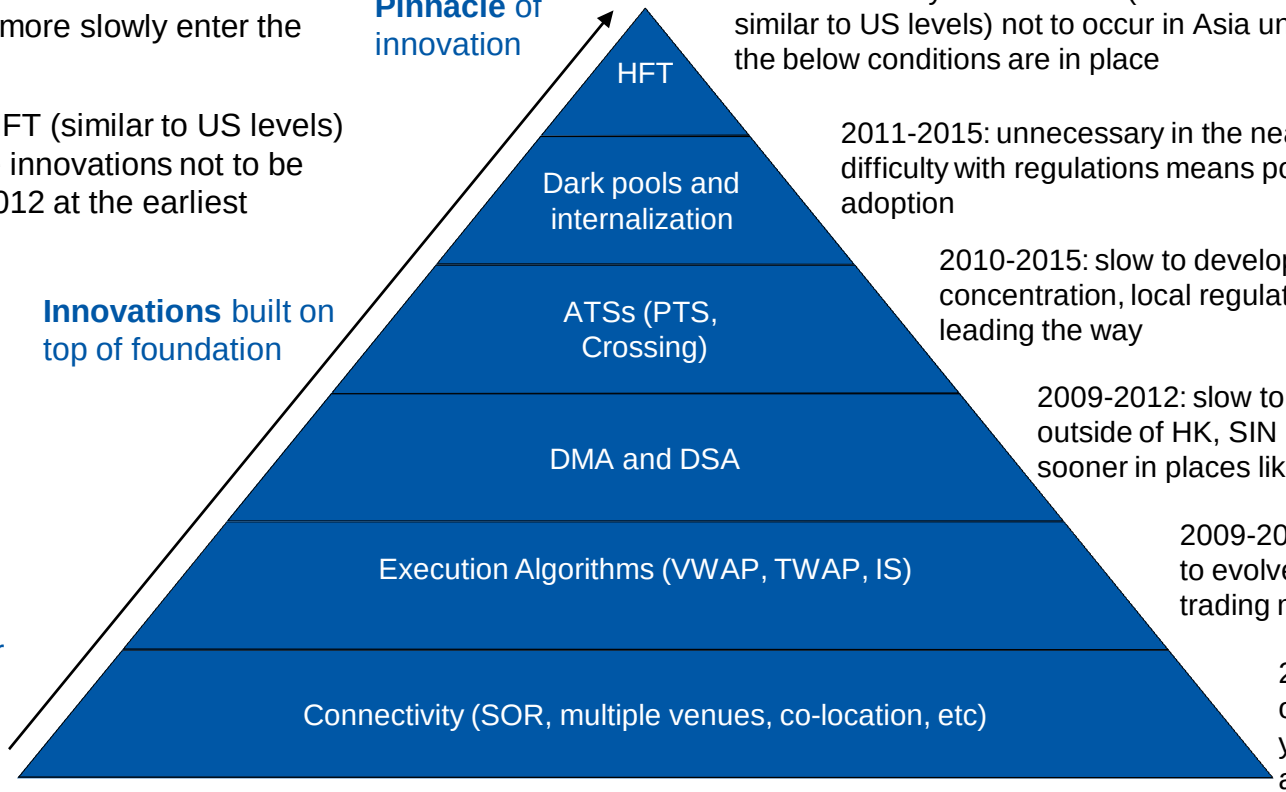


Asia market innovations evolving slowly but steadily

Pyramid represents pace of important technology-driven innovations

Asian equities markets evolution/innovation

- The market structure will more slowly evolve in Asia than in Europe post-MiFID
- As a result, innovations based on technology will more slowly enter the marketplace
- Fully realized HFT (similar to US levels) based on these innovations not to be reached until 2012 at the earliest



Timeline

2012-2015: fully realized HFT (>30% of value, similar to US levels) not to occur in Asia until the below conditions are in place

2011-2015: unnecessary in the near-term and difficulty with regulations means postponed adoption

2010-2015: slow to develop due to exchange concentration, local regulations, with global firms leading the way

