

THE HIDDEN ALPHA IN EQUITY TRADING

STEPS TO INCREASING RETURNS WITH THE ADVANCED USE OF INFORMATION



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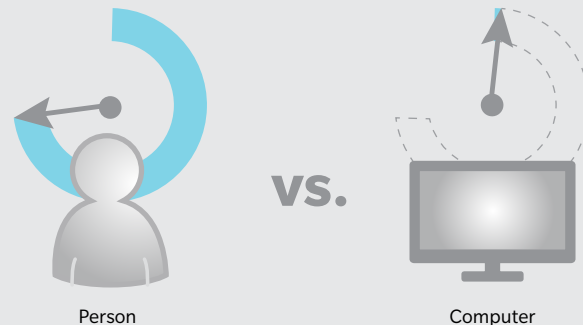
1. INTRODUCTION

Following regulatory initiatives aimed at creating competition between trading venues, the equities market has fragmented. Liquidity is now dispersed across many lit equity trading venues and dark pools. This complexity, combined with trading venues becoming electronic, has created profit opportunities for technologically sophisticated players. High frequency traders (HFTs) use ultra-high speed connections with trading venues and sophisticated trading algorithms to exploit inefficiencies created by the new market structure and to identify patterns in 3rd parties' trading that they can use to their own advantage.

For traditional investors, however, these new market conditions are less welcome. Institutional investors find themselves falling behind these new competitors, in large part because the game has changed and because they lack the tools required to effectively compete.

The traditional traders need to catch-up quickly. This Oliver Wyman perspective aims to help by describing the new game: how it came about (Section 2), how HFTs have proliferated in this new environment (Section 3), how the new game has led to negative events and systemic concerns (Section 4), how this is changing the relationship between investors and brokers (Section 5), how this has created an opportunity for investors (Section 6). Finally, regardless of your stage of adaptation, we identify a two step process to take advantage of this opportunity (Section 7).

THE TIME DIFFERENCE IN TRADING ROUTES; PEOPLE VS. COMPUTERS



JUST HOW FAST ARE TRADERS PROCESSING TRADES?

- » Traders that take advantage of technology can create programs that trade in milliseconds. In many cases these traders can operate faster than the venues can accept messages
- » Human traders are greatly disadvantaged when trying to deploy basic arbitrage opportunities in the market; computers are trading far too fast for humans to compete [difference between sending email and mailing a letter via snail mail]

REMARKS: The role of the human trader has evolved. They must now also understand how various electronic trading methods work, when to use them, and when to be aware of those that may adversely affect their trades.

2. MARKET FRAGMENTATION AND THE GROWTH OF INFORMATION

Market venue competition began with the Alternative Trading System regulation of 1998. This was introduced to provide a framework for competition between trading venues. In 2007 the National Market System regulation extended the framework by requiring traders to access the “best displayed price” available from an automated visible market. These regulations were intended to promote efficient and fair price

formation in equities markets. As new venues have successfully competed for trade volume, market liquidity has fragmented across these venues.

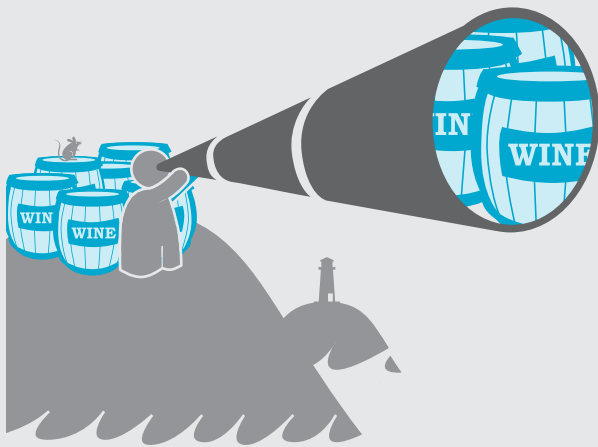
Market participants seeking liquidity are required by regulatory obligations to access visible liquidity at the best price, which may require them to incorporate new technologies that can access liquidity fragmented across trading venues. These technologies may include routing technology and algorithms that re-aggregate fragmented liquidity. Dark Pools – trading platforms originally designed to anonymously trade large block orders electronically – began to expand their role and trade smaller orders. This allowed dealers to internalize their flow and institutional investors to hide their block orders from market opportunists.

The use of these technologies can lead to leaking trading information that can be exploited by opportunistic traders. Information is leaked when electronic algorithms reveal patterns in their trading activity. These patterns can be detected by HFTs who then make trades that profit from them.

Competition for liquidity has encouraged trading venues to move from the traditional utility model, where each side of a transaction would be charged a fee, to models where the venues charge for technological services, pay participants to provide liquidity and charge participants that remove liquidity. Many trading venues have become technology purveyors.

Broker-dealers have realized that they are often the party paying the trade execution fee, which is used by the venues to pay opportunistic traders a rebate for providing liquidity. To avoid paying these fees and internalise their valuable uninformed active flow, especially from retail customers, broker-dealers have also established dark pools. By internalising their flow or, in many cases, selling it to proprietary trading firms, they can avoid paying the trading fees that the venues charge for removing liquidity from their order books.

