The rise of algorithmic trading:
what challenges for regulators?

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These are personal views of the author, which are not necessarily those of the AMF
Summary

1. AT & HFT: what are the issues?
2. Supervisory framework & analytical tools
3. Regulatory challenges

“HFT can be characterised as a sub-group of algorithmic trading, that is to say as a technology (and not a strategy), that is used mainly by 3 types of actors: proprietary trading units of investment firms, some HF and proprietary trading firms. It usually involves trading in a very short time span with small price differences, with a predominant focus on highly-liquid instruments and aims at ending the day with closed positions” (ESMA, 2011).
1. Issues: some negative externalities?

- **AMF duties** (Monetary & Financial Code, L. 621-1)
  Protection of savings
  Orderly operation of the markets
  Objectives of financial stability

- But doubts whether AT/HFT may foster
  - Markets disruptions?
    - 6 May 2010: US flash crash
    - 23 March 2012: BATS’ failed IPO
    - 1 Aug. 2012: Knight Capital $400 million loss

- Ghost liquidity, volatility & market abuse?
- Diversity of HFT strategies
1. Issues: predominance of HFT (1/3)

- **Transactions:**
  - « pure » HFT: 20% of the volumes.
  - Some HF members have significant trade market shares.

- **Orders:**
  - « pure » HFT: 60% of the volumes
  - Concentration is decreasing but still high.
  - (5 members account for 2/3 of the orders)
  - New entrants rapidly take predominant market shares (and sometimes rapidly disappear).
1. Issues: predominance of HFT (2/3)

- **Transactions in 2013 Q3**
  - Among the 5 biggest members, 2 are “pure” HFT
  - Distinguishing HFT from the mixed trading flow of global IBs is challenging. MIFID 2 should provide more clarity in reporting (with algo ID).
  - HFT is currently estimated between 40% and 50%
  - Liquidity programs, which are market making strategies falling under HFT activity, account for a significant share of volumes: 30% in Q3

<table>
<thead>
<tr>
<th>Transactions</th>
<th>Orders</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Other members</strong></td>
<td><strong>Other members</strong></td>
</tr>
<tr>
<td>11,8%</td>
<td>13</td>
</tr>
<tr>
<td>9,7%</td>
<td>18</td>
</tr>
<tr>
<td>7,7%</td>
<td>15</td>
</tr>
<tr>
<td>7,7%</td>
<td>20</td>
</tr>
<tr>
<td>6,6%</td>
<td>16</td>
</tr>
<tr>
<td>6,0%</td>
<td>7</td>
</tr>
</tbody>
</table>

The order to trade ratio (OTR) in the Orders pie chart is based on the number of trades, while the Transactions pie chart is based on the amount of trades.
A proxy of HFT relative weight, as market making strategies result typically in large number of orders (but not all HFT strategies are passive)

- Depends on volatility
1. Ex. of strategies: No 1 quote stuffing

High density of quotes

Blurring sequence
1. ... to hide one's own's strategy?

In 500 ms, the firm changes its quotes (same size) on the sell side across 18 different prices 760 times.
Possible objective: slow down competitors, unwind a position on another market, take an opportunity?

1. ... or to slow down other firms?
1. Strategy No 2: Testing algos?

To reduce the spread

... or just painting?

Sources:
http://www.nanex.net/ack2/4407.html
http://www.nanex.net/ack2/4337.html
1. Strategy No 2: Battle of algos?

Two algos answering each other during a pre-opening auction lead to rises & falls in the theoretical opening price
1. Strategy No 3: Layering

Entering orders so as to create imbalance in the order book, in order to execute a transaction on the opposite side
2. Supervisory & analytical tools

• No generally agreed definition of HFT
  Direct or indirect approach
• Estimations vary across venues
  Euronext Paris vs. MTF
• Concentration of players
  But moving market shares
• Links between HFT & market makers
  Investment banks mixed activity
• Rise in HFT:
  When volatility
  For less liquid assets
Order life duration may help determine HFT activity:

Examples of order life median duration:

<table>
<thead>
<tr>
<th>Firm or Broker</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>HFT Firm F</td>
<td>422 ms.</td>
</tr>
<tr>
<td>Retail broker B</td>
<td>27 min.</td>
</tr>
<tr>
<td>Market average</td>
<td>2.4 s.</td>
</tr>
</tbody>
</table>

Test: Is a member’s 25% percentile < 1 sec.? 

Distribution of order life durations:

Order life duration breakdown:

- HFT Firm F
- Market avrg

The market average is heavily weighted by HFT which may account for 90% of orders.
The order book replay enables to get the big picture
2. Supervisory & analytical tools

- Market making
  Avoid adverse selection risk by attracting retail business
  Retail flow accounts for 4% of total volumes but is highly profitable for MM

- Cross-venues arbitrage
  Benefiting or not from exchange rebates
  Primary listing vs. ADR arbitrage

- Basket trading (index future vs. cash)
  Index is fully or partially replicate

- Long-short statistical arbitrage
  Identifying pairs of correlated stocks and assuming their mean-reverting pattern on the short term
3. Regulatory challenges

- **Risks of market abuse are high**
  - Micro manipulations can be repeatedly carried out
  - Detecting these manipulations necessitates appropriate tools (complex algorithms) & an access to order book data (not organized by the current MifiD & MAD).

- Cross-market surveillance has still to be organized:
  - Order books surveillance is not properly organized (need for collection and exchanges between regulators)
  - Regulators should be in a position to collect order book data on the instruments they are competent for.

- **Negative externalities on the functioning of the market**
  - Never-ending race with expensive costs for all investors
  - Questions on the equal access to pre/post trade transparency
  - Dysfunctional in the price formation mechanism

- **Consequences**
  - Tick sizes, latency, fees on cancelled/modified orders?
Challenge: incorporate in 2D numerous variables (price, venue, size, quotes from a specific member...)

- Main drawback: cross-venues consolidation is currently achievable only with anonymous data from data vendors
3. Regulatory challenges

- Questions on data & metrics for each participant
- MiFID2: client ID, order book & algos monitoring
- Still under discussion:
  - description of strategies annually to regulators
  - audit trail of any quotation and trading activities
  - requirements for systems and controls
  - minimum tick size
  - market making obligations
  - limit colocation & pricing structure of venues

=> International harmonization is key