

TAQ exercise, summary results, Spring 2015

Ticker symbols: AED, AEH, AEK, AOR, ARCW, ARDC, ASA
Market data from 4 December 2014

Trade Counts	All		Volume shares, %	Clustering		All		-00, .01, .02, ..., .99
		N					%	
	All	2,321		All	100	All	%	100
	t30					mod100		
	8:00	1				0	%	97
	9:00	2				1	%	3
	9:30	146				mod50		
	10:00	159				0	%	96
	10:30	232				1	%	4
	11:00	266				mod25		
	11:30	164				0	%	91
	12:00	107				1	%	9
	12:30	143				mod10		
	13:00	114				0	%	87
	13:30	147				1	%	13
	14:00	189				mod5		
	14:30	124				0	%	79
	15:00	146				1	%	21
	15:30	353						
	16:00	25						

	All	col%	SIZE	
All	100			
EX				
B/NASDAQ BX	1			
D/FINRA ADF	48			
J, Edge A	2			
K, Edge X	5			
N/NYSE	27			
P/NYSE Arca	7			
Q/NASDAQ	1			
T/NASDAQ	3			
X/NASDAQ PSX	0			
Y/BATS Y	3			
Z/BATS Z	2			

1%?	2%	4%	10%	20%
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What fraction of trades were priced exactly on a dollar boundary, \$xx.00?

... on a multiple of \$0.50 (\$xx.00 or \$xx.50)?

... on a multiple of \$0.25 (\$xx.00, \$xx.25, \$xx.50, or \$xx.75)?

... on a multiple of \$0.10 (\$xx.00, \$xx.10, \$xx.20, ...)?

... on a multiple of \$0.05 (\$xx.00, \$xx.05, \$xx.10, ...)?

Subpenny trades

centsPartial is zz
in, e.g., \$123.45zz

ask 92.22
\$92.215 →
bid 92.21
trade at
92.2129

	All
	%
All	100
centsPartial	
00	81
99	3
50	3
90	2
01	2
10	1
20	1
32	1
40	1

CQ counts

	All
	N
All	43,342
EX	
B/NASDAQ BX	3,183
D/FINRA ADF	995
J, Edge A	1,485
K, Edge X	2,463
N/NYSE	10,409
P/NYSE Arca	5,522
T/NASDAQ	6,306
X/NASDAQ PSX	136
Y/BATS Y	6,144
Z/BATS Z	6,699

mean spread

	All
	Mean spread
All	\$0.0978
t30	
9:30	\$0.2791
10:00	\$0.0851
10:30	\$0.0634
11:00	\$0.0423
11:30	\$0.0436
12:00	\$0.0411
12:30	\$0.0349
13:00	\$0.0357
13:30	\$0.0312
14:00	\$0.0435
14:30	\$0.0278
15:00	\$0.0312
15:30	\$0.0421

Securities Trading: Principles and Procedures

Chapter 7 Dark mechanisms

Darkness

- ❑ A *Dark market* does not display bid and ask quotes.
 - They may exist in the system, but are not displayed.
 - Antonym: *lit market*
- ❑ In a *dark trade*, the market center executing the trade did not display a quote at the trade price.
 - The trade itself will be reported.
 - Most dark trades are reported to Finra's ADF (alternative display facility).
- ❑ The "darkness" refers to the absence of a visible bid or offer not the absence of a trade report.

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Where/how does dark trading occur?

- ❑ Some markets that are mostly "lit" allow trades to occur by dark mechanisms.
 - Hidden orders
 - Internalized orders
- ❑ In (completely) dark markets, visible bids and offers are never displayed.
 - Crossing sessions
 - Continuous dark pools

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Hidden limit orders

- ❑ The NBBO is 20.00 bid, offered at 20.10.
- ❑ Market Z has an undisplayed order to sell, limit 20.04.
- ❑ If Z receives an order to buy priced at 20.04 or better, there will be a trade at 20.04 against the hidden order.
- ❑ The trade is dark because the market was not showing a visible offer at 20.04.
- ❑ Executions against hidden orders are reported on the executing exchange.

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Internalization 1

- ❑ The NBO in a NASDAQ stock *ABC* is 20.10.
- ❑ NASDAQ market maker *Y* is offering 20.15.
- ❑ A broker at *Y*'s firm receives a marketable customer buy order.
- ❑ *Y* sells to the customer at 20.10 (the NBO)
- ❑ The market maker is acting as principal.
- ❑ The trade is reported.
- ❑ The trade is dark because executing firm was not offering at 20.10.
- ❑ Note: this is called an internalization because the customer order was not allowed to interact with the larger pool of "external" orders that might have been found on NASDAQ's limit order book (for example).