ORIGINS OF HIGH FREQUENCY TRADING (HFT)

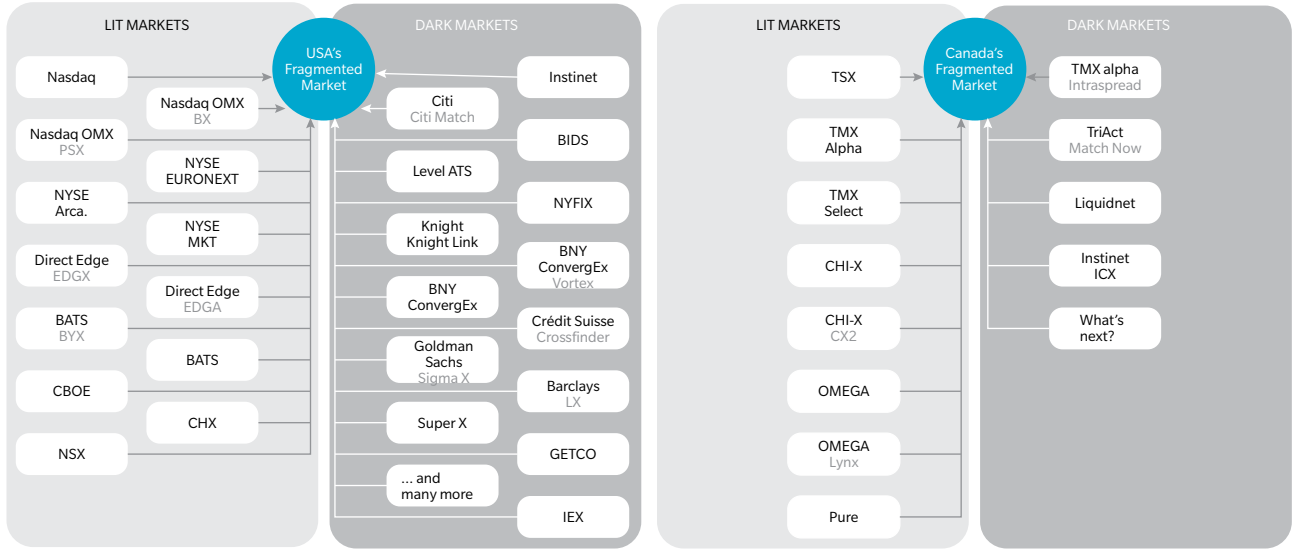


HFT IS NOT A NEW CONCEPT

- » Although today HFT is closely associated with high speed computers, HFT is a relative term, describing how market participants use technology to gain information, and act upon it, in advance of the rest of the market
- » Near the advent of the telescope, market merchants would use telescopes and look out to the sea to determine the cargo hold of incoming merchant ships. If the merchant could determine which goods were soon to arrive on these ships, they could sell off their excess supply in the market before the incoming goods could introduce price competition

REMARKS: Although many HFT practices have come under considerable criticism in recent times, citing unfair advantages, these firms are simply using technology to their advantage, as is equally accessible by all major market participants.

EXHIBIT 1: CURRENT MARKET FRAGMENTATION FOR THE US AND CANADA

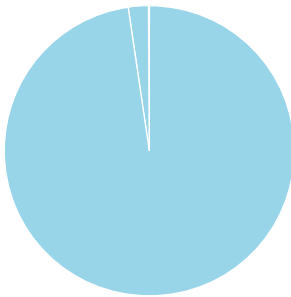


Source: The Trade USA, IEX primed for Friday launch, October 21st, 2013; IEX Websites, iextrading.com/about

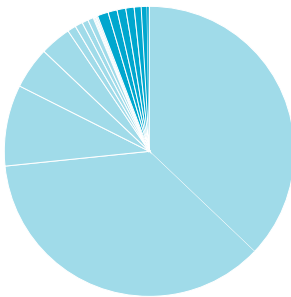
EXHIBIT 2: US AND CANADIAN MARKET FRAGMENTATION 2007 VS. 2013

CANADIAN MARKETS

2007

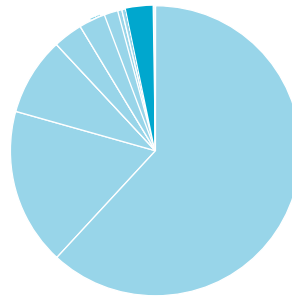


2013

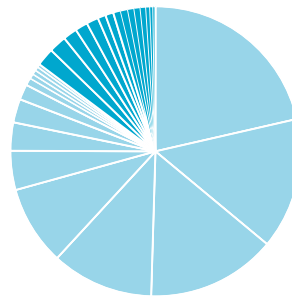


US MARKETS

2007



2013



Many US dark venues do not report volumes; it is suspected that dark venues have much higher market share

■ Lit market
■ Dark pool

Source: TABB Group, IIROC

THE BUSINESS OF BEING A TRADE VENUE

	VENUE 1	VENUE 2
Price model	Maker-Taker; Paying liquidity provider, charging liquidity takers	Equal pricing; Liquidity providers and takers are charged equally
Advanced series	May charge for low-latency connectivity	Charges for low-latency connectivity
Institutional investor perception	High HFT activity	Low to no HFT activity
Actual HFT activity	ELP, latency arbitrage, mean regression, etc.	Latency arbitrage, mean regression, etc.

HOW MOST TRADE VENUES MAKE MONEY WHILE ATTRACTING LIQUIDITY

- » The measure of consummated liquidity (volume) is a key variable in determining the successfulness of any trade venue

- » Some venues promote liquidity providers, such as HFT ELP strategies, directly by offering a “maker-taker” pricing model, where providers of liquidity are paid a rebate to participate, and takers of liquidity are charged a fee which is higher than the rebate. The venue derives revenue from the difference between the fee and the rebate
- » Other venues may not offer a “maker-taker” pricing structure, however they still attract liquidity providers by offering advanced connectivity and information services for a fee; charging willing clients, typically HFT firms, that wish to take advantage of low-latency connection speeds or segregated order flow (e.g. Retail only)

REMARKS: Although the venues that do not have a “maker-taker” structure may seem to have less HFT activity, the low-latency connectivity attracts other HFT strategies that profit off of latency difference from slower-informed order flow; both venue revenue models attract HFT clientele.