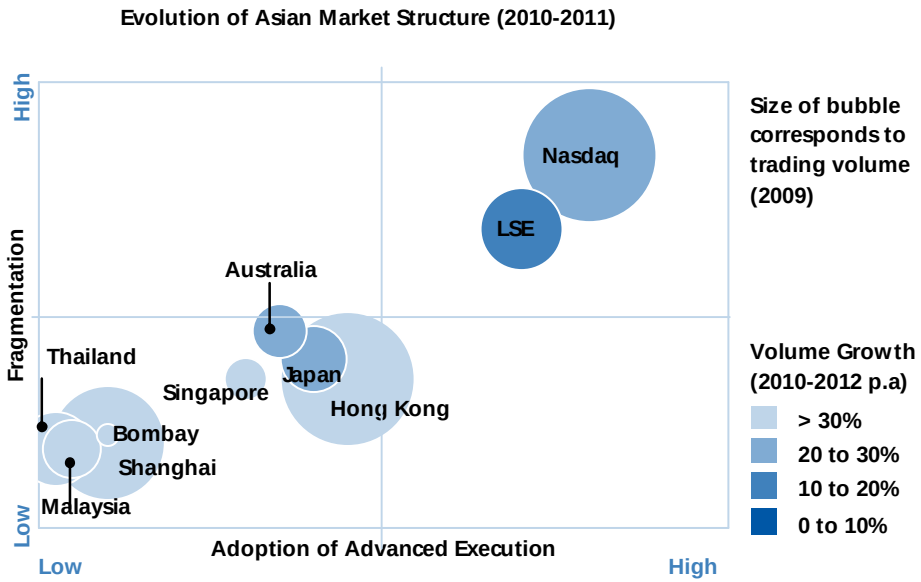
2009-2012: slow to become pervasive outside of HK, SIN but to be realized sooner in places like JP

2009-2011: already beginning to evolve in more advanced e-trading markets of HK, SIN, JP

2009-2010: exchanges offering new services this year and brokerages adding new connections daily

Celent expects a gradual but steady evolution in market structure and fragmentation

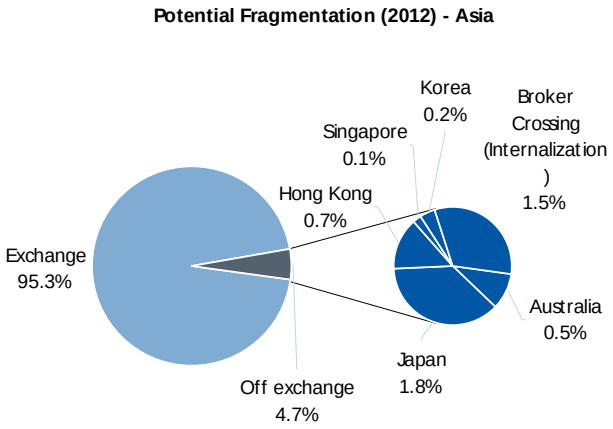
- Limited disruption (low in years 2-3 but gradually increasing over 5 years)
- New entrants gain market share, but incumbent exchanges benefit from overall rise in trading volumes -> “the pie gets bigger”
- Volumes grow by more than 15% a year, primarily driven by economic fundamentals and high-velocity traders and prop. arm of Investment Banks (+15% to +20% p.a.)

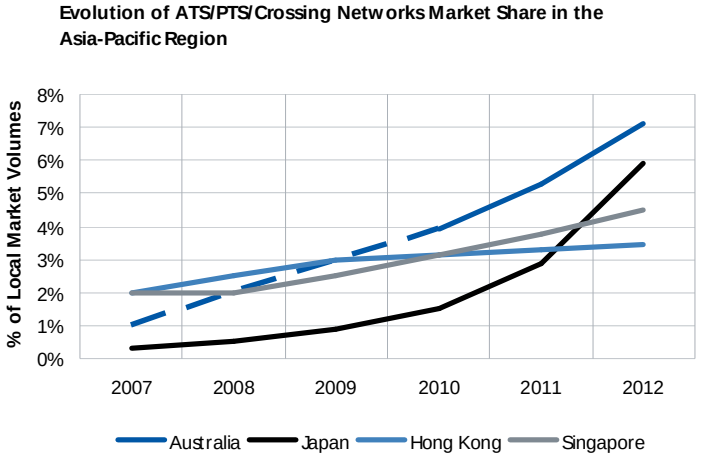


Low Industry Disruption: Fragmentation

We estimate that off-exchange crossing volumes should grow to about 5% of total trading volumes in 2012, up from about 1% in 2009.

