ASSESSMENT
OF THE
PLAN TO IMPLEMENT A TICK SIZE PILOT PROGRAM

ORIGINALLY SUBMITTED TO
THE NMS PLAN PARTICIPANTS

JULY 3, 2018

(Revised August 2, 2018)

A. Background and Statement of Purpose

On June 24, 2014, the US Securities and Exchange Commission ordered national securities exchanges and the Financial Industry Regulatory Authority (FINRA) to jointly develop and propose to the Commission a pilot program that would widen the quoting and trading increments for certain small-capitalization stocks.[1] Two months later the exchanges and FINRA (the Participants) submitted a National Market System Plan to implement a tick-size pilot, which the Commission approved on May 6, 2015.

The Plan laid out a detailed implementation timeline, which began on April 4, 2016, with data-collection testing and is set to end on April 1, 2019, when the collection of data for the post-pilot period ends. The Pilot itself — the period in which rules regarding minimum quoting and trading increments were changed for Pilot securities — began October 3, 2016 and is scheduled to end on October 2, 2018 (Please see section B, Key Attributes and Details of the Plan, page 5, for more detail).

The Plan also called for the Participants to publish a Joint Assessment of the Pilot, which would serve as the foundation for further study by policy makers and others. On December 11, 2017, the Participants contracted with Rosenblatt Securities to undertake the Assessment. The heart of the Assessment, dealing with market quality, market-maker participation and profits and market transparency under the Pilot, is based in large part on the Pilot data collected by the Participants, as well as Rosenblatt's independent analysis of exchange order books during the period between April 16, 2016 and December 29, 2017.

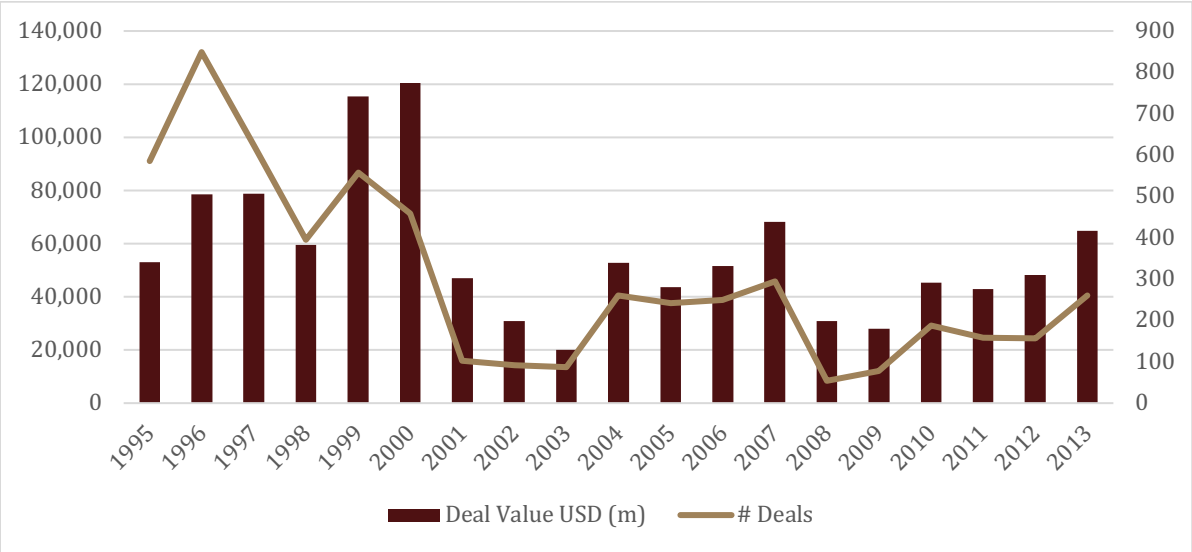
The Order, NMS Plan and its implementation followed several years of public debate about how sweeping changes to US equity market structure since the late 1990s had affected market quality for small-capitalization stocks. Some market participants believed that this structural transformation made markets less hospitable for emerging-growth companies. Several focused on the 2000-2001 decimalization of price quotations, which for the first time established a minimum price variation of one penny for US-listed equity securities, as particularly harmful. Previously, the minimum tick had long been one-eighth of a dollar, or 12.5 cents, before a brief period at one-sixteenth of a dollar, or 6.25 cents. Critics theorized that such a dramatic reduction discouraged small private companies from going public, in part because narrower spreads hurt market-maker profits that may have supported both secondary-market liquidity and sell-side research coverage that benefited newly public enterprises.