THE CONCEPT OF LIQUIDITY

Passive order book representing of an example stock

TIME	BUYER	VOL	BID	ASK	VOL	SELLER	TIME
1a	A	2	10.00	10.01	4	D	1b
2a	B	6	10.00	10.02	7	D	2b
3a	B	6	9.99	10.02	8	F	3b
4a	C	3	9.99	10.02	10	G	4b
5a	A	7	9.98	10.03	9	E	5b
6a	C	10	9.97	10.03	3	D	6b
7a	B	4	9.97	10.03	2	F	7b

These orders sit passively until they interact with a marketable order that actively transacts with them or the passive order is cancelled by the buyer/seller that posted it.

For example, if a marketable buy order for 35 shares with a limit price of 10.05 were to enter this venue, that order would actively take liquidity away from the first 4 layers of the order book, with an ending execution price of 10.03 (4 shares at 10.01 + 25 shares at 10.02 + 6 shares at 10.03). The resulting top layer of the order book would now sit with a bid/ask spread of 0.03, at a volume count of 8, due to the active orders market impact.

LIQUIDITY IS THE LIFEBLOOD OF ANY VENUE

- » Liquidity is the measure of the willingness of participants to transact with respect to particular asset (in this example the asset is stock of an example company). The deeper (more layers) and wider (more volume per layer) the order book, the more liquid the stock is considered to be, relative to historical/expected layer and volume levels
- » The greater the liquidity in a stock, the more likely an investor is to be able to buy into or sell out of the stock, whenever they wish, and in a timely manner with respect to the size of the investors order, therefore, venues with the most liquidity are potentially the most sought after by the investor community

REMARKS: Many venues have pricing models that pay participants a rebate to passively post liquidity, and charges other participants that actively take liquidity away; commonly called the “maker-taker” pricing model. HFTs use ELP programs to collect passive liquidity posting rebates, which in turn offer the venues increased liquidity.

3. THE PROLIFERATION OF HIGH FREQUENCY TRADING

With the equity markets becoming electronic and prices quoted by the cent (as opposed to the previous eighths of a dollar), the traditional, “manual”, market makers have found it difficult to keep up with the new technologically savvy firms. The playing field has been tilted in favor of HFTs, who use high speed computers, low-latency connectivity and low latency direct data feeds to realize hidden alpha.

HFTs can follow active, passive or hybrid strategies. Passive HFTs employ market making strategies that seek to earn both the bid/offer spread and the rebates paid by trading venues as incentives for posting liquidity. They do this efficiently across many stocks simultaneously by utilizing the full potential of their computer hardware, venue-provided technology and statistical models. This strategy is commonly known as Electronic Liquidity Provision (ELP), or rebate arbitrage.

These ELP strategies can also be signal detectors. For example, when ELP strategies are adversely affected by a price that changes the current bid/ask spread,

this may indicate the presence of a large institutional block order. An HFT can then use this information to initiate an active strategy to extract alpha from this new information.

Active HFTs monitor the routing of large orders, noting the sequence in which venues are accessed. Once a large order is detected, the HFT will then trade ahead of it, anticipating the future market impact that usually accompanies sizable orders. The HFT will close out their position when they believe the large order has finished. The result of this strategy is that the HFT has now profited from the impact of the large order. The concern for the institutional investor, that originally submitted the large order, is that their market impact is amplified by this HFT activity and thus reduces their alpha. The most sophisticated HFTs use machine learning and artificial intelligence techniques to extract alpha from knowledge of market structure and order flow information.

HOW REBATE ARBITRAGE (A FORM OF ELP) WORKS

Rebate arbitrage & spread capture schematic

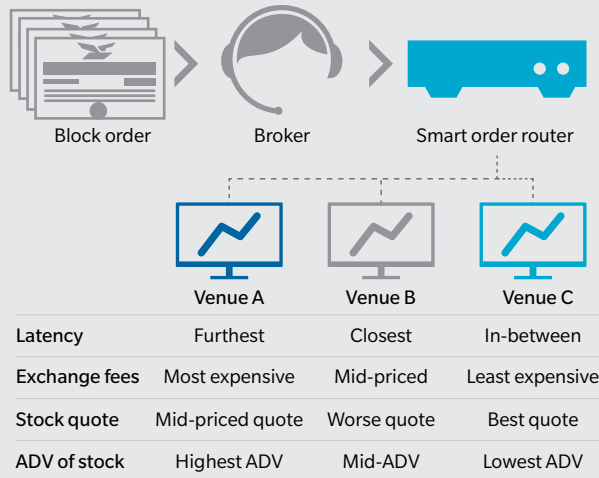


VENUES PAY FOR LIQUIDITY

- » Venues pay a rebate for posting passive liquidity, that transacts with active orders. Electronic Liquidity Provision (ELP) programs, written by High Frequency Traders (HFT), try to collect these rebates as a form of revenue
- » Rebates compensate traders for the risk of being adversely selected by larger orders that can move the quote beyond it's current level (via market impact)
- » Passive orders increase the venue's posted liquidity and attracts more investors

REMARKS: Although ELP programs are credited with supplying liquidity, some argue that HFTs that run ELP strategies only really supply liquidity when they believe they can earn a profit. Some HFTs may also use ELP strategies to help identify movements in the market and may then initiate strategies that take liquidity, which would amplify market impact.