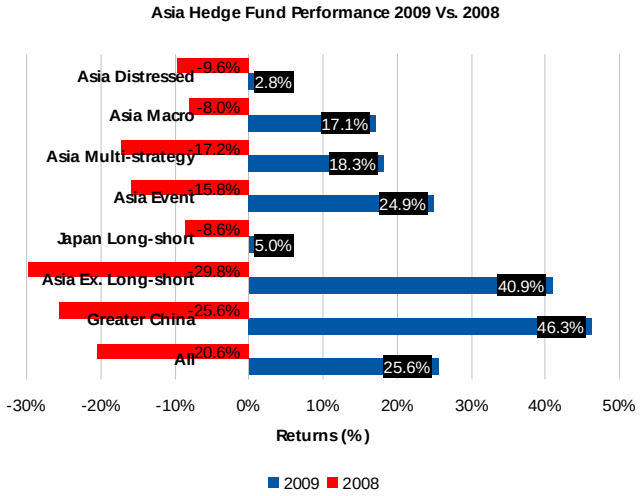
- Exchange dominance has been the standard in the region due to concentration rules and "regulatory protectionism" - this is unlikely to change substantially in the next three years.
- ATSs market share is expected to grow faster than it has from 2003 to 2009
  - Regional: From a low 1.1% in alternative crossing and executions, we foresee that figure to grow to almost 5% in 2012.
  - This relatively significant growth projection is based on regulatory drivers particularly in Australia & Japan
  - Local: Off-exchange share should grow to about 7% in Australia, 6% in Japan, while Hong Kong and Singapore should have ATS/crossing networks share of around 3 to 4%
  - Internalization and broker crossing to be an growing trend especially in Hong Kong, Singapore, and Japanese equities and we expect about 1.5% of the overall 5% to be attributed to internalization

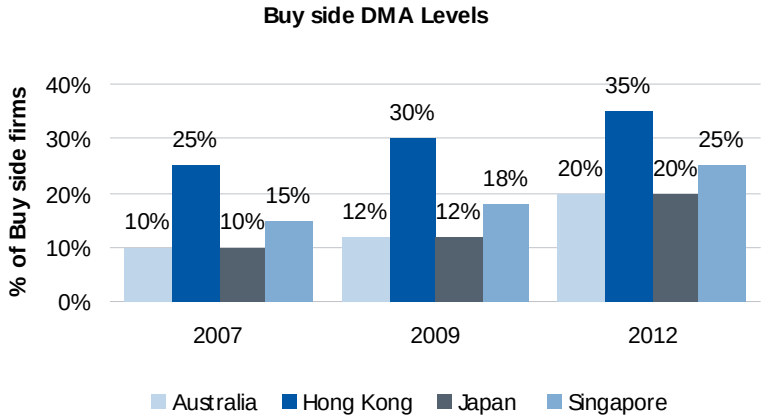


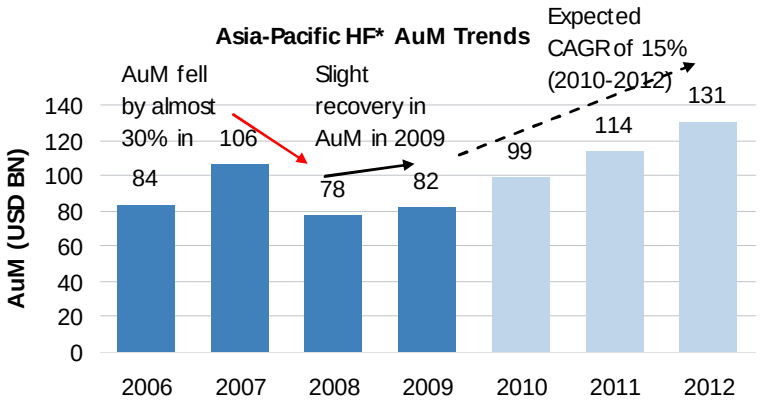


Low Industry Disruption: Execution

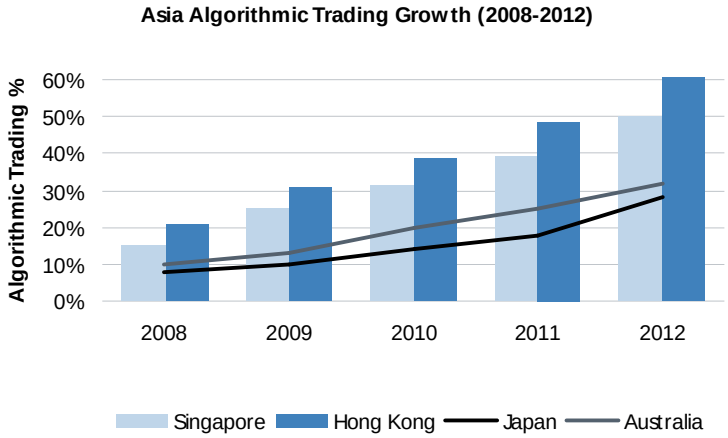
Moderate rate of advanced execution adoption driven by buy side recovery & trading sophistication