Indeed, IPO issuance suffered a dramatic downturn beginning in 2001, following several years of record or near-record activity. As the Pilot was being debated in the early 2010s, IPO issuance was still depressed compared with the levels seen in the late 1990s and in 2000, when a record $120 billion was raised by 458 companies making their market debuts. The number of IPOs hit a record 849 in 1996, but fell as low as 87 in 2003 and failed to break 300 in the subsequent years leading up to the adoption of the Pilot (see Fig 1, next page). Venture-backed IPOs, in which the company coming public has received investment from at least one venture-capital firm, fared even worse (see Fig 2, next page). Looking at venture-backed deals is one way to focus on startups and emerging-growth companies, as opposed to spinoffs by bigger corporations or other types of IPOs.

[1] Federal Register, Vol. 79, No. 125, June 30, 2014, pp 36,840-36,848

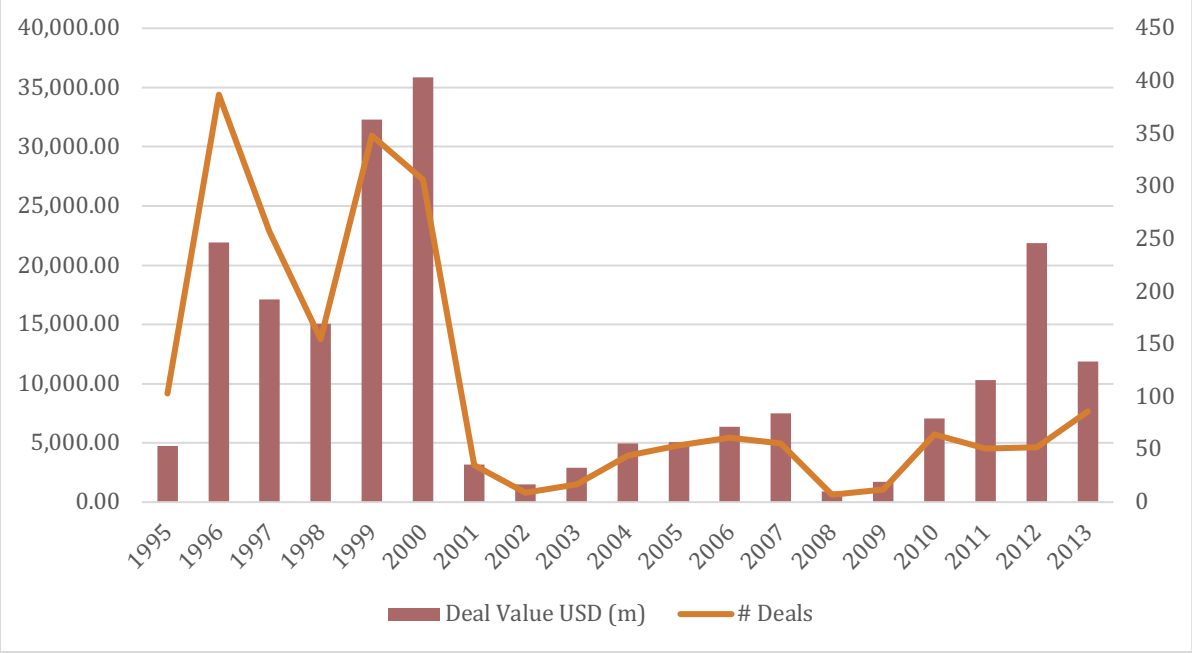
The data regarding US IPOs, however, need to be examined in the proper context. There are myriad factors influencing companies' decisions about whether to go public or remain private — and, if an IPO is desired, in which country to list shares. These include the availability of capital outside the public equity market, the regulatory burdens placed on public companies, market conditions, broader macroeconomic trends and differences in economic conditions between countries globally. Additionally, broader historical context may reveal certain periods of strong IPO issuance, particularly during times of high speculative activity in markets, as anomalous and unsustainable.

Fig 1: US IPO Issuance, 1995-2013



Source: Dealogic

Fig 2: US Venture-Backed IPO Issuance, 1995-2013



Source: Dealogic

Concern about the impact of decimalization and other market-structure changes on emerging-growth companies intensified following the financial crisis that peaked in late 2008 and early 2009. Members of the US Congress grew particularly interested in measures that would boost employment amid the so-called Great Recession that accompanied and followed the financial crisis. Many viewed emerging-growth companies as a vehicle for job growth and sought to bolster these enterprises' ability to raise capital in public equity markets.

In April 2012, Congress passed the Jumpstart our Business Startups (JOBS) Act. Section 106(b) of the JOBS Act directed the Commission to conduct a study of decimalization's impact on the number of US IPOs, as well as liquidity for small and middle-capitalization companies and the economic viability of brokers making markets in and otherwise supporting small- and mid-capitalization issues. Section 106(b) also allowed the Commission to designate a minimum quoting and trading increment of "greater than $0.01 but less than $0.10" for emerging-growth companies should it judge a wider tick size necessary.