PUTTING THE “SMARTS” IN SMART ORDER ROUTERS



JUST HOW SMART ARE SMART ORDER ROUTERS?

- » The purpose of a SOR is to connect the fragmented markets in an effort to source the liquidity required to fill larger orders
- » Active HFT strategies attempt to game SORs by learning the sequence by which they interact with various venues. The goal of the HFT is to discover a large institutional order that is trying to source liquidity from these venues. Understanding this, some SORs have been designed to try and avoid negative impact from HFT

REMARKS: Although some SORs attempt to avoid negative impact from HFTs, each SOR leaves a pattern, and skilled HFTs can detect that pattern and use that information to their advantage. Each of these patterns can be a clear signal to an HFT that a large block order is trying to trade.

WHICH ORDER ROUTE SHOULD BE USED?

SMART ORDER ROUTER (SOR) TYPES	VENUE SEQUENCE	CAN HFT'S NOTICE THE PATTERN?
Lowest fee seeking	C, B, A, C, B, A	Yes, lowest to highest
Best stock quote seeking	C, A, B, C, A, B	Yes, best to worst price
Most ADV seeking	A, B, C, A, B, C	Yes, highest to lowest ADV
Latency compensating	(A, C, B), (A, C, B)	Yes, simultaneous delivery

Attempts to avoid HFT impact by sequencing orders according to latency such that the orders arrive simultaneously at each venue

EXHIBIT 3: RANGE OF HFT STRATEGIES

HFT STRATEGY	DESCRIPTION	STAKEHOLDER			
		INSTITUTIONAL INVESTOR	INSTITUTIONAL BROKER DEALER	RETAIL INVESTOR	RETAIL BROKERAGE
ETF market making	Arbitrage between the ETF and it's underlying securities	Provides liquidity	Provides liquidity	Provides liquidity	Provides liquidity
Statistical arbitrage	Using correlations to determine trade behavior	Neutral	Neutral	Neutral	Neutral
News feed arbitrage	Using low latency news feeds to position trades	Neutral	Neutral	Neutral	Neutral
Rebate arbitrage	Layering passive orders to collect rebates from venues	Could intensify flash crashes	Increases venue costs	Reduces spreads and time to fill	Increases venue costs
Momentum detection	Using strategies to identify spread breaches to position trades	Increases market impact	? No effect if clients are unaware	Orders are too small	Orders are too small
Order flow detection	Identifying block orders using electronic means	Increases market impact	? No effect if clients are unaware	Orders are too small	Orders are too small
Order flow prediction	Predicting block trades and profiting from them	Increases market impact	? No effect if clients are unaware	Orders are too small	Orders are too small
Latency arbitrage	Identifying Smart Order Routers (SOR) processes to position trades	Increases market impact	? No effect if clients are unaware	Orders are too small	Orders are too small
Other	HFTs are continuously innovating new strategies	?	?	?	?

Positive effect Negative effect

4. FLASH CRASHES, BOTCHED IPOs AND OTHER SYSTEMIC CONCERNS

The market has suffered several adverse events as a consequence of the new fragmented, for-profit, market venue environment. In some cases, these events resulted from the unpredictable interaction of trading algorithms; in other cases they were the result of software glitches or overloaded hardware.

KNIGHT CAPITAL LOSS – OVER \$450 MILLION + WAVES OF ACCIDENTAL TRADES¹

A software malfunction from Knight caused waves of accidental trades to NYSE-listed companies. The incident caused losses of over \$450 million for Knight. The SEC later launched a formal investigation.

GOLDMAN SACHS – \$10S OF MM + TECHNICAL GLITCH IMPACTS OPTIONS²

An internal system upgrade resulting in technical glitches impacted options on stocks and ETFs, leading to erroneous trades that were vastly out of line with market prices. Articles suggest that the erroneous options trades could have resulted in losses of \$10's of millions. Goldman Sachs stated that it did not face material loss or risk from this problem.

- 1 The Wall Street Journal, *SEC Expands Knight Probe*, November 13th, 2012
- 2 Reuters, *Goldman losses from options glitch in tens of millions: source*, August 26th, 2010

NASDAQ – 3 HOUR TRADING HALT DUE TO CONNECTION ISSUE³

Due to a connection issue NASDAQ called a trading halt for more than three hours in order to prevent unfair trading conditions. A software bug erroneously increased data messaging between NASDAQ's Securities Information Processor and NYSE Arca to beyond double the connection's capacity. The software flaw also prevented NASDAQ's internal backup system from functioning properly.

NASDAQ – DATA TRANSFER PROBLEMS FREEZE INDEX FOR 1 HOUR⁴

An error during the transferring of data caused the NASDAQ Composite Index to be frozen for approximately one hour. Some options contracts linked to the indexes were halted, though no stock trading was impacted. NASDAQ officials state that the problem was caused by human error. Although the market suffered no losses, this technical malfunction – the third in two months – raises considerable concerns.

