



Transparency

Securities Information Processors

SIP



Value of transparency

- All have the same information reducing asymmetries and adverse selection
- Enhances quoting competition
- Allows clients to evaluate broker reducing agency costs
- Makes multiple security transactions easier enhancing hedging



The Plans

- NYSE and AMEX (the first market) set up the Consolidated Tape Association (CTA) to oversee the CTS and CQS Plans which provide transaction and quote data
 - Network (now Tape) A for NYSE listed
 - Network (now Tape) B for AMEX, and Regional (and later Arca) listed
- NASDAQ set up Nasdaq/UTP (Unlisted Trading Privileges) plan for Nasdaq listed stocks (Tape C)



The Plans

- Original participants AMEX, NYSE, CBOE, NASD and 5 Regionals (Boston, Chicago, Cincinnati, Philly, Pacific)
- Current membership of each administers
 - All 13 current and former equity exchanges plus ISE and FINRA (CBOE not member of NASDAQ/UTP)
- Operations responsibility of NYSE (CTA) and NASDAQ (NASDAQ/UTP)



CTS, CQS, UTDF, UQDF

- CTS and UTDF continuously update high, low and volume for every (eligible) security during the day
- CQS and UQDF continuously update National Best Bid and Offer (NBBO) for every security
 - Also update best bid and offer with sizes at each exchange
- Provide data on a continuous basis to clients (vendors and broker/dealers)



Latency (1Q16)

- Latency: time from exchange event to message leaving SIP
 - Transactions: (CTS) mean 330 μ s, median 240 μ s
 - Quote changes: (CQS) mean 490 μ s, median 220 μ s
 - Transactions (UTDF) mean 770 μ s, median 49 μ s
 - Quote changes (UQDF) mean 920 μ s, median 47 μ s
- CTA latency 10-20 times longer in 1Q10
- NASDAQ/UTP 6-10 times longer in 1Q10



Capacity (1Q16)

- Capacity: Transactions per second
 - CTS 860,000 mm (peak 123,000)
 - UTDF 614,000 (peak 75,000)
- Capacity: Quotes per second
 - CQS 3.92 mm (peak 615,000)
 - UQDF 1.245 mm (peak 250,000)
- Ratio of capacity to peak per 100 ms smaller at around 2



Data Cost (approx. 2015)

- Cost of data (CTA)
 - Access Fee \$750-\$1750 per month
 - Subscriber Fee (non-professional) \$1/month
 - Subscriber Fee (professional) \$20-\$50/unit per month
- Cost of data (UTP)
 - Access \$500-\$2500/month
 - Subscriber Fee (non-professional) \$1/month
 - Subscriber Fee (professional) \$22/month



Other data available

- Exchanges are also selling data directly
 - At “exactly” the same time that a message is sent to CTS/CQS or NASDAQ/UTP a signal is sent out on the private network
 - NYSE fined in 2011 for sending out early
- Does not mean that the messages arrive at the same time



Other Data sent by exchanges

- The SIPs only send out “top of book” information—best bid, bid depth, best offer, offer depth—and transactions
- Other data include full depth of book information—every standing order with size information, except orders that choose to be hidden
- Purchased by HFTs and some brokers



Observations

- SIP viewed as monopoly public utility
 - CTA monopoly in TAPE A and TAPE B
 - UTP monopoly in TAPE C
- Gallagher (SEC)
 - Why should there be a monopoly?
 - Why can't exchanges sell data competitively
 - As they already do

Disadvantage to upstart?



