Evolution of Market Microstructure

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Head of Asia Pacific Trading
Evolution of Market Microstructure

What I am going to cover

- Competition & Technology has changed Equity Markets environment... and changed it for the good

- How to navigate Dark Pools & guard against High Frequency Trading Strategies

- What should trustees be asking to ensure they and their service providers have adapted to the new environment?
Visual Order Book in the 90’s

Single Exchange with a **Spread of 100 bps**
Modern Fragmented Order Book

Single Exchange Post Decimalisation with a **Spread of 20 bps**
## Modern Fragmented Order Book

Multiple Exchanges Post Decimalisation with a Spread of 10 bps

<table>
<thead>
<tr>
<th>Price</th>
<th>Bids</th>
<th>Offers</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.02</td>
<td>BATS</td>
<td>ARCA</td>
</tr>
<tr>
<td>10.03</td>
<td>BATS</td>
<td>ARCA</td>
</tr>
<tr>
<td>10.04</td>
<td>BATS</td>
<td>ARCA</td>
</tr>
<tr>
<td>10.05</td>
<td>ARCA</td>
<td>BATS</td>
</tr>
<tr>
<td>10.06</td>
<td>BATS</td>
<td>ARCA</td>
</tr>
<tr>
<td>10.07</td>
<td>BATS</td>
<td>EDGX</td>
</tr>
</tbody>
</table>

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Modern Fragmented Order Book

Naive Order Generation result in fading liquidity and increased spreads
What Are Dark Pools?

- Venues that post un-displayed orders, which can be executed (and then reported publicly) against other orders in the venue.

- Most are owned and operated by brokerage firms to internalise their client orders and/or avoid higher transaction charges imposed by exchanges.
Modern Fragmented Order Book with Dark Pools

Multiple Exchanges Post Decimalisation with a Potential Spread of 5 bps

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The evolution of financial markets

The effects of these technological and structural developments on market structure have been two-fold.
The evolution of financial markets

The effects of these technological and structural developments on market structure have been two-fold.
What is High-Frequency Trading?

- No clear, standardised definition
- “Catch-all” term with commonly agreed characteristics

1. Use of extraordinarily high speed and sophisticated programs for generating, routing, and executing orders
2. Trade Very short time-frames for establishing and liquidating positions
3. Very low latency infrastructure; sustained, high-messaging frequency
The speed of strategic thought

CHECK?
Information processing time

HUMAN DECISION ECOSYSTEM

- ACADEMIC WHITE PAPER: 3 hrs
- THE AUSTRALIAN NEWSPAPER STORY: 1 hr
- THE TELEGRAPH NEWSPAPER STORY: 10 min
- 140 CHAR TWEET: 1 min
- LIMIT HUMAN DECISION MAKING: 3 s

ALGORITHMIC ECOSYSTEM

- FASTEST TRADE TIME NASDAQ: 1 ms
- TIME OF LIGHT TO TRAVEL NY → London: 1000 ms (65ms)

TEDxNewWallStreet - Sean Gourley - High frequency trading and the new algorithmic ecosystem
# HFT Strategies Overview

<table>
<thead>
<tr>
<th>Constructive</th>
<th>Passive Market Making</th>
<th>Arbitrage</th>
<th>Directional</th>
<th>Structural</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spread trading</td>
<td>Cross asset / Cross market arbitrage</td>
<td>News trading</td>
<td>Latency arbitrage / Manipulation</td>
</tr>
<tr>
<td></td>
<td>Receipt of liquidity rebates</td>
<td>Statistical arbitrage</td>
<td>Liquidity detection</td>
<td>Flash orders</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Momentum trading &amp; ignition</td>
<td></td>
</tr>
<tr>
<td>Less</td>
<td>Cross asset / Cross market arbitrage</td>
<td>Statistical arbitrage</td>
<td>News trading</td>
<td>Latency arbitrage / Manipulation</td>
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</tr>
</tbody>
</table>

Source: SEC
Index Arbitrage
Statistical Arbitrage

Source: Bloomberg
How “big” is High-Frequency Trading?

HFT Market Share (# Shares Traded)

Source: Tabb Group, ASIC
Evolution of Electronic Trading

Take aways…

- Competition & Technology have made Equity Markets more complex but this complexity has lowered trading costs

- Not all the negative media coverage on Dark Pools & High Frequency Trading is true and it can be effectively managed

- Going forward, adaptation is key – how will you/your service providers stay ahead of the curve?
Appendix
Evolution of spreads in Australia

Reduction in spreads over 15 years

Source: Credit Suisse Trading Strategy
Evolution of spreads in Australia

Reduction in spreads over 15 years

Number of Trades and Trades Size on the ASX

Source: ITG TCA® and Peer data
# Key moments in the evolution of electronic trading

<table>
<thead>
<tr>
<th>1970s</th>
<th>1980s</th>
<th>1990s</th>
<th>2000s</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1976:</strong> NYSE introduces the Designated Order Turnaround System (DOT)</td>
<td><strong>1983:</strong> Bloomberg &amp; Merrill Lynch build 1st computer system to bring real-time market data and analytics</td>
<td><strong>1998:</strong> SEC authorises electronic exchanges and alternative trading systems (Reg. ATS)</td>
<td><strong>2001:</strong> US markets move from quoting in fractions of USD to decimals</td>
</tr>
<tr>
<td>1st electronic transmission of orders</td>
<td>First physicists arrive on Wall Street</td>
<td>US markets move from quoting in fractions of USD to decimals</td>
<td><strong>2005:</strong> SEC introduces Reg. NMS. Trade-through rules allow traders to benefit from any small price difference between venues</td>
</tr>
<tr>
<td><strong>1976:</strong> LSE goes Electronic Order Driven</td>
<td><strong>1998:</strong> LSE goes Electronic Order Driven</td>
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<td><strong>2007:</strong> MiFid introduced in Europe</td>
</tr>
<tr>
<td><strong>2011:</strong> ASIC approves ChiX for trading Australian equities.</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
## Regulatory Focus