- 3 Reuters, *NASDAQ says software bug caused trading outage*, August 29th, 2013
- 4 The Wall Street Journal, *NASDAQ glitch prompts trading halt in some markets*, October 29th, 2013

EXHIBIT 4: TIMELINE OF NEGATIVE MARKET EVENTS

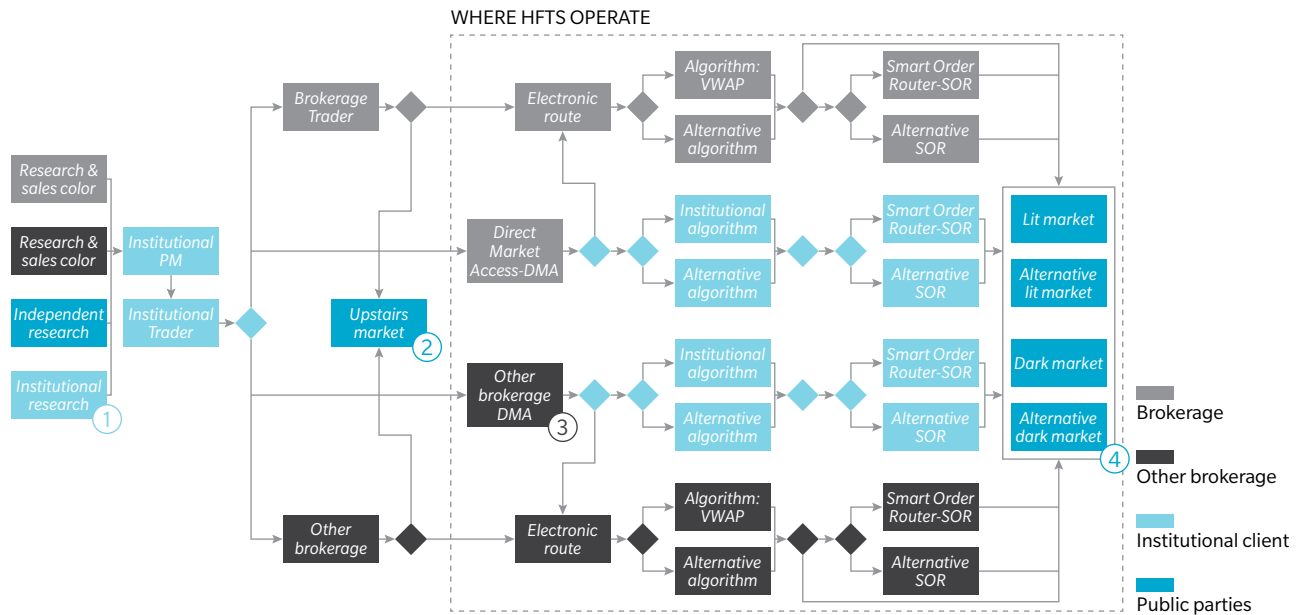


5. THE CHANGING INVESTOR-BROKER RELATIONSHIP

Traditionally, investors spent their efforts seeking alpha and brokers were charged with sourcing liquidity. Liquidity could be sourced via the upstairs market or the stock exchange. The stock exchange operated as a utility that consolidated liquidity. Beyond generating alpha, the only decision for an investor was choosing a broker to execute their trades. Today, investors are still concerned with generating alpha. However, the trading process required to execute their alpha strategies has become more complex. The consolidated utility model has been replaced by a market that is highly fragmented with for-profit venues vigorously competing for liquidity which is provided primarily by HFTs (see Section 3).

This new environment puts brokers in a difficult position. They have a fiduciary responsibility to provide best execution to their clients. This requires them to invest in new technology to source liquidity and defend against HFT strategies. And because many of these venues now pay rebates for liquidity, which is quickly provided by HFTs, brokers are usually left having to pay active take fees to the venue. And at the same time that brokers are incurring these costs, investors are pressuring them to reduce commissions.

EXHIBIT 5: THE NEW ORDER TRADING PROCESS



- ① More heavily relied on due to increased complexity
- ② <25% of trades occur over upstairs market
- ③ May have several broker relationships
- ④ Market fragmentation is increasing

EXHIBIT 6: THE TRADITIONAL TRADING PROCESS



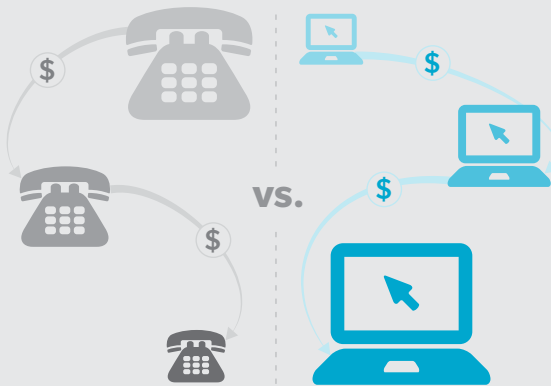
These pressures on brokers' margins are creating conflicts of interest with their clients. By accessing venues with lower trading fees, or attempting passive order routes of their own, brokers can reduce their operating costs. However, these trade routes are not necessarily best for the investors.

Sophisticated investors now demand granular execution information detailing how their order flow was managed by their broker so they can ensure they are receiving the best execution. While brokers provide aggregate performance reports, investors can build a more complete analysis, including broker performance comparison by using more granular information.

VOICE VS. ELECTRONIC TRADING

Client Service

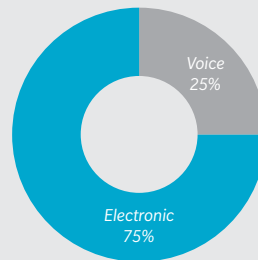
Example: Rise of electronic trading in global cash equities



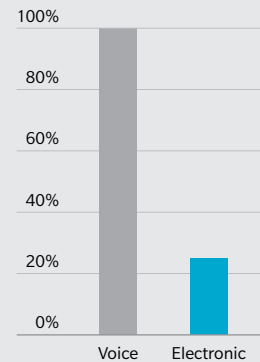
Electronic vs. Voice volumes and revenues

Cash Equities – institutional (dealer to client), 2012 est.

VOLUME



MARGIN



Source: Oliver Wyman analysis

DO ELECTRONIC TRADING CAPABILITIES PROVIDE A STRATEGIC ADVANTAGE IN CASH EQUITIES TRADING?