In a July 2012 report[2] back to Congress, the SEC staff considered an array of academic literature on the impact of decimalization, input from the SEC Advisory Committee on Small and Emerging Companies and a survey of international tick-size policies. The staff report concluded that decimalization was one of many factors — including the globalization of capital markets, the bursting of the late 1990s technology-stock bubble, increased availability of private investment capital and changes to investment-research, accounting, corporate governance and financial-reporting regulations — that may have influenced the issuance and trading of small- and mid-cap equities, making it hard to attribute specific causality to any one factor. The staff thus recommended that the Commission "solicit the views of investors, companies, market professionals, academics and other interested parties on the broad topic of decimalization, how to best study its effects on IPOs, trading and liquidity for small and middle capitalization companies, and what, if any, changes should be considered."

Following on this recommendation, the Commission on February 5, 2013, held a Decimalization Roundtable, featuring three panels of industry professionals, academics and other experts covering various aspects of the topic.[3] Panelists expressed a range of views.[4] Some argued for recreating the "ecosystem" that existed for supporting small IPOs and public companies through the 1990s but withered following decimalization and related market-structure changes that altered the nature of liquidity provision in the stock market, as well as reforms that erected stronger divisions between broker-produced equity-research and investment-banking businesses. Others noted that the market structure and business models of that era were gone forever, and that widening tick sizes alone could not bring them back. And some panelists argued that even though a tick-size pilot would have little to no effect on research coverage or companies' desire to go public, it might be worth trying simply to improve liquidity for small- and mid-cap issues, which had not benefited as much as actively traded securities from the market-structure transformation that began in the late 1990s.

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[2] SEC Staff Report to Congress on Decimalization, July 2012

[3] Press Release, "SEC Announces Panelists for Roundtable on Decimalization." US Securities and Exchange Commission, January 31, 2013.

[4] Transcript of the Roundtable on Decimalization, Tuesday, February 5, 2013. US Securities and Exchange Commission; amended March 13, 2013

Despite the lack of market-participant consensus, members of Congress continued to express a strong desire for a pilot program that would experiment with wider tick sizes to support job creation by emerging-growth companies. On November 12, 2013, Rep. Sean Duffy (R-WI), introduced the Small Cap Liquidity Reform Act, which would have amended the Securities Exchange Act of 1934 to change the minimum quoting increment to either $0.05 or $0.10 for "emerging growth companies (ECGs) with total annual gross revenues of less than $750 million." The bill passed the House by a vote of 412-4 on February 11, 2014, was sent to the Senate and referred to the Committee on Housing, Banking and Urban Affairs but did not become law.[5] Barely more than four months after the House bill passed, the SEC issued its Order to the Participants to create the Pilot.

B. Key Attributes and Details of the Plan

The Plan called for a Pilot to be conducted for two years, beginning October 3, 2016, in which 1,200 securities would be spread across three Test Groups, with the remainder of securities satisfying the Pilot criteria placed into a Control Group. As adopted, the Pilot applies both during and outside of regular trading hours. Pilot securities were selected based on their trading characteristics during the Measurement Period, which began April 4, 2016 and ran for three calendar months.[6]

The universe of potential Pilot securities was limited to those satisfying the following criteria:[7]

1. Market capitalization (total number of shares outstanding multiplied by closing price) of $3 billion or less on the last day of the Measurement Period
2. Closing price of at least $2 on the last day of the Measurement Period
3. Closing price not less than $1.50 on every trading day during the measurement period
4. Consolidated average daily volume (single-counted share volume of all reported transactions divided by number of trading days) during the measurement period of 1 million shares or less
5. Measurement Period volume-weighted average price (sum of VWAP for each trading day, divided by number of trading days) of at least $2

Once the universe of Pilot Securities was determined based on these criteria, the Participants used a stratified random sampling process to assign them to three Test Groups, each of which is subject to slightly different quoting and trading requirements. To accomplish this, the Participants divided all Pilot securities into 27 possible categories, representing a low, medium or high categorization for three factors: market capitalization on the last day of the Measurement Period, Measurement Period VWAP and CADV during the Measurement Period. Each of the low, medium and high "scores" for each factor (VWAP, market cap, CADV) consisted of one third of the population for that factor. The tables in Fig 3, on the next page, illustrate the process of dividing all pilot securities into these 27 categories.