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Internalization 2

- ❑ Brokerage firm Q is an order entry firm.
 - It does not make markets.
- ❑ A broker at Q receives a marketable customer buy order in NASDAQ stock XYZ .
- ❑ The broker sends the order to the NASDAQ market maker at firm Y (as in the case of internalization 1)
- ❑ Y executes the order at the NBO.

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Point-in time crossing markets

- ❑ Traders submit directions and quantities (but not prices)
 - “Buy 40,000 IBM”
- ❑ Orders are held, but not displayed.
- ❑ At a scheduled time, the system looks for a match (or partial match).
- ❑ If there is a “Sell 30,000 IBM” the buyer and seller are matched for 30,000 shares.
 - The price is usually the NBBO midpoint.
- ❑ Example: ITG’s POSIT MATCH formerly operated one 9:45 crossing for US equities, random timing of the match)
- ❑ Scheduled crossing markets have mostly been replaced by continuous dark pools.

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Continuous dark pools

- ❑ Rules and procedures vary but some features are standard.
- ❑ Standard
 - Customers submit direction (buy/sell), quantities.
 - Orders are held, but not displayed.
 - Trades can occur whenever there's a match.
- ❑ Variations
 - Orders may have limit prices;
 - Orders may be pegged (matched to the NBB, the NBO, or the midpoint)
 - Matches might be conditional on a minimum size.

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The dark pool universe

- ❑ There are about 80 dark pools
 - e.g. UBS, SIGMA X (Goldman), Crossfinder (Credit Suisse)
- ❑ Users often try them sequentially.
- ❑ A dark pool can decide whether or not to accept a particular client.

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Dark pool trading volumes

- ❑ Most dark pools report trades to the NASDAQ ADF (alternative display facility, exchange symbol D)
- ❑ We can't determine which dark pool actually executed a trade.
- ❑ Since 2014, FINRA reports weekly total volume executed by each dark pool. (ats.finra.org)
- ❑ Next overhead: AAPL for week of Feb 2, 2014.

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Alternative Trading Systems Data Details

Symbol	AAPL	Report	NMS Tier 1
Description	Apple Inc. - Common Stock	Week of	02/02/2015
Product	UTP		
Total Shares	24,212,466	Total Trades	116,924

ATS Description	Shares	Shares Last Updated Date	Trades	Trades Last Updated Date
UBSA UBS SECURITIES LLC	2,994,296	02/23/2015	21,401	02/23/2015
CROS CREDIT SUISSE SECURITIES (USA) LLC	2,943,695	02/23/2015	17,785	02/23/2015
IATS INTERACTIVE BROKERS LLC	2,879,634	02/23/2015	7,586	02/23/2015
NYFX CONVERGEX EXECUTION SOLUTIONS LLC	2,528,788	02/23/2015	1,885	02/23/2015
JPMX J.P. MORGAN SECURITIES LLC	1,408,333	02/23/2015	5,387	02/23/2015
ITGP ITG INC.	1,235,500	02/23/2015	5,930	02/23/2015
DBAX DEUTSCHE BANK SECURITIES INC.	1,234,200	02/23/2015	9,104	02/23/2015
KCGM KCG AMERICAS LLC	1,089,834	02/23/2015	5,855	02/23/2015
SGMA GOLDMAN SACHS EXECUTION & CLEARING, L.P.	929,174	02/23/2015	5,296	02/23/2015
IEGX IEX SERVICES LLC	910,229	02/23/2015	3,944	02/23/2015
EBXL LEVEL ATS	810,400	02/23/2015	4,947	02/23/2015
PDQX PDQ ATS, INC.	726,322	02/23/2015	4,733	02/23/2015
LTPL CREDIT SUISSE SECURITIES (USA) LLC	710,573	02/23/2015	3,505	02/23/2015

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Advantages

- ❑ Trades occurring in crossing networks and continuous dark pools are sometimes described as zero impact.
- ❑ When the trade is reported, it can't be determined whether the aggressor was a buyer or seller.
- ❑ Nothing is shown prior to execution. If there is no execution, nothing is shown.

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Disadvantages: leakage

- ❑ Trading intentions may be detected via “sniffing” and “sniping”
 - Opponents may enter patterns of small standing orders to detect larger incoming orders.
 - Opponents may enter small marketable orders to detect larger standing orders.

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Disadvantages: incentives for manipulation

- ❑ A buyer sending an order to a dark pool knows that any execution will be priced at the NBBO midpoint.
- ❑ The buyer can lower the midpoint by submitting an aggressive sell limit order prior to dark pool submission.
- ❑ After achieving a dark pool execution, the sell limit order is cancelled.
- ❑ Spoofing

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Regulatory concerns

- ❑ They are difficult to monitor.
 - There are many of them, housed at operators own computers.
 - Recent cases: Pipeline/Millstream, Barclays, UBS
- ❑ Dark mechanisms (aside from hidden orders) are said to “free ride” on the visible NBBO.
- ❑ They don’t contribute to the visible liquidity.
- ❑ They weaken incentives to post visible liquidity.

