ALGORITHMIC TRADING
AN OVERVIEW
Algorithmic Trading – What is it?

• Electronic trade execution “piloted” by a model

• Model tries to match a specific execution cost benchmark

• Usually breaks up a larger trade into a series of smaller trades to be executed over time
Algorithmic Trading – How much is there today?

Tower Group says 7% of all Buy Side flow…

Algorithmic Trading – How much is there today?

..while the Tabb Group reports that over half of all firms have access to algorithms.

Most Popular Algorithms

The list of most popular algorithms is dominated by the key execution benchmarks: VWAP and Arrival Price

- VWAP (27%)
- Arrival Price (19%)
- Imp. Shortfall (13%)
- EOD / Beat Close (10%)
- Guerilla (8%)
- Liquidity (8%)
- % ADV (6%)
- Other (9%)

Essentially the same algorithm (32%)

Trading Cost – How Big?

~ 20bps Implementation Shortfall for Average Trade per Side*

At 1 x Portfolio Turnover, 40bps Drag on Annual Portfolio Performance

Assume 6% Annual Return

40bps / 6 % = 6.7% negative return contribution

Implicit Trading Cost Attribution

- Market Impact
- Timing / Trend Cost
- Unexecuted orders/ Opportunity Cost
- Spread Cost

\{ Strategic / Scheduling \}
\{ Tactical / Implementation \}
Timing Cost is Critical, but Spread Costs Matter Too!

Cost Attribution Example: Order to Buy 60,000 shares, filled via 3 Executions*

1 Order – 3 Executions

Order Trading Cost is Sum Total of Executions A/B/C

* Hypothetical Executions
Two Common Benchmarks

Volume Weighted Average Price (VWAP)
- A weighted average price
- Trading volumes are the weights
- Intuitive & easy to use for traders > commonly used in the market
- VWAP does not measure Trend/Timing Cost!

Arrival Price
- The portfolio decision price
- Difference between Arrival Price and execution price, plus forgone returns on unexecuted shares is called “Implementation Shortfall”
- There is little agreement in the market on what an “appropriate” implementation shortfall ought to be
### Pros and Cons: VWAP vs Arrival Price

<table>
<thead>
<tr>
<th>VWAP Advantages</th>
<th>Arrival Price Advantages</th>
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<tbody>
<tr>
<td>• Easy-to-use</td>
<td>• Directly related to portfolio returns (“capturing alpha”)</td>
</tr>
<tr>
<td>• Direction-neutral</td>
<td>• Can’t be fooled</td>
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<tr>
<th>VWAP Disadvantages</th>
<th>Arrival Price Disadvantages</th>
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<tr>
<td>• “Becoming” VWAP</td>
<td>• Harder to implement</td>
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<tr>
<td>• “Waiting out” VWAP</td>
<td>• Law of large numbers</td>
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<tr>
<td>• “Stretching out” the order</td>
<td>• Direction-bias</td>
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<tr>
<td>• “Saying No” to a block</td>
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*Instinet*

*THE INSTITUTIONAL BROKER*
“Becoming VWAP” Threat – Recent Data

ITG Study Shows Empirical Evidence of ‘Becoming VWAP’

Data Source: ITG “The Cost of Algorithmic Trading: A First Look at Comparative Performance” (March 2005)

Charts: Instinet
Instinet & Northfield

Instinet already had a robust VWAP rule

We wanted to develop an Arrival Price rule that would
• Factor in an effective measure of timing risk
• Work for portfolios & pairs, not just single stocks
• Factor in short-term stock correlations for portfolios & pairs

So we turned to someone who
• Had expertise in risk management models
• Had a proven short-term risk model
The Instinet & Northfield Partnership

Benefits & Synergies

• Be able to execute portfolios against Arrival Price
• React to real-time market data
• Optimize and re-balance real-time, during the execution process
TRADING TACTICS FOR ALGORITHMIC TRADING
Implementation

- FIX
- NORTHPORT™ Execution Management System
- Northfield Risk Model
- Instinet Order Handling
- Instinet Trading Engine
- Feedback Loop

Newport™ is patent-pending
Scenario: Buying 50,000 of NYSE-listed mid-cap, Limit 19c, Current Market 16c x 20c. BlockPeg Execution Style “Aggressive”

1. Market: 16c x 20c Executed: 0 Left: 50,000
   - CBX
   - DOT
   - Post at mid-spread
   - BlockPeg
   - 20c
   - 18c
   - 16c

2. Market: 17c x 21c Executed: 0 Left: 50,000
   - CBX
   - DOT
   - Post at mid-spread
   - BlockPeg
   - 21c
   - 19c
   - 17c

3. Market: 16c x 20c Executed: 10,000 Left: 40,000
   - CBX
   - DOT
   - Peer institution takes block @ 18c
   - 18c
   - 16c

4. Market: 22c x 25c Executed: 0 Left: 40,000
   - CBX
   - DOT
   - Not posting
   - BlockPeg
   - 25c
   - 22c

5. Market: 15c x 19c Executed: 2,000 Left: 38,000
   - CBX
   - DOT
   - 2000 shares marketable @ 19c
   - BlockPeg
   - 19c
   - 17c
   - 15c

6. Market: 14c x 18c Executed: 1,000 Left: 37,000
   - CBX
   - DOT
   - Someone hits the bid: 1,000 shares @ 14c
   - BlockPeg
   - 18c
   - 16c
   - 14c

NYSE Spread-cost Minimization Tactic: BlockPeg®
Another Spread-Cost Minimization Tactic: Momentum detection & Mean reversion

Rule Detects Intra-Day Volatility “Noise”
- Pricing Buy Order Passively -

Rule Detects Adverse Momentum
- Pricing Buy Order Aggressively -
Cost vs Arrival Price I have realized (executed portion of the order)

What the entire order’s realized Cost vs Arrival would be if I executed all residuals now

Cost vs Arrival Price of unexecuted residuals
Best Execution – What else can you do?

- Use a great model
- Use great technology
- Trade through a broker who doesn’t have a dog in the fight

- 100% Pure Agency
- 100% Anonymous
- Always trading for the customer
- No firm proprietary account