Buying and selling at the speed of light:
Taking stock of high frequency trading

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Types of High Frequency Trading
Main Types of HFT Strategies

- Passive Market Making
- Arbitrage
- Structural
- Directional

Volume Estimates
- Passive MM: 60%
- Arbitrage: 30%
- Directional: 5%
- Structural: 5%

**Main Types of HFT Strategies**

<table>
<thead>
<tr>
<th>Definition</th>
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<tbody>
<tr>
<td>Directional</td>
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<tr>
<td>- Order anticipation strategies seek to ascertain the existence of a large order to trade ahead of and capture a price movement</td>
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<td>- Momentum strategies can ignite rapid price move either up or down</td>
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<table>
<thead>
<tr>
<th>Profit Opportunity</th>
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<tbody>
<tr>
<td>- Large opportunity to profit, but can be unhealthy for the market</td>
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<tr>
<td>- Some executions happen at the expense of the long-term investor</td>
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<table>
<thead>
<tr>
<th>Challenges</th>
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<tbody>
<tr>
<td>- Can be high-risk if trade does not work out as planned</td>
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<tr>
<td>- Regulators plan to track manipulative trading strategies</td>
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<th>Structural</th>
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<tr>
<td>- Exploit structural vulnerabilities in the market or in certain market participants</td>
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<td>- Utilizing certain order types or market data discrepancies</td>
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<td>- Often compliment other strategies, like arbitrage or high frequency market making</td>
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<tr>
<td>- Many opportunities across asset classes/regions</td>
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<tr>
<td>- Dependent on technology, market structure, and regulation</td>
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<tr>
<td>- Profit opportunity falls as more traders utilize same structural advantages</td>
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<th>Arbitrage</th>
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<tr>
<td>- Capture pricing inefficiencies between related products or markets</td>
</tr>
<tr>
<td>- Identify discrepancies between the price of derivative and the underlying basket of stocks and buy/sell products simultaneously</td>
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<tr>
<td>- Large profit opportunity if unique relationships are defined</td>
</tr>
<tr>
<td>- Many opportunities across markets, regions, and asset classes</td>
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<tr>
<td>- Have to adapt to market structure</td>
</tr>
<tr>
<td>- Small profit opportunities and increasing competition makes arbitrage very risky</td>
</tr>
<tr>
<td>- Transactions must occur simultaneously to avoid exposure to market risk</td>
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<th>Passive Market Making</th>
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<tr>
<td>- Submit non-marketable resting orders that provide liquidity at specified prices</td>
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<tr>
<td>- Layer the order book to gain queue priority when the market moves</td>
</tr>
<tr>
<td>- Aggressively price order flow to feed market making model</td>
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<td>- Earn the spread by buying at the bid and selling at the offer</td>
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<tr>
<td>- Capture liquidity rebates offered by trading centers</td>
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<tr>
<td>- Need to connect to many venues, which can be costly</td>
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<td>- Increasing competition and regulation</td>
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Sell-Side Tools to Empower Clients
The Dynamic Router minimizes information leakage

The Dynamic Router uses predictive liquidity models to prevent information leakage by sending orders to the minimal number of venues with the greatest likelihood of fill.

**Predictive Liquidity Models**
- Synthesizes historical and real-time data and executions to predict liquidity
  - Probability of fill models for both aggressive and passive trading
  - Dark and hidden liquidity forecasting
  - Based on research at the symbol by venue level

**Unique Market Intelligence**
- Utilizes the unique liquidity and technology throughout the firm to enhance execution logic
  - #3 Broker-dealer ATS, Barclays LX Liquidity Cross

**High-Performance Technology**
- Offers high performance access to all major exchanges and dark pools
  - Co-located connectivity and market data
  - Hardware accelerated technology

**Advantages**
- **Symbol-based logic** vs. sector/capitalization models
- **Dynamic** capabilities vs. static logic
- **Latency arbitrage**
- **Predictive**: hunting liquidity through probability of fill models
- **Access to LX**

**Maximizes fill rates**
**Minimizes information leakage**

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1. Rosenblatt Securities Inc. and Barclays internal analysis
Dynamic Router reports measure execution quality

Dynamic Router Performance Reports

- Execution summaries for posting and taking
- Venue toxicity analysis
- Mean reversion analysis
- Symbol analysis

FOR ILLUSTRATIVE PURPOSES ONLY
Tool allows transparency of client’s profitability

- Monitor changes in client’s flow or trading behavior
- Effectively engage in pricing strategy by considering all monetizing points (e.g. LX)

**Data Sources**
- All algo execution data
- Synced all execution fee data
- LX contra commission generated
- Incorporate alpha / quantitative metrics in the future

**Features**
- Access through web server
- Ability to search by client
- Visual representation of profitable versus not profitable clients
LX® Profiling improves access to beneficial liquidity

**Modified Take % vs. 1-Second Alpha (spreads)**

**Legacy Segments**
- Internal MM
- Broker Dealer
- ELP
- Institutional

**New Liquidity Profiles**
- Passive
  - 23%
  - Neutral
  - 63%
  - Aggressive
  - 14%
- Aggressive
  - 24%
  - Passive
  - 1%
  - ELP
  - 41%
  - Institutional
  - 34%

**Constantly Monitoring Flow Quality**
- The new LX Liquidity Profiling framework provides Barclays with transparency into the flow coming from individual participants in LX:
  - Firms classified as ELPs include both aggressive and passive liquidity providers, e.g., those operating market making strategies.
  - Institutions and BDs segments include both passive and aggressive liquidity providers, e.g., those with high-alpha flows.
- By understanding the characteristics of flow at the client level, Barclays can improve the overall quality of LX liquidity:
  - Passive liquidity providers can be identified and encouraged.
  - High alpha takers can be held accountable, e.g., by demanding liquidity providing strategies, or by refusing a client access.
  - Natural selection – transparency means aggressive flows will tend to be suppressed by clients.

**Note:** This chart represents the top 100 clients in LX (~86% of total flow). The analysis spans more than 11.3 million trades.
Liquidity Profiling allows monitoring at the individual counterparty level
Not all Electronic Liquidity Providers are created equal

Toxicity Monitoring Example 1: ELPs

LX® Profiling

Aggressive

Passive

Modified Take %
Not all Institutions are created equal

Toxicity Monitoring Example 2: Institutions

LX® Profiling

Barclays
LX reports provide transparency to clients

Regular, individualized reports provide insight into a client’s trading activity and performance in LX.

### LX 20-Day Client Summary Report

**Equities**

**Electronic Trading**

#### LX 20-Day Client Summary

**1 Month Historical Volume**

- Shares Executed (req)
- Shares Executed (std)

**Execution Aggressiveness**

- Trades (req)
- Trades (std)

**Client Provide / Contra Take Breakdown**

- Shares Executed (req)
- Shares Executed (std)

**1-Second Provide Alpha vs. Take Segment**

- Shares Executed (req)
- Shares Executed (std)

**Order Size vs. 1-Second Alpha (Grayscale)**

- Shares Executed (req)
- Shares Executed (std)

### LX Report Benefits

- Understand how your flow is profiled based on the new Liquidity Profiling framework
  - Factors include short-term alpha, order size, provide vs. take ratio
- See trends in your order flow charted over time
- View details around interactions by counterparty segment
  - Percentage of interaction against each segment
  - Performance measurements by counterparty segment

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If you have any questions please contact the LX Support Group at LXservice@barclays.com