* Excluding APAC-focused foreign funds



High Frequency Trading

High frequency trading: Basic definitions

- Celent definition of High Frequency Trading (HFT):
  - The frequent turnover of many small positions in one or more financial instruments (typically in very liquid instruments such as large cap equities) enabled by the detection of minute changes in market inefficiencies through the use of sophisticated technology
  - Examples: statistical arbitrage strategies (index, event and information)
- HFT is different in the Asian markets because of the speeds of the electronic order books

High frequency trading: Comparison with program trading and algo

- HFT is a subset of electronic trading (ET), but is not totally synonymous with Program Trading (PT) or Algorithmic Trading (AT)
- HFT vs. Electronic Trading (ET) or Program Trading (PT)
  - ET/PT is often very high speed, but not necessarily high frequency
- HFT vs. Algorithmic Trading (AT)
  - AT does not typically involve repetitive or high frequency turnover of positions
  - AT is used to source fragmented liquidity, minimize market impact, match or improve upon a benchmark and otherwise improve execution
- All types of trading prefer low latency connections, but only HFT depends on reliable, ultra-low latency connections on a regular basis (trading strategies are coupled with execution strategies)

High Frequency vs. High Speed (only)	
High Speed Trading	**High Speed AND High Frequency Trading**
Program trading	
Algorithmic Trading	
HFT (i.e. Stat arbitrage, market making, trending/predictive strategies)	HFT (i.e. Stat arbitrage, market making, trending/predictive strategies)

High frequency trading: Firm types

- High frequency trading is a method to implement a strategy employed by a particular set of firms who are trading using their own capital:
  - Proprietary trading firms
    - Broker-dealer supported: Goldman Sachs, Morgan Stanley
    - Non broker-dealer supported: Archelon, Peak6, Optiver, Citadel, Getco, Schonfeld
    - May include market-making activities
  - Hedge funds (quantitative strategies)
    - Equity-hedge strategies
    - Event-driven
    - Quantitative directional
    - Examples: Amaranth, Bridgewater, Citadel, Fortress, GLG, Renaissance
- In Japan, HFT trading includes some of the major wirehouses and proprietary trading firms
  - Many onshore HFT firms choose to locate in Singapore and HK to trade Japanese equities instead of onshore in Tokyo
  - arrowhead may draw more HFT activity onshore

High frequency trading: Market drivers

HFT market drivers

- HFT strategies are enabled by market structure, brokerage services and technology:
  - Market structure/exchanges:
    - High performance electronic order book (EOB) matching engines (i.e. process 100,000 messages/second)
    - Fragmented liquidity (multiple electronic order books or EOBs)
    - Maker-taker (i.e. rebate) pricing at EOBs to encourage trading
    - Low cost clearing and settlement infrastructure
    - Electronically linked markets across different asset classes
    - Co-location of servers with matching engines and exchange/ATS data feeds
  - Brokerage services
    - DMA (direct market access) and DSA (Direct Strategy Access)
    - Execution management systems (EMS) with embedded algorithms
  - Technology:
    - Connectivity- FIX protocol, high-speed networks
    - Multi-asset trading software
    - Complex event processing (CEP) engines

