Information Events and Market Microstructure

Robert Almgren

Stevens High Frequency Data
July 21, 2012
Pit trading → electronic

Pit
- position traders
- floor brokers

Electronic
- HFT & Market Makers
- algorithmic brokers
QB = Agency algorithmic execution

Average execution price = 9883.56  Cost to strike = −$7.67 per lot

Sell 97 June 2012 Eurodollar

Order book (thin for Eurodollar)

Our limit orders

Our fills

Cointegration signal

Benchmark = Arrival price

Strike 9883¼

Limit orders
Aggressive Fills
Passive Fills
Cumulative exec
Bid–ask
Micro price
Cointegration price
Market trades
Cumulative TWAP

CDT time on Wed 13 Apr 2011
Quantitative Brokers

Algo execution and cost measurement

No prop trading or market making

Interest rate products, starting with futures
Equities already well served
Live with CME Treasury & Eurodollar since 2010
Live with Eurex June 2012
LIFFE soon

Good execution depends on microstructure expertise (large tick markets)
Interest rate futures products

Chicago Mercantile Exchange (CME)
  US Treasury futures
  Eurodollar futures (LIBOR)

Eurex
  Bund, Bobl, Schatz (European govt bonds)
  CONF (Switzerland), BTP (Italy), FOAT (France)

London International Financial Futures (LIFFE)
  Euribor, Euroswiss, Euroyen, etc
  Short Sterling
  Gilt
Differences between rates futures and equities

• No market fragmentation (more or less)
  simple routing, good market data
• Trading rules more complicated
  pro rata match algorithms
  implied quoting
• Large tick size (bid-ask spread)
• High degree of interrelation
  cointegration
  multidimensional algorithms
  basis trading, substitutions, etc
• Round the clock trading
  Information events
Volume forecast

Volatility forecast

No definite open as in equities

Peaks from events

10-year note futures
Thurs March 29

Peaks from events

Year Note

Volume forecast

Volatility forecast

03:30 | [UK] Mortgage Approvals, [UK] Net Consumer Credit, [UK] Net Lending Sec. on Dwellings
03:30 | [UK] Index of Services (3mth/3mth)
12:00 | [US] 7–YEAR NOTE
Nonfarm Payrolls -- June 1, 2012

Sept 10-yr

2000 lots

CDT on Fri 01 Jun 2012
Market dynamics strongly affected by events ("Earnings announcements for rates")

- Economic announcements
  - employment, inflation, productivity, etc
- Treasury auctions
- FOMC minutes and actions

Events are scheduled in advance
Information released at precise time
Specific to rates markets

Timing is everything in ICE, CBOT grain futures and options competition

By Suzanne Cosgrove

A tempest followed the IntercontinentalExchange’s launch of five new U.S. grain and oilseed futures and options contracts on ICE Futures U.S. earlier this month, encroaching on a market long dominated by the CME Group’s Chicago Board of Trade.

... 

As a result of the longer trading hours, both U.S. grains futures markets will be open for electronic trading through key market-moving releases from the U.S. Department of Agriculture, a development that sent tremors through the industry.

Unlike in the financial markets, “grains traders in general are not used to trading through reports, even minor reports,” said Terry Roggensack, an analyst at The Hightower Report. “They never got around to the kind of trading that financial markets deal with.”
## July, 2012

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Release</th>
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<tbody>
<tr>
<td>Wednesday, July 04, 2012</td>
<td></td>
<td>Independence Day</td>
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<tr>
<td>Friday, July 06, 2012</td>
<td>08:30 AM</td>
<td>Employment Situation for June 2012</td>
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<tr>
<td>Tuesday, July 10, 2012</td>
<td>10:00 AM</td>
<td>Job Openings and Labor Turnover Survey for May 2012</td>
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<td>Wednesday, July 11, 2012</td>
<td>10:00 AM</td>
<td>Employee Benefits in the United States for March 2012</td>
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<tr>
<td>Thursday, July 12, 2012</td>
<td>08:30 AM</td>
<td>U.S. Import and Export Price Indexes for June 2012</td>
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<tr>
<td>Friday, July 13, 2012</td>
<td>08:30 AM</td>
<td>Producer Price Index for June 2012</td>
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<tr>
<td>Tuesday, July 17, 2012</td>
<td>08:30 AM</td>
<td>Consumer Price Index for June 2012</td>
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<td>Tuesday, July 17, 2012</td>
<td>08:30 AM</td>
<td>Real Earnings for June 2012</td>
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<td>Wednesday, July 18, 2012</td>
<td>10:00 AM</td>
<td>Usual Weekly Earnings of Wage and Salary Workers for Second Quarter 2012</td>
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<td>Friday, July 20, 2012</td>
<td>10:00 AM</td>
<td>Mass Layoffs (Monthly) for June 2012</td>
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<td>Friday, July 20, 2012</td>
<td>10:00 AM</td>
<td>Regional and State Employment and Unemployment (Monthly) for June 2012</td>
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<td>Wednesday, July 25, 2012</td>
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<td>Number of Jobs, Labor Market Experience, and Earnings Growth: Results from a National Longitudinal Survey for</td>
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<tr>
<td>Tuesday, July 31, 2012</td>
<td>08:30 AM</td>
<td>Employment Cost Index for Second Quarter 2012</td>
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**NOTE:** All times on calendar are Eastern Time.

**Last Modified Date:** June 25, 2012
<table>
<thead>
<tr>
<th>Security Type</th>
<th>Announcement Date</th>
<th>Auction Date</th>
<th>Settlement Date</th>
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<tr>
<td>4-Week BILL</td>
<td>Monday, July 02, 2012</td>
<td>Tuesday, July 03, 2012</td>
<td>Thursday, July 05, 2012</td>
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<td>10-Year TIPS</td>
<td>Thursday, July 05, 2012</td>
<td>Wednesday, July 11, 2012</td>
<td>Monday, July 16, 2012</td>
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<td>30-Year BOND</td>
<td>Thursday, July 05, 2012</td>
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<td>Monday, July 16, 2012</td>
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<td>13-Week BILL</td>
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<td>Monday, July 09, 2012</td>
<td>Thursday, July 12, 2012</td>
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<td>26-Week BILL</td>
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<td>Monday, July 09, 2012</td>
<td>Thursday, July 12, 2012</td>
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<td>52-Week BILL</td>
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<td>2-Year NOTE</td>
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<td>5-Year NOTE</td>
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<td>7-Year NOTE</td>
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<td>13-Week BILL</td>
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<td>Monday, July 30, 2012</td>
<td>Thursday, August 02, 2012</td>
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<td>26-Week BILL</td>
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<td>Monday, July 30, 2012</td>
<td>Thursday, August 02, 2012</td>
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<td>4-Week BILL</td>
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</table>
Data -- event data from Bloomberg

US and Western Europe
All economic events and auctions
868 information announcements
693 government auctions
15,275 events since Jan 2011
Overlap of events

Clustered event names

Events that occur together at least once
Global dependence

US 10-year

3:30 AM Chicago time:
German Purchasing Managers Index worse than expected

Exec = 128–18.73  Cost to VWAP = 5.56 tick = $86.95 per lot

Strike 128–18.73  VWAP 128–21.51

02:14:35  02:00 02:10 02:20 02:30 02:40 02:50 03:00 03:10 03:20 03:30 03:40

CDT time on Thu 22 Mar 2012

15000 lots
How to trade through events

TWAP/VWAP Get exactly onto schedule
Arrival price: try to complete before event
Don’t try to trade when liquidity not present
Pull limit orders from market

Only do this for “significant events”