<table>
<thead>
<tr>
<th>FOCUS</th>
<th>RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MICRO IMPACT</strong></td>
<td></td>
</tr>
<tr>
<td>• Effects on spreads, liquidity, volatility</td>
<td>• Large Trader identification systems, flagging (Germany)</td>
</tr>
<tr>
<td></td>
<td>• Financial Taxes (Italy, France)</td>
</tr>
<tr>
<td><strong>SYSTEMIC RISK</strong></td>
<td></td>
</tr>
<tr>
<td>• Role of HFT in Flash Crashes</td>
<td>• Government Investigations (UK, US, Australia)</td>
</tr>
<tr>
<td>• Processes &amp; Controls</td>
<td>• Post-trade transparency requirements</td>
</tr>
<tr>
<td></td>
<td>• Introduction of Exchange circuit breakers</td>
</tr>
<tr>
<td><strong>COST TO MARKET INFRASTRUCTURE</strong></td>
<td></td>
</tr>
<tr>
<td>• Increase load on Exchange infrastructure</td>
<td>• No regulatory response yet</td>
</tr>
<tr>
<td>• IT induced systemic risk</td>
<td>• Increasing attention on infrastructure pricing policy</td>
</tr>
</tbody>
</table>
Glossary

ASX Centre Point
ASX Centre Point is an anonymous, automatic trade matching system. This system uses the prevailing midpoint of the best bid and offer of the ASX Lit order book. By matching orders anonymously, trading via Centre Point reduces market impact costs and the risk of information leakage. Centre Point can be referred to as a 'Dark Pool'.

‘Dark’ Order Book
‘Dark’ Order Books or Dark Pools are a mechanism for trading whereby the price and size of unmatched orders are not disclosed until the trade has been executed. Orders sent to Dark Order Books are generally pegged to the prevailing prices of the same security on the primary stock exchange.

‘Lit’ Order Book
‘Lit’ Order Book is the traditional exchange order book a whereby the price and size of unmatched orders and previously executed trades are publicly disclosed.

High-touch Brokerage
High-touch brokerage is the traditional brokerage service whereby execution of orders is outsourced by buy-side firms to a broker. The broker’s sales trader, while trading the order in the market, will look to find the block trading opportunities by locating another buy-side firm who has the opposite interest in the same security.

Direct Market Access (DMA)
Direct Market Access (DMA) is an electronic facility supplied by brokers that enable buy-side traders to place orders directly in the market order book or in a broker’s algorithm without intervention from a dealer or sales trader at the brokerage firm. Buy-side firms will use the trading infrastructure of the brokerage firm, but have more control over trade execution. DMA is generally offered at lower brokerage cost than a High-touch brokerage service.

Trading Cost Analysis (TCA)
Transaction Cost Analysis (TCA) it is the measurement of the costs of trading. TCA was spawned from the notion of Best Execution as mandated by US & EU regulators. There are 2 components of trading costs: Explicit Trading Costs and Implicit Trading Costs. Implicit costs are generally higher than explicit costs. TCA is intended to measure the costs of trading at several points along the trading life cycle. This helps identify where undue costs are borne and then to compare those costs against a benchmark such as Volume-weighted average price (VWAP) and Implementation Shortfall (IS) as well as forward looking benchmarks such as T+1 Market Adjusted Close. TCA helps measure and monitor transaction costs. High transaction costs result in significant leakage to fund performance.
Glossary

Explicit Trading Costs
Explicit Trading Costs includes costs such as brokerage, market taxes, and exchange fees, all of which can be easily calculated and measured.

Implicit Trading Costs
Implicit Trading Costs include market impact cost and opportunity cost resulting from the delay between the order generation following the decision to trade and the execution of the order.

Large Block Trade Internalised Flow
Large Block Trade Internalised Flow represents a trade resulting from instances where a high-touch sales trader finds a trading opportunity by locating another buy-side firm who has an opposite interest in the same security the resulting block trade.

Small Trade Internalised Flow
Small Trade Internalised Flow represents trades which are executed either intentionally, as in the case of broker Dark Pools, or inadvertently where both the buyer and seller are trading through the same broker and the size of the trade does not meet the exchange's minimum Block Trade size.

Touch Size Value
The ‘Touch’ represents, at any given time during the trading day, the highest price a buyer of a particular security is willing to pay and the lowest price a seller is willing to sell. The Touch therefore specifies the best bid or ask price for a particular security at any point in time.

The Touch Size Value is the average of the size available for that best bid and ask for a particular security at any point in time, multiplied by price. The Touch Size Value represents the amount of liquidity that is available at any given point of time by crossing one spread.

VIX
VIX is the trademarked ticker symbol for the Chicago Board Options Exchange (CBOE) Market Volatility Index. VIX is a widely used measure of market risk and is often referred to as the ‘investor fear gauge’.

The first VIX, introduced by the CBOE in 1993, was a weighted measure of the implied volatility of eight S&P 100 at-the-money put and call options. S&P/ASX 200 VIX index was launched in early 2013 calculated using the mid-point of the bid and ask prices for S&P/ASX 200 put and call options to derive a weighted average of the implied volatility being incorporated into the options.

VIX values greater than 30 are generally associated with a large amount of volatility as a result of investor fear or uncertainty, while values below 20 generally correspond to less stressful, even complacent, times in the markets.
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