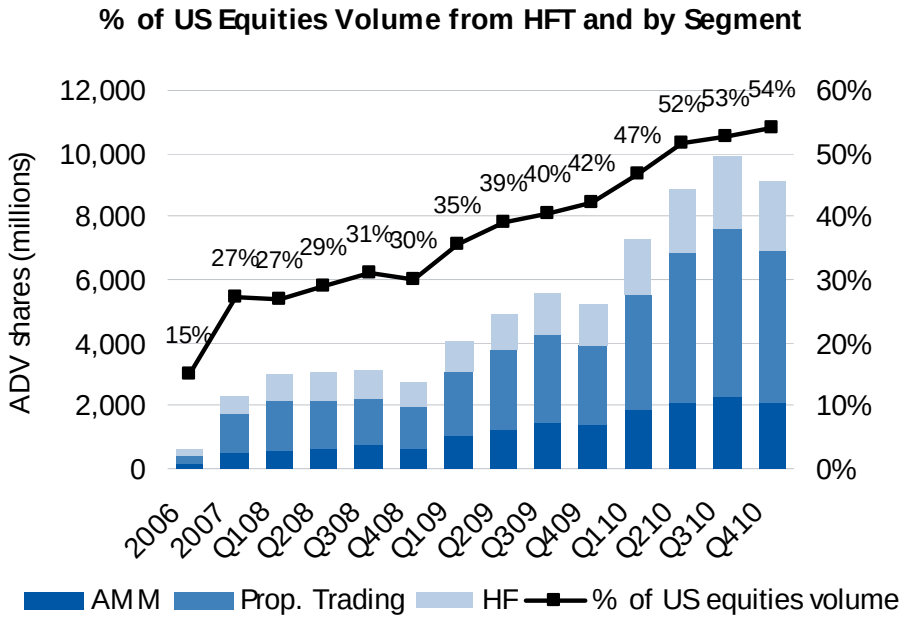
High frequency trading: Market sizing

HFT market sizing

- HFT is an implementation tool driven by the success of underlying trading strategies more than anything else
  - As a result, comparing the growth of HFT with hedge fund AuM is not productive
- However, we can estimate the HFT segment by looking at the underlying strategies employed by funds and proprietary trading firms:
- For example, hedge funds employ the following basic strategies. Within these strategies, some funds are using HFT:
  - Equity hedge
  - Event driven
  - Macro
  - Relative value
- Proprietary trading firms do not report positions and the market and strategies often shift over time. However, prop trading firms act very much like hedge funds in practice
- Our Celent methodology to size the HFT segment is to forecast propensity for certain strategies to grow and be enabled by HFT by the following segments:
  - Hedge funds
  - Proprietary trading firms

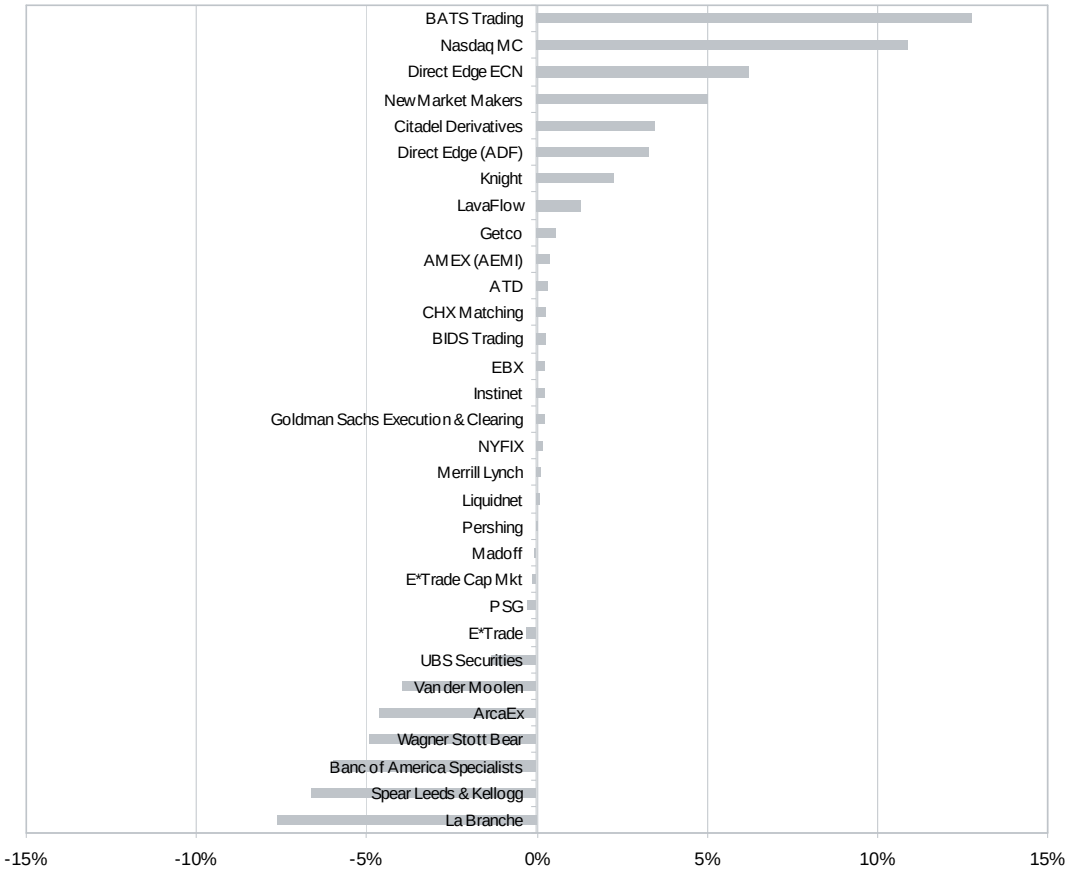
HFT has penetrated 42%+ of overall US equities share volume