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Pipeline/Millstream (SEC Cease and Desist Order, Oct 2011)

- ❑ Pipeline was a dark pool.
 - A dark pool is supposed to allow buyers and sellers to directly trade against each other anonymously.
- ❑ Pipeline set up an affiliated proprietary trading group (“Millstream”) to trade against customers.
- ❑ “Pipeline occasionally revealed to [Millstream], after the trades were consummated, order and trade data of other customers.

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Barclays (Allegations by NY State Attorney General, January 2015)

- ❑ The .. complaint includes detailed e-mails between Barclays employees that the New York attorney general claims show a widespread pattern of deceiving clients.
- ❑ The complaint says Barclays routed orders to its own dark pool first, regardless of whether the client could get a better price through another venue. Barclays assured investors they were protected from high-frequency trading strategies that it characterized as “‘toxic,’ ‘predatory,’ or ‘aggressive.’”
- ❑ “Barclays was doing deals left and right with the high frequency firms to invite them into the pool to be trading partners for the buy side,” the complaint cited a former employee as saying. The employee added the pool was “mainly made up of high-frequency trading firms.”

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UBS (SEC news release, Jan 15, 2015)

- ❑ An SEC examination and investigation of UBS revealed that the firm failed to properly disclose to all subscribers the existence of an order type that it pitched almost exclusively to market makers and high frequency trading firms. The order type enabled users ... to place subpenny-priced orders that jumped ahead of other orders submitted at legal, whole penny prices.
- ❑ Furthermore, the SEC investigation found that UBS similarly failed to disclose to all subscribers a “natural only crossing restriction” developed to ensure that select orders would not execute against orders placed by market makers and high frequency trading firms. This shield was only available to benefit orders placed using UBS algorithms, which are automated trading strategies.
- ❑ UBS did not disclose the existence of this feature to all subscribers until approximately 30 months after it was launched.
- ❑ UBS Securities LLC agreed to settle the charges by paying more than \$14.4 million, including a \$12 million penalty that is the SEC’s largest against an alternative trading system (ATS).

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“They don’t contribute to the visible liquidity.”

- ❑ Suppose that in XYZ there is one visible bid at \$10.00 and one visible offer at \$10.50.
- ❑ Five hundred executions occur in crossing networks, dark pools, and via hidden orders, ranging in price from \$10.00 to \$10.50.
- ❑ If dark mechanisms weren’t available, would those buyers and sellers have posted visible bids and offers that would have narrowed the spread?

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“They weaken the incentives to post visible liquidity”

- ❑ The traders posting visible bids and offers see trades occurring at their prices, but they’re not getting executed.
- ❑ Why should they bother to post their best prices?
- ❑ Why should they bother to post at all?

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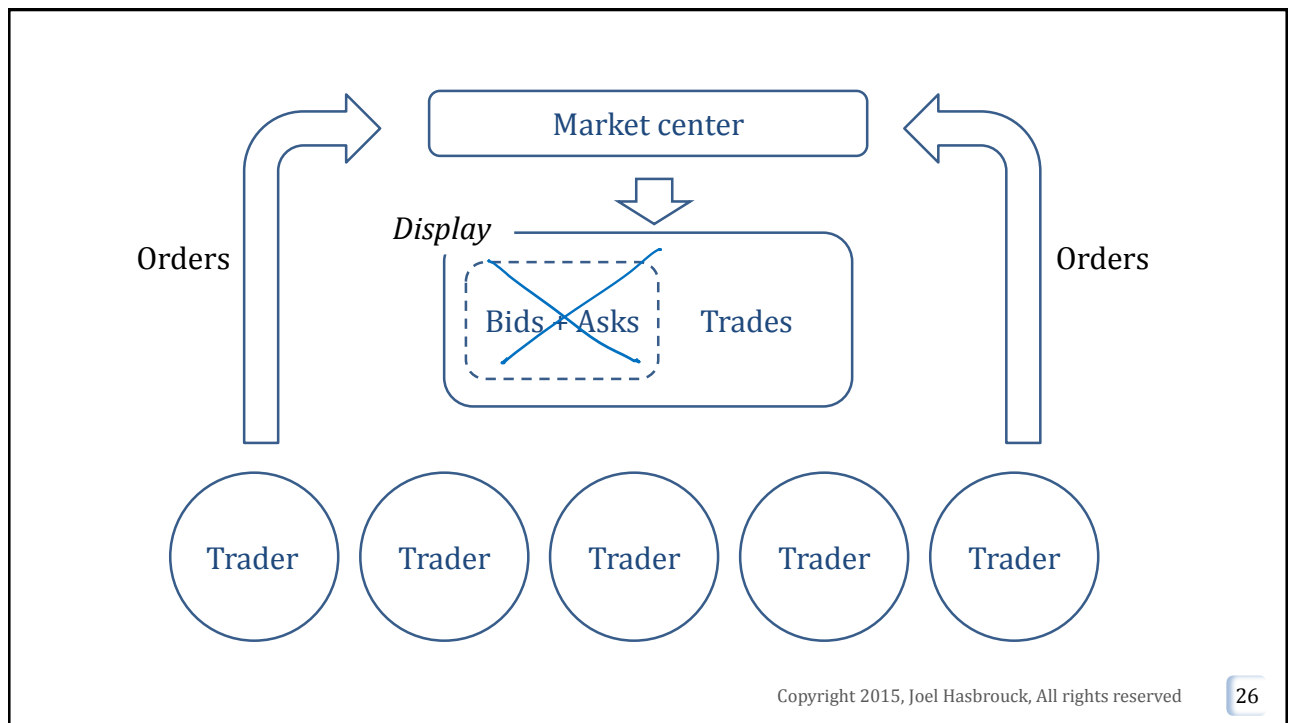
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Do dark markets help or hurt overall market quality?

