Compliance and Risk Management in 21st Century

Erozan Kurtas

The Securities and Exchange Commission, as a matter of policy, disclaims responsibility for any private publication or statements by any of its employees. The views expressed herein are those of the author and do not necessarily reflect the views of the Commission or of the author's colleagues upon the staff of the Commission.
Convergence of disciplines: Rise of the Algorithms

**Computing Power**
- Microprocessor Transistor Counts 1971-2011 & Moore's Law

**Internet**
- Broadband
- Smart Routers
- High speed Networks

**Algorithmic/Computerized Trading**
- ECN/ATS
- DMA
- Electronic Market Making
- Dark Pools
- Tick Sizes
- Co-Location

**Storage Capacity**
- Capacity (GB)

**GLOBALIZATION**
- Connectivity of the markets
- 24/7 News
- Global social networks

**Computer Science**
- Statistics
- Data Mining
- Artificial Intelligence

**Econometrics**
- Financial Engineering
- Behavioral Economics

Erozan Kurtas
Algorithms come in many fashion

Execution Tactics
VWAP, TWAP

HFT

UHFT

Latency Arbitrage

Statistical Arbitrage

Market Making

Fees/Rebates
Maker/Taker

Fundamental

Technical

Event Based

News Aggregators

Alpha Capture

Analyst surveys

Time series Analysis

Neural Networks

Adaptive/Learning Systems

Pattern Recognition

7/20/2012
Erozan Kurtas
Alpha Capture Systems

• Started with Marshall Wace in 2001 in UK
• Web based systems to capture trading ideas coming from contributors: sales desks, analysts
• More than buy or sell ideas
• Becoming more and more common place
Trade Idea Flow: Old Model

SELL SIDE

BUY SIDE

IDEAS

• Decentralized
• Minimal Computational Power
• Minimal use of Historical Data
• No Statistical Analysis
Alpha Capture Systems: New Model

Computation Power
Real Time
Historical Data
Centralized
Sophisticated Statistics
A Few of The Risk Factors for Alpha Capture

• Material non-public information

• Compliance requirements both at the contributing and receiving firms

• Compensation Structure

• Difficulty in establishing cause-effect relationship between contributor ideas and executed trades

• Regulation arbitrage: lack of strong controls in overseas markets
# High Frequency Trading

<table>
<thead>
<tr>
<th>Ultra High Frequency</th>
<th>1 millisecond to 1 second</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Frequency</td>
<td>1 second to minutes</td>
</tr>
<tr>
<td>“Slow”</td>
<td>Minutes to hours</td>
</tr>
</tbody>
</table>

## Research By Tabb Group

<table>
<thead>
<tr>
<th>Region</th>
<th>2005</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>21%</td>
<td>56%</td>
</tr>
<tr>
<td>Europe</td>
<td>9%</td>
<td>25-35%</td>
</tr>
<tr>
<td>Asia</td>
<td>10-30%</td>
<td></td>
</tr>
</tbody>
</table>
High Frequency Trading: Good or Bad?

SUPPORTERS
• Increases Liquidity
• Makes markets more efficient
• Decreases Volatility
• Natural evolution of markets
• Cancellations are natural
• Does not need more regulation

OPPONENTS
• Liquidity Fleeting: not real, not there when needed
• Distorts the markets: self similarity, correlation
• Increases Volatility
• Privileged access to markets, data
• Huge number of cancellations to manipulate markets
• Significant Number of ODD LOT trading
• Needs more regulation

STRATEGIES
• Liquidity Providing
• Trading the Tape
• Statistical Trading
• Market Making
• Momentum Trading
• Technical Trading
• OTHER: ? ? ?

ACADEMIC RESEARCH
• J. Brogaard, July 2010: HFT and its impact on market quality.
• J. Hasbrouck and G. Saar, Oct 2010: Low-Latency Trading
• R. Smith, June 2010: Is HFT inducing changes in market microstructure and dynamics?
• R. Cont, September 2011: Statistical Modeling of High-Frequency Financial Data
• M. O’Hara, July 2011: What’s Not There: The Odd-Lot Bias in TAQ Data

JURY IS OUT ON HFT
HFT IMPACT IS REAL
RESEARCH INCONCLUSIVE SO FAR

7/20/2012
Erozan Kurtas
Out On The Field

What We Hear: Nice and Orderly

Data Sources

Data Normalization

Forecasting Models

Risk Models

Portfolio Generator

Order Management and Execution Tactics

Exchanges
REALITY IS DIFFERENT: What We See

Land of many languages: Lost in Translation

Micro second latency

Alpha $$$

Risk Metrics, VaR, Stress Tests, Cross Business Impact

C++, Python, Java, Matlab, FPGA

Optimization, Information Ratio, Covariance Matrix

Dodd-Frank

Cross Trades, wash trades, churning, layering ...
Interaction of Algorithms
Compliance and Risk Management Challenges

• Proper documentation of models, systems and processes

• Proper testing of the models and systems:
  – Can they start or accelerate market events?
  – How do they behave individually and in aggregate under stress environments?
  – How do the changes in models tracked?

• Most compliance personnel do not have the background to understand, monitor or test the models

• Models and Systems evolve faster than Risk or Compliance processes

• In my opinion, traditional compliance need to become Quantitative Compliance: Financial Engineering requires Compliance Engineering.
A Robust Risk and Compliance Process

DATA SOURCES

TECHNOLOGY

RISK TARGETING

QUANTITATIVE ANALYSIS

FINANCIAL ANALYSIS

LEGAL/COMPLIANCE ANALYSIS

RESULT

TECHNICAL ENABLERS

DATA