- About 42% of current daily US equity share volume is related to high frequency trading by the hedge funds, proprietary trading firms and electronic market makers
- Despite a slowdown at the end of 2008, we believe HFT in the US will increase until it reaches 54% of volume by late 2010
- The growth will be driven by an expansion of quantitative hedge fund strategies and the growth of proprietary trading firms (non broker-dealer owned firms)
- In addition, the convergence of fundamental and quantitative strategies by some firms will mean the coupling of execution and investment strategies, leading to greater HFT among even more traditionally conservative organizations



A changing equities market has put pressure on less automated models

Net gain in market share US primary equities markets, 2006-2008 (1)



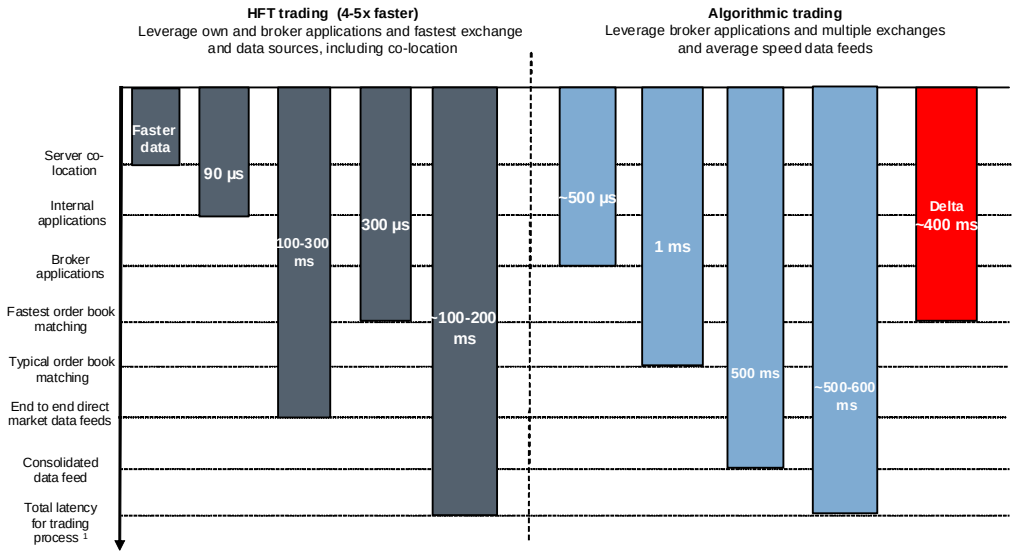
- Winners:
  - Electronic order books (BATS Trading, Nasdaq MC, Direct Edge, LavaFlow)
  - New market makers (Getco, Citadel Derivatives)
- Losers:
  - NYSE Specialists
  - NYSE Arca

Source: Securities & Exchange Commission (SEC) Rule 605 data, Celent analysis; Note-data may underrepresent some market centers, such as dark pools or crossing systems, which specialize in large orders (such as orders >10,000 shares)

(1) Net gain in market share, not the percentage increase in market share. For example, BATS Trading, the largest gainer, added 12.8% of market share (0.2% total market share in 2006 to 13.0% total market share in 2008). Alternatively, 1,280 bps.

Impact of HFT in US equities: Pros

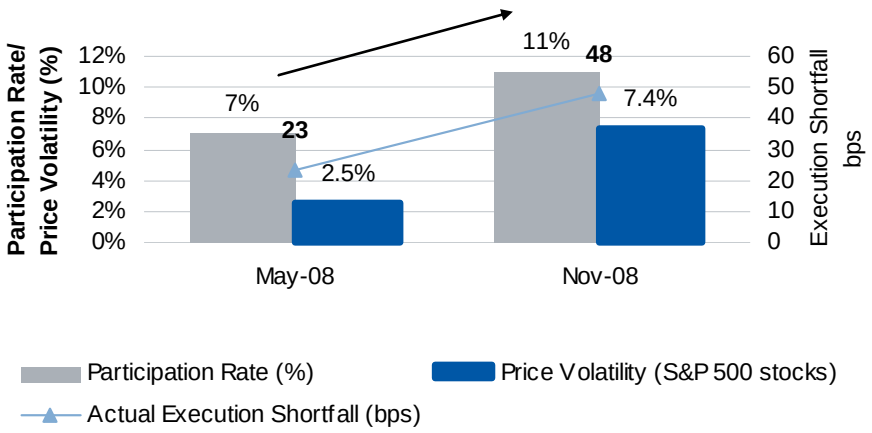
- **Increased liquidity provisioning**
  - High-frequency market makers (including HFs, prop. trading firms) contribute to over 5% of US equities volume
- **Narrowed quoted spreads and lower trading costs**
- **Greater latency competition**
  - Ultra-low latency connections enable quicker messaging, quote updates and data feeds.
- **Increased trading volumes and transaction fees for exchanges/ECNs**
- **Increased dark liquidity utilization**