- » Volume has shifted dramatically in this direction and made these capabilities critical to mid-term relevance – laggards have and will lose share of the business
- » Equities trading has been pressured into lower cost execution methods, forcing firms to seek even greater volumes. Those that do not invest in electronic execution are quickly being displaced

REMARKS: As demands of clients (across businesses) shift towards digital needs, traditional firms must decide whether they continue to have a strategic advantage or not. Where their advantage has been eroded, re-thinking the strategy may be more sensible than investing in a technological arms race they are not well positioned to win.

6. THE INFORMATION OPPORTUNITY FOR INSTITUTIONAL INVESTORS

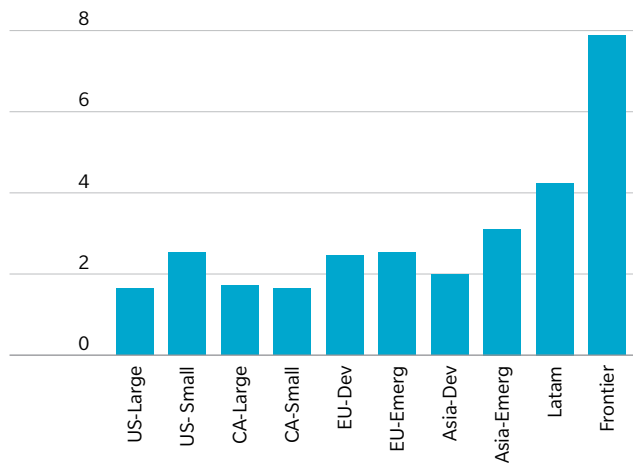
Understanding the typical market impact cost of executing an institutional order reveals how much alpha loss can be prevented in subsequent orders and help to identify opportunities to generate alpha. Exhibit 7 below shows forecasted impact costs as a function of relative order size

versus daily volume for several regions. The charts show that as the size of orders increases, so does the expected market impact. The impact costs for large orders in Canada and US for large cap stocks is about 40 bps, and higher in other regions.

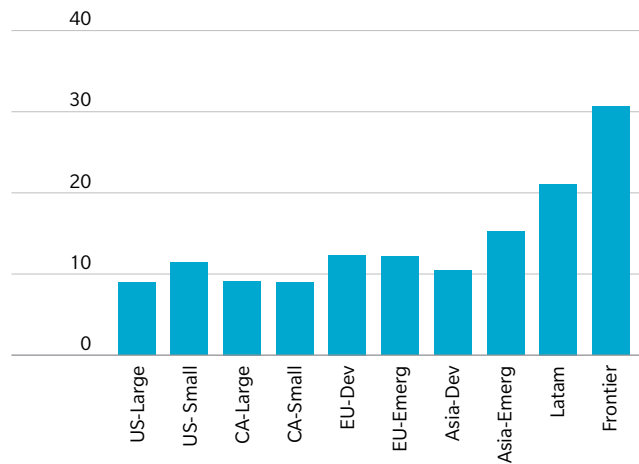
EXHIBIT 7: FORECAST MARKET IMPACT COST BY ORDER SIZE RELATIVE TO AVERAGE DAILY VOLUME (ADV)[†]