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[5] H.R. 3448 – Small Cap Liquidity Reform Act of 2014

[6] Plan to Implement a Tick Size Pilot Program; Submitted to the Securities and Exchange Commission Pursuant to Rule 608 of Regulation NMS Under the Securities and Exchange Act of 1934 [As Modified by the Commission]

[7] Ibid

The Participants then randomly selected securities from each of the strata for inclusion in the Test Groups, so that each Test Group contained 400 securities.[8] Securities not chosen for the Test Groups were assigned to the Control Group. For more details, see Section C, Description and Analysis of Pilot Securities and Selection Criteria, page 7.

Fig 3: Possible categories for conducting random stratification of Pilot securities

Category	1	2	3	4	5	6	7	8	9
Mkt Cap	Low	Low	Low	Low	Low	Low	Low	Low	Low
VWAP	Low	Low	Low	Med	Med	Med	High	High	High
CADV	Low	Med	High	Low	Med	High	Low	Med	High

Category	10	11	12	13	14	15	16	17	18
Mkt Cap	Med	Med	Med	Med	Med	Med	Med	Med	Med
VWAP	Low	Low	Low	Med	Med	Med	High	High	High
CADV	Low	Med	High	Low	Med	High	Low	Med	High

Category	19	20	21	22	23	24	25	26	27
Mkt Cap	High	High	High	High	High	High	High	High	High
VWAP	Low	Low	Low	Med	Med	Med	High	High	High
CADV	Low	Med	High	Low	Med	High	Low	Med	High

The quoting and trading requirements of the Test Groups were designed to measure the effects of different approaches to implementing a wider tick size for less-liquid issues, as follows:[9]

1. Test Group One features a minimum quoting increment of $0.05, and prohibits the display, ranking or acceptance of any order or indication of interest at finer price increments (midpoint and retail-liquidity-program orders excluded). Trades in Test Group One securities, however, are permitted to trade at any increment currently permitted for NMS securities.
2. Issues in Test Group Two are subject to the same quoting requirements and exceptions as Test Group One, but may be traded only in $0.05 minimum increments, subject to the following exemptions:
    a. Trades may occur at the midpoint of the National Best Bid-Offer or the protected best bid-offer
    b. Retail Investor Orders (as defined on pp 5-6 of the Plan) may receive price improvement of at least $0.005 better than the best protected bid or offer
    c. Negotiated Trades may trade in finer increments
3. Test Group Three includes the same quoting and trading requirements (and exemptions) as Test Group Two, but also includes a trade-at prohibition. This means that non-quoting trading centers cannot price-match protected quotations. Trading centers displaying protected quotations can execute orders only at that price level up to the amount of the quotation's displayed size. The following exceptions, allowing trading centers to price-match a protected quotation, apply to the trade-at prohibition:

[8] Ibid; more details on Test-Group selections and steps taken to ensure statistical significance appear on pp 13-14 of the NMS Plan.

[9] Ibid; examples of how the test-group requirements are applied appear on pp 18-20 of the NMS Plan.

a. If the trading center is displaying a quotation at a price equal to the traded-at, protected quotation, but only up to the trading center's full displayed size
b. Executing an order of block size
c. Executing a Retail Investor Order with price improvement of at least $0.005
d. Executing an order when the trading center displaying the protected quotation was experiencing a failure, material delay or systems/equipment malfunction
e. Executing an order as part of a transaction that was not a "regular way" contract
f. Executing an order as part of a single-priced opening, reopening or closing transaction
g. Executing an order when a protected bid was priced higher than a protected offer
h. Executing an Intermarket Sweep Order
i. When simultaneously routing Trade-at Intermarket Sweep Orders (a new order type introduced with the Pilot) to execute against the full displayed size of the protected quotation
j. As part of a Negotiated Trade
k. When the trading center displaying the protected quotation had displayed, within one second prior to the trade-at execution, a best bid or offer (as applicable) with a price inferior to the traded-at price
l. Executing a "stopped order" for a customer account, at a price specified by the customer on an order-by-order basis; The trade-at execution may be equal to the national best bid for a stopped buy order or equal to the national best offer for a stopped sell order
m. Orders for a fractional share of a security, provided it did not result from breaking an order for one or more whole shares into fractional shares or otherwise being designed to evade the trade-at or other Plan provisions

4. Securities in the Control Group may be quoted and traded at any currently permitted price increment

The Plan also requires the Participants to collect data on market quality, order types and the number, participation and profitability of market makers. Market-quality statistics include data on orders by security, order type, original order size (as observed by the trading center), hidden status if applicable and coverage under Rule 605 of Regulation NMS. The Pilot yielded a truly immense quantity of data — some 20 terabytes across billions of records. This Assessment relies in large part upon that data, particularly for Sections E (Market Quality), F (Market-Maker Participation and Profits) and G (Market Transparency) below. Many of the calculations are also derived from independent analysis of exchange order books during the Pre-Pilot and Pilot periods, conducted by Rosenblatt Securities, whom the Participants retained to perform the Assessment (please see Appendix B, page 55, for more on methodology and data treatment).

