Algorithmic Trading during Financial Crisis

Gangadhar.Darbha@rbs.com
Titles?

Market Structure during Financial Crisis

or more honestly,

some random Thoughts about Market Structure during Financial Crisis

Apologies!
Why this topic is important?

Notwithstanding what you see in the papers, what happened over last few years is an extra-ordinary opportunity to understand what aspects of market mechanisms that were built over years succeeded and what aspects failed and why? and how could we design systems better?

If one gives too much emphasis on the headline-numbers and assume that everything failed in the crisis, we would be giving up years of accumulated knowledge and expertise about the functioning of financial markets that is so essential for future growth and development.

In analysing and understanding the financial crisis, we need to distinguish the role of banks, other institutions and markets.
Why Algorithmic Trading?

- Systematic and Transparent trading strategies
- based less on human biases and judgements in run time
- frontier trading + technology tools deployed in most liquid markets

Provides much cleaner “data” to study the market structure

As an aside, highlights the role of Quants / Acads in financial markets - have they caused or exacerbated the crisis?
Algorithmic trading is any type of computer-assisted mathematical / statistical model based trading activity which handles the timing, submission and management of trades and orders.


Equities an FX
More generally, Algorithmic Trading could be defined as any automated routine that processes incoming market data and provokes trading activity.
Market Structure and Algorithmic Trading

Macro-Structure

- Macro-policy environment
- Depth and Breadth of Financial Markets
- Regulatory framework
- e.g. Emerging Markets

Micro-structure

- Organization of Trading Process
- Electronic vs OTC
  - Information Dissemination
- Liquidity and Transparency
Algorithmic Trading System

Historical / Real-time Data Infrastructure
- Tick-data
- Historical / Real-time on Govt. Bonds, Futures, swaps
- Database servers
- Connectivity to models
- Maintenance Infrastructure
- Sharable across groups

Model Development & Testing Infrastructure
- Simulator for Back-testing
- Integration with Order-book
- Parallel computation
- More specific to FI – Algo area

Trade Execution Infrastructure
- Connectivity to Liquidity pools
- Sharable across groups

Tuesday, 9 March 2010
Algorithmic Solutions - Overview

**Decision Support**
- Price Generation (dynamic)
  - Mid-price
  - B/A spreads
  - Client Spreads
- Auto-Hedging (Real-Time)
  - PnL/Risk Decomposition
  - Optimal Hedging
- Inventory Management
  - Risk / Position limits

**Flow or Prop-Trading**
- Order Execution / Routing

**Auto-Execution**
- External Clients
  - RV Analytics
    - Single / Multiple Instruments
    - Single / Multiple Asset Classes
  - Directional Signals
    - Low-frequency
    - High-Frequency
- Internal Clients
## Have Algorithms Failed?

<table>
<thead>
<tr>
<th></th>
<th>Pricing</th>
<th>Execution</th>
<th>Predictive / Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equities / FX</td>
<td>Good</td>
<td>Good</td>
<td>not clear</td>
</tr>
<tr>
<td>Sovereign Bonds</td>
<td>Good</td>
<td>Good</td>
<td>bad</td>
</tr>
<tr>
<td>Credit Products</td>
<td>Bad</td>
<td>?</td>
<td>bad</td>
</tr>
</tbody>
</table>
Comments

1. Different asset markets responded differently <= differences in underlying market (micro and macro) structures

2. Equities - exchange traded, centrally settled, etc. - have been relative more resilient (craig Furfine’s paper); FX markets were also resilient (clara Vega)

3. Govies - due to flight to quality - experienced high volume as well as volatility; but the risk management systems failed - lack of credibility in inter-bank markets.

4. Credit Products - flow and exotics - did badly.

5. Quant Strategies + predetermined (pro-cyclical) risk control systems => liquidity crisis
Conclusion

“Art of Progress is in 
Managing Order in times of Change 
and
Managing Change in times of Order”