FORECAST COSTS

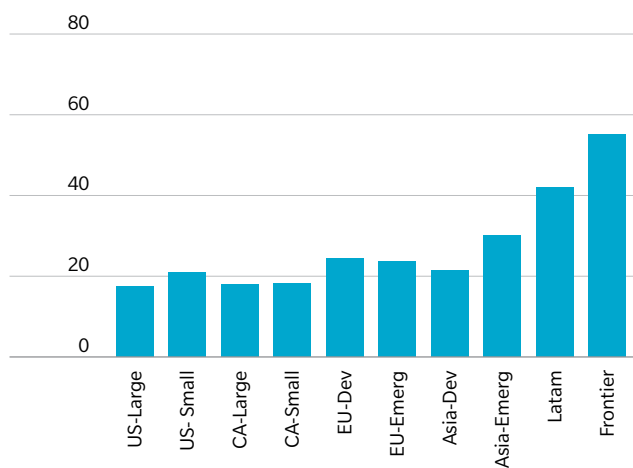
COST (BP)
1% ADV



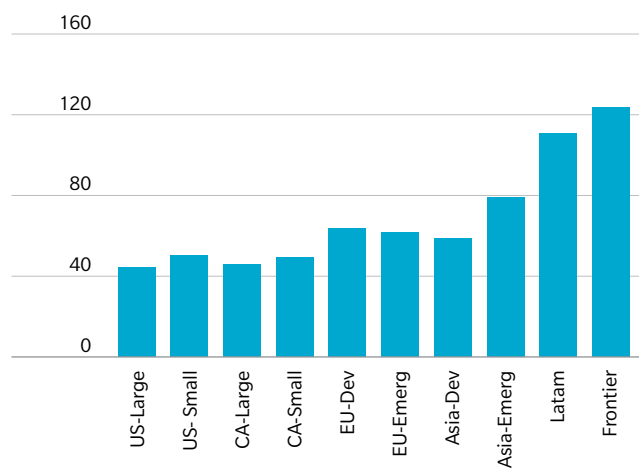
COST (BP)
5% ADV



COST (BP)
10% ADV



COST (BP)
25% ADV



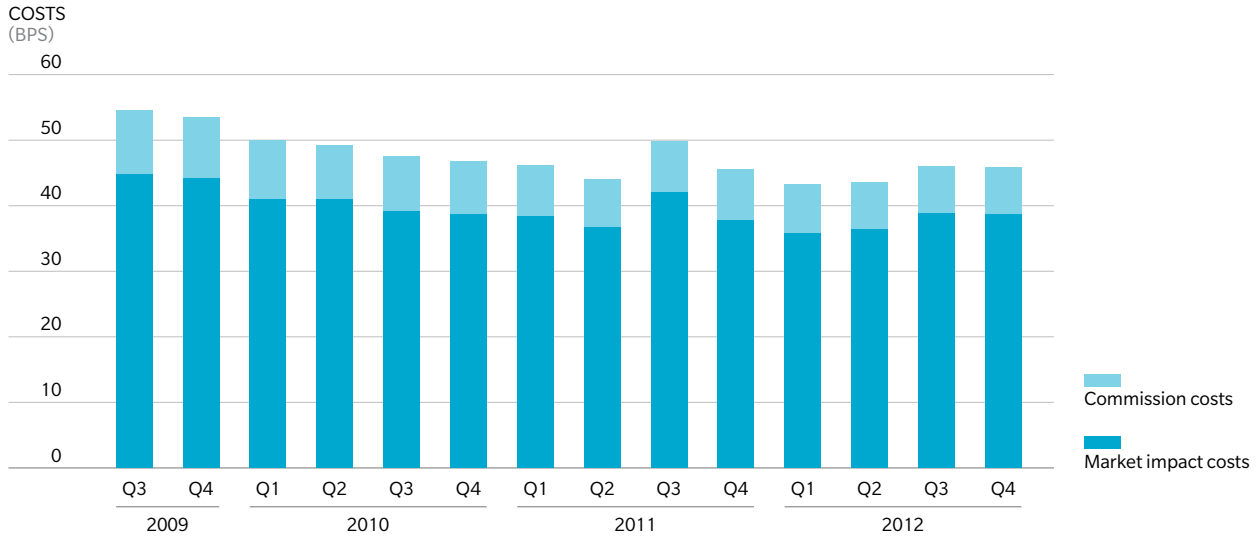
Source: Kissell Research Group

[†] Kissell Research Group, I-Star Global Cost Index, Q1 2013 Market Outlook, March 15th, 2013

Exhibit 8 displays the observed impact averaged across all US securities and all order sizes as a function of time. It shows a fairly steady impact cost of close to 40 bps, which agrees with the estimates shown in Figure 7. This suggests that approximately 40 bps of potential improvement can be achieved by avoiding market

impact. Even if an institutional investor were able to achieve 25% of this potential, that would represent 10 bps of performance improvement. This level of performance improvement can move a fund up many levels in ROI rankings versus peer funds.

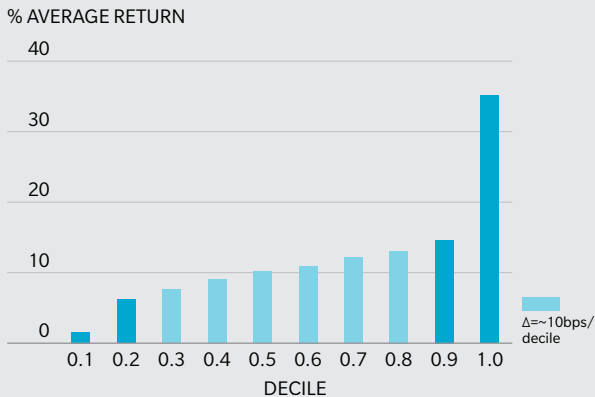
EXHIBIT 8: OBSERVED MARKET IMPACT AND COMMISSION COSTS FOR AGGREGATE US INSTITUTIONAL ORDERS



Source: ITG Peer Analysis, Global Cost Review Q4/2012, April 24th, 2013

INSTITUTIONAL INVESTORS ARE IN CLOSE COMPETITION WITH EACH OTHER

Distribution of US based, global equity asset funds with AUM of at least \$1 BN



Note: Analysis covers ~190 institutional investment firms and nearly 1,300 funds
Source: Morningstar

A SMALL BPS INCREASE IN ROIC COULD MEAN A SIGNIFICANT DIFFERENCE IN RANKING

- » The majority of the deciles (between 0.3 and 0.8) are ~100 bps apart
- » **For the majority of the distribution, an increase in just 10 bps would move a fund ahead of 13 competitor funds**

REMARKS: Considering market impact cost can account for ~40 bps, investing solutions to reduce that cost can mean a significant difference in how well your fund performs against it's peers, and thus increase it's ability to attract more investors.

7. STEPS TO FINDING HIDDEN ALPHA AND INCREASED RETURNS

In order to find hidden alpha, it is important to first understand where market participants are with respect to information utilization. The light grey area in Exhibit 9 represents the typical institutional investor, playing the role of the “ostrich” or “compiler”, either choosing to ignore the changes around them or to use information

only for basic compliance tasks. Most HFTs belong in the light blue “commander” stage; they take command of the information around them and let it guide their business. Taking advantage of the information opportunity, and finding hidden alpha, requires a firm to move up the stages of adaptation.