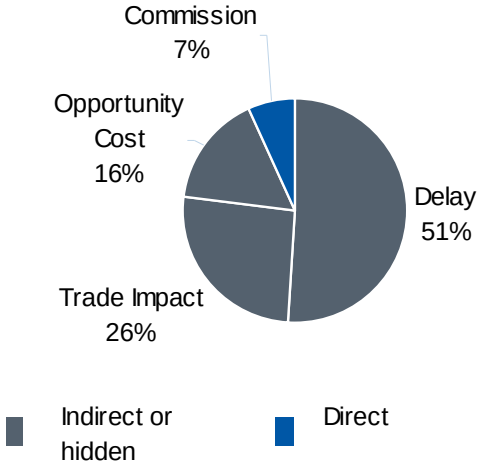
Impact of HFT in US equities: Cons

- **Increased volatility**
  - Short-term volatility and price fluctuations are potential downside risks of HFT as it constitutes a greater percentage of overall trading
- **Over-aggressive algorithm selection due to potential raised volatility environment**
  - Maker-taker pricing models to attract liquidity have motivated traditional liquidity providers (e.g market makers) to engage in HFT to earn rapid, numerous rebates
- **Increased implementation shortfall costs**
  - Cost of liquidity (IS costs) has increased over 70%
  - Volatility levels have also risen sharply in the corresponding period by 111%
  - Market impact costs has seen the biggest increase from 2006 with an estimated 30% growth

Execution shortfall versus Algo. Participation Rates & Price Volatility (May versus Nov 2008)