Recent (3/16) average
5 day market shares
(notional volume) of
registered exchanges
and trade reporting
facilities (TRF)
(source:
batstrading.com)

• NASDAQ (Q)	16.24%
• NYSE Arca (P)	13.63%
• NYSE (N)	12.03%
• BATS BZX (Z)	7.27%
• EDGX (K)	7.35%
• EDGA (J)	2.39%
• BATS BYX (Y)	3.90%
• BEX (B)	1.99%
• PSX (X)	1.12%
• CHX (M)	0.69%
• NSX (C) NSX(C)	0.00%
• NYSE MKT (A)	0.06%
• CBOE (W)	0.00%

TRF

• NASDAQ (DQ)	29.53%
• NYSE (DN)	3.81%
• ADF (D)	0.00%



The network

- Every time there is a quote change CQS UQDF receive a message from the exchange on which the quote change occurred
- Every other exchange receives the same message



Revenue Sharing

- UTP and CTA obtain revenue from selling data (trades and quotes)
 - 2013 CTA/UTP revenue of \$382mm (SEC filing by UTP requesting permission to change charges)
- Exchanges share in quote and trade net (of costs) revenue, TRFs share in trade revenue
 - If net revenue is negative that is shared as well



Formula

- Initial Security income allocation security j :
plan income times square root share of
overall volume

$$\frac{\sqrt{DV(j)}}{\sum \sqrt{DV(i)}} = \text{square_root_share}(j)$$

- Gives relatively more weight to low volume
stocks and less to high volume stocks



Example calculations

- Dollar volumes: 4 9 25 38
 - Volume shares: .1 .24 .66
 - Root volume: 2 3 5 10
 - Root Volume share .2 .3 .5
-
- Reduces incentives of exchanges to focus attention on high volume names



Formula

- If initial security income allocation greater than 4 times the value of qualified transaction reports then an adjustment
 - Qualified transaction report is a transaction with a dollar value greater than \$5,000
 - A transaction report with a dollar value less than \$5,000 is a fractional transaction report, the fraction being of \$5,000



Adjustment (if large)

- The initial security income allocation minus 4 times the total value of security qualified transactions is subtracted from the initial security income allocation and that amount is allocated on a volume weighted basis to all securities
- Leads to final security income allocation
- First step: allocate revenue to securities



Trading share

- Trading share for exchange e in security s is 50% of the final security income allocation times the exchange's trade rating in s

$$trade_rating(e, s) = \frac{1}{2} \left(\frac{DV(e, s)}{DV(s)} + \frac{\#qualified_transaction_reports(e, s)}{\#qualified_transaction_reports(s)} \right)$$

- The notional volume and transaction reports are across all trading venues including TRF
 - Average of volume and transaction shares



Quoting share

- Exchange quote rating in security times 50% of final security income allocation
- Quote rating for exchange e in security s :

$$quote_rating(e, s) = \frac{quote_credit(e, s)}{total_quote_credits(s)}$$

$$quote_credit(e, s) = \$size(e, s) * (\#whole_seconds @ best)$$



Quoting revenue

- Since ATSs and other TRF reporters not quoting, they do not share in this revenue
- Total exchange revenue is trade revenue plus quote revenue across all securities



Follow the Money

1. Revenue is allocated to securities by the square root sharing rule
 1. Reduces incentive of exchanges to favor high volume names
2. Revenue in each security is allocated to a venue according to the average of
 1. Trade Rating
 2. Quote Rating
3. Trade Rating is average of notional volume share and Transaction share

4 Incentives-transactions and quotes

- An exchange wants Dollar volume, Transactions, Large Aggressive quotes
- How might an exchange increase reported transactions?
 - Not just report sell order executions but all order executions (they do)
 - Encourage “shredding?” (but cannot be too small)
- How might an exchange try to attract large aggressive quotes?
 - Maker/Taker fees



Becoming a New Participant

- To become NASDAQ/UTP participant must pay share of development cost
 - Cost was \$439,530, so each have had to pay 1/15 of this or 29,302
 - A new participant would pay 1/16 of original cost by paying \$1,962.19 to each of the existing 15 participants
 - No inflation adjustment



Complex System

- The system involves many “pipes”
 - CQS, CQT, UQDF, UTDF each of which consists of many channels each dedicated to a list of names
- Reg SCI (System Compliance and Integrity) asks for more secure exchange system
 - Effective date: February, 2015
 - Perhaps historical redundancy useful?