EXHIBIT 9: STRATEGIES OF ADAPTATION

		STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
Definition	Archetype	Ostrich	Complier	Thinker	Commander	Optimizer
	Description	Evaluates trade performance purely on a benchmark comparison over simple arithmetic means May do so over individual trades or aggregate trades	Considers probability and correlations when evaluating trade performance May do so over individual trades or aggregate trades More-or-less analyses trades to comply with internal policies	As well as practicing statistical methods, the “Thinker” considers strategic motivations, answering; “If I implement ABC will my opponents implement XYZ?”	Continuously evaluates all trades statistically and strategically with the objective of continuously improving trade methods; ensuring they capture new methods from opponents	Understands that it takes more than their individual efforts to keep up with change; they form an impartial utility, in collaboration with other institutional investors, to increase exposure to opponents attempted strategies
Dimension	Complexity	Arithmetic	Statistical	Statistical + strategic	Statistical + strategic	Statistical + strategic
	Frequency	Select trades	Select trades	Every trade	Every trade	Every trade
	Iteration	None	None	None	Continuous	Continuous
	Breadth	None	None	None	None	Utility

- **COMPLEXITY:** This measures the sophistication of the use of information in directing action. Whether the information is trade data or newsfeeds, it can be put to use in more or less sophisticated ways, from simple arithmetic to complex statistical methods coupled with strong strategic understanding. Arithmetic uses aim at providing no more than basic accounting measures of values, volumes and gains and losses. Statistical methods aim to identify patterns in information that can be used to guide trading. Strategic understanding introduces game theory, anticipating the reaction of other market participants when an investor employs a particular trade strategy.
- **FREQUENCY:** Each trade an investor makes provides an opportunity to learn. Gathering information from every trade, as opposed to a select few, helps give the investor a better understanding of how those trades

may perform in the future. The more frequent the analysis, the more relevant the findings will be.

- **ITERATION:** Findings serve a purpose only if they are acted upon. The key is to use information to guide actions whose outcomes are then analyzed and the findings reapplied. This creates a continuous iterative loop that drives towards ever greater efficiency.
- **BREADTH:** Knowledge sharing with similar objectives (e.g. institutional investors trading large blocks) could lead to a more efficient investment implementation process for all participants. Working together, institutional investors can share block order implementation experience and data, as a utility. The result of this could help participating institutional investors defend against market impact losses and protect proprietary strategies.

HFT firms will likely plateau at stage 4, “commander”, as they are less likely to share any information in a utility concept; trade execution is their proprietary intellectual capital. Institutional investors, on the other hand, have the potential to reach stage 5, “optimizer”. For institutional investors, their proprietary intellectual capital usually lies within their investment decisions, not their trade implementation routes. Institutional investors are thus more willing to collaborate with each other to work against trade strategies that cause them market impact.

Regardless of an investor’s disposition towards trading strategies; leveraging advanced technology or committing to more traditional trading strategies, it is important to realize that advanced technology trading is today’s reality. Investors need to strongly consider taking the appropriate steps to protect against the potential negative repercussions of, as well as position themselves to find the hidden alpha within, today’s advanced market. For investors that accept this new reality, we recommend the following two steps: Assess and Adapt.

STEP 1: ASSESS

All market participants need to understand the ever increasing importance of information and the systems that impact it. In particular, institutional investors need to first assess their trading strategies to determine whether there is an opportunity to capture hidden alpha; as discussed earlier, as the complexity of trading increases so does the opportunity, for those that embrace technology, to exploit an information advantage. Specifically, Portfolio managers need to understand how liquidity is sourced via technology; traders need to understand the logic behind the systems that implement their orders; and ultimately c-suite leaders need to understand how information and technology impact the overall goals and strategies of their firms. This understanding can be gained by assessing the ‘decision footprint’ of the investor.

These decisions may include, but are not limited to, determining which liquidity source to use (upstairs market, dark pools or lit market), how to access that source (self-directed or broker-directed), how much liquidity to take/offer, what the value of their trade is with respect to market impact (in the case of a liability trade offer), when to execute these decisions and how all of these decisions could affect the trades expected performance. The sum of the probable outcomes of each of these decisions is called the ‘decision footprint’.

Understanding the size of an investor’s decision footprint is how they could assess the impact today’s market has on their trades and overall investment strategy. Subsequently, the investor can assess how to utilize information and technology to effectively ‘shrink’ the size of the footprint to a size that is more predictable, manageable and less complex. Shrinking the footprint not only helps to reduce impact costs, but also helps to identify alpha generating opportunities, which would have otherwise likely gone unnoticed. This is what we call “adapting” to the new market environment.

STEP 2: ADAPT

Each market participant has its own privileged sources of information, in addition to publically available data. Whether it is market data, proprietary block trade reports or independently derived views of electronic trading strategies, this information will help participants find alpha. Adapting to an ever changing information-driven environment, leading firms have developed proprietary information-based processes and tools to help them find the opportunities in today’s complex marketplace. For example, using data visualization tools to examine historical block trade reports and public trade data has helped firms to deal with the complexity and number of decisions traders face when sourcing liquidity. Some leading firms have also augmented data visualization tools with automated algorithms that use information to not only to avoid market impact but to also drive alpha seeking strategies; creating a feedback-loop between trade performance and portfolio management and ultimately bringing the information process full circle.

Such systems have the capacity to gather and curate large volumes of information, analyze it, then derive alpha from it. The primary step in this process is to develop the capability to gather information from all the various venues, and then curate the information with respect to accuracy, symbol changes, reference points, timestamps, etc. Secondly, the firm's own trade information must be placed through the same diligence. Next, the platform would merge both data sets, public and proprietary, and numerically derive insights. These

insights would then be tested using game-theory to isolate winning insights that will drive desired actions that help generate alpha; identifying optimal trade routes, accurately pricing blocks, estimating returns, assessing market impact, etc.

A system like this describes an investor's adaptation to the new advanced market environment. As with all things in an evolving environment, it is those that adapt with change that will flourish.

Oliver Wyman is a global leader in management consulting that combines deep industry knowledge with specialized expertise in strategy, operations, risk management, and organization transformation.

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