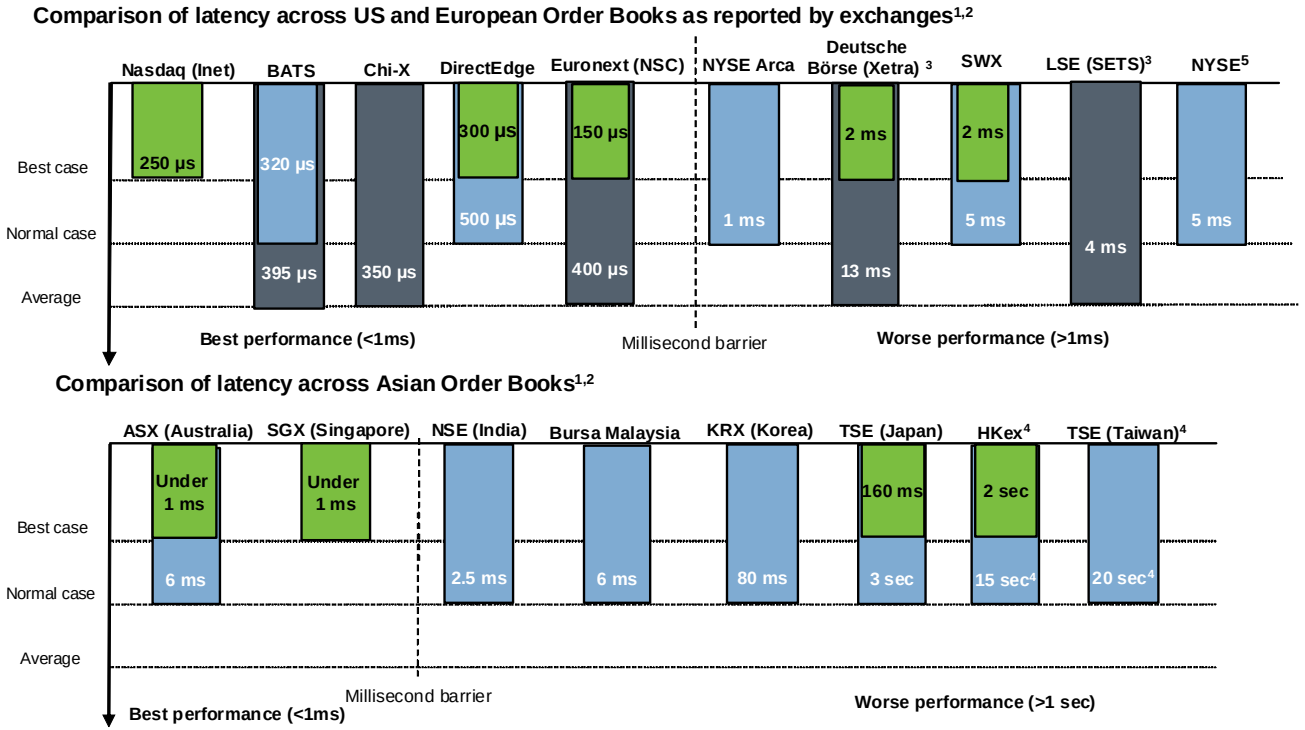


Transaction Costs Breakdown (3Q2009: 158 b.p)



HFT in Local Context

Regional variations change the rules of the game



- Speed: The speed of venue to confirm an order, execute, cancel/replace, and deliver market data is highly correlated with the likelihood for HFT at that venue. But most Asian exchange order books have not broken the millisecond barrier.
- Regulation: Equities market structure in Latin America and Asia will also be slower to evolve than Europe pre-MiFID due to more heavy-handed regulation.
- Pricing: HFT strategies are becoming more pervasive across Europe, and exchanges have responded or are responding with upgrades to matching engines and improvising new tariff structures

arrowhead and Reach may drive HFT throughout Asia

- HFT will most certainly expand in Asia over the next few years
- In Japan, with the advent of the TSE Arrowhead system, the number of HFT trading firms trading Japanese equities will grow significantly
- SGX Reach will have a similar impact in Singapore
- HFT strategies will be enabled and force more US and European firms to locate hardware and software applications closer to the exchange matching engines in Tokyo and Singapore
- Similarly, these firms may move to be physically closer to other exchanges in Asia, i.e., co-location will become more important
- But we expect it will take time for the growth trajectory in Asia to accelerate to the levels seen in the US and Western Europe

Winners…

Firms that can customize to local markets and have sufficient capital and patience to wait out evolutionary trends will see potential upside in Asia

- **Tier 1 International Brokers**
  - Significant fixed investments in advanced trading tools and a global client base
  - Economies of scale in technology and execution, in addition to know-how involving product structuring and prime services
- **Local Asian brokerages who advance up the technology curve**
  - Regionals such as Nomura, Daiwa, Kim Eng, DBS Vickers will benefit from the wide availability of ISV software to upgrade and compete with international brokers
- **Low-cost agency brokers in some markets, but not all**
  - As HFT evolves in some local markets (e.g Japan and Australia) firms will choose low cost, advanced execution providers. E.g. Instinet, ITG
- **Software and connectivity vendors**
  - Regional and pan-Asian brokerages will seek out vendor relationships to narrow the gap with leading international brokerages
- **Buy side traders who are ahead of the curve**
  - Leading buy side firms who adopt advanced trading tools before their competitors like algorithms, DMA and SOR will benefit from improved execution quality

…and losers…

Firms that fail to develop capabilities for the changing markets may find it hard to compete

- **Regional brokers with no real niche**
  - Regional players without significant relationships, market know-how or access, research, or improved technology
- **Local IT vendors without sufficient knowledge**
  - Local vendors that do not have sufficient knowledge to supply OMS/EMS/connectivity packages to increasingly savvy customers, in a low cost manner, will find that local firms choose international vendors instead
- **ATS/Dark pools that have the "wait-and-see" approach**
  - Vendors and firms have to be well-placed to "ride the wave" once markets open up and buy side advanced trading adoption reaches critical mass
  - Firms that wait will find it difficult to come in at a later stage due to barriers of entry (e.g. lagged regulatory approvals, lack of familiarity with local culture, regulatory nuances and local broker and buy side networks)

Abbreviations

- ATS- Alternative Trading System
- DP – Dark Pool / Non-Display
- ECN – Electronic Communication Networks
- MTF – Multilateral Trading Facility
- PTS – Proprietary Trading System
- STP-Straight-through Processing
- SOR-Smart Order Route
- EOB-Electronic Order Book
- DSA-Direct Strategy Access

Thank you

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