- ❑ Run an experiment
 - Take a lit market and turn off the display of the bids and offers.
 - This makes all limit orders hidden orders.
 - See what happens to bid-ask spreads.

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"Island goes dark"

- ❑ Background
 - Island was a market organized as an electronic limit order book.
 - Its market share in the SPY was 56% of all trades.
 - The SPY also traded on the NYSE, AMEX, NASDAQ, and other markets.
- ❑ In a dispute with the SEC about procedures, Island found that it could legally comply by turning off display of all quotes.
 - Its market share dropped to 30%
 - Why didn't its market share drop to zero?
- ❑ Bid-ask spreads on Island *and all other markets* increased.
- ❑ Hendershott, T., Jones, C.M., 2005. Island goes dark: transparency, fragmentation and regulation. *Review of Financial Studies* 18, 743-793.

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Is dark trading something new/unusual? A parallel

- ❑ Two retailers sell PlayBox videogames.
- ❑ Retailer *A* advertises “PlayBox for \$250.”
- ❑ Retailer *B* advertises “We’ll match any other advertised price.”

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Dark crosses in floor markets

- ❑ A broker (“member”) might simultaneously have a customer order to buy and a customer order to sell.
- ❑ Could the broker simply cross the trade at the bid, the offer, or some price in between?
- ❑ Example: The market is 20 bid, offered at 21. Broker JSH has a customer order to buy 10,000 shares, and a customer order to sell 10,000 shares.
 - Can JSH cross the trade at 20? 21? 20.50?
- ❑ Why would this be considered a dark trade?
- ❑ Did/do floor markets allow them?

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Chicago Mercantile Exchange (CME) Rule 533

- ❑ A member who is in possession of both buy and sell orders for different beneficial owners for the same product ... may execute such orders for and directly between such beneficial owners provided that ...
- ❑ In pit trading, a member executing such orders shall first bid and offer by open outcry three times at the same price, stating the number of contracts, and, thereafter, if neither the bid nor the offer is accepted, the orders may be matched in the presence, and with the approval, of a designated Exchange official.
- ❑ Interpretation: to cross, you have first make a market (bid and offer) and give other traders the right to participate in the trade.

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NYSE Rule 76

- ❑ In crossing orders between the established bid and offer,
- ❑ “When a member has an order to buy and an order to sell the same stock, he or she must publicly offer at a price higher than his or her bid by the minimum variation.”
- ❑ “When crossing stock *at* the published bid/offer, the ... market procedures of priority, parity and precedence are applicable.”
- ❑ Roughly: if someone is already bidding or offering at the cross price, they must get an execution.

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Conjecture

- ❑ I suspect that CME Rule 533 and NYSE Rule 76 were in place prior to the existence of external regulators (like the CFTC and SEC).
- ❑ These were rules that traders imposed on themselves because they thought that the rules promoted fair and orderly markets.

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Canadian rules effective October 10, 2012, Investment Industry Regulatory Office of Canada (IIROC)

- ❑ Visible orders must have priority over hidden.
- ❑ Large dark orders may be crossed at or within the NBBO.
 - “Large” means valued above \$100,000.
- ❑ All other orders must be crossed within the NBBO:
 - If the NBBO spread is two ticks or more, the execution price must be at least one tick away from the NBB and the NBO.
 - If the NBBO spread is one tick, a midpoint cross is permitted.

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