C. Description and Analysis of Pilot Securities and Selection Criteria

The Participants determined the universe of Pilot securities by applying the selection criteria to the universe of Reg NMS securities. That process identified 2,399 Pilot constituents. These were further divided into the 27 possible categories described in the previous section by classifying them according to low, medium or high market capitalization, share price and consolidated average daily volume. Of these 27 possible strata, two applied to no Pilot securities. Four others wound up with fewer than 10 members. As a result, in keeping with the stratification

methodology laid out in the NMS Plan, their constituents were moved to a similar group (see Fig 4, below, for the distribution of Pilot securities among possible and revised strata).

Fig 4: Distribution of Pilot Securities Among Market Cap/VWAP/ADV Strata

Stratum (Mkt Cap/VWAP/ADV)	# Securities (Orig)	# Securities (Revised)	Difference	Comments
HHH	291	291	0	
HHL	27	27	0	
HHM	224	224	0	
HLH	23	23	0	
HLL	2	0	-2	Moved to HMM
HLM	6	0	-6	Moved to HMM
HMH	163	163	0	
HML	7	0	-7	Moved to HMM
HMM	49	64	15	
LHH	1	0	-1	Moved to LMM
LHL	50	50	0	
LHM	0	0	0	
LLH	69	69	0	
LLL	309	309	0	
LLM	147	147	0	
LML	185	185	0	
LMM	31	32	1	
LMH	0	0	0	
MHH	12	12	0	
MHL	105	105	0	
MHM	82	82	0	
MLH	125	125	0	
MLL	23	23	0	
MLM	88	88	0	
MMH	108	108	0	
MML	84	84	0	
MMM	188	188	0	
Total Securities	2399	2399	0	
Total Strata	25	21	-4	

The Participants drew randomly from each of the 21 revised strata to populate each Test Group with 400 securities. The random selection was conducted based on the percentage of all Pilot securities in each category, so that each of the 21 strata would be represented in the three Test Groups according to their relative proportion in the total population of Pilot constituents. Any symbols not chosen for one of the Test Groups was assigned to the Control Group.

This assessment measures the impact of the Pilot based on activity recorded between September 1, 2016 and December 29, 2017, excluding October 2016, during which securities were assigned

to the various Test Groups from the Control Group. During this period, 320 symbols were removed from the Pilot for various reasons, including mergers and acquisitions, de-listings and share prices falling below $1. Of these, 155 were deleted from the Control Group, 48 from Group 1, 56 from Group 2 and 61 from Group 3 (see Fig 5 and Fig 6 below)

Fig 5: Securities Deleted from the Pilot, by Group

Group	Count
C	155
G1	48
G2	56
G3	61
Total	320

Fig 6: Securities Deleted from the Pilot, by Group and Reason

Group	Reason	Count
C	Deleted - Delisting	26
C	Deleted - Merger or Acquisition	129
G1	Deleted - Delisting	3
G1	Deleted - Merger or Acquisition	30
G1	Removed - Price Below $1.	15
G2	Deleted - Delisting	4
G2	Deleted - Merger or Acquisition	37
G2	Removed - Price Below $1.	15
G3	Deleted - Delisting	3
G3	Deleted - Merger or Acquisition	41
G3	Removed - Price Below $1.	17
Total		320

D. Notes on Methodology and Statistical Significance

This Assessment presents various data and calculations to attempt to show the effects of the Test Group rules on Pilot securities. Much of the data was provided by the Plan Participants, in accordance with the terms of the Plan. In some cases, aggregate totals, percentages or specific values —either taken directly or derived from the various data collected as part of the Pilot — are provided. In other cases, in an effort to illustrate statistical significance and isolate the effects of the Test Group treatments, statistical tests such as regressions or difference-in-difference analyses are shown. The text makes reference to statistical-significance testing where it applies. In some cases, the text includes and makes references to tables providing evidence of statistical significance. We refer to “high,” “medium” and “low” statistical significance. High significance corresponds to probability values (p values) of <1%. Medium significance corresponds to p values >=1% and <=5%. Low significance refers to p values >=5% and <=10%. Statistical-significance tables also feature asterisks next to individual values to denote degrees of statistical significance (from one to three, low to high). For a complete account of the methods used to

determine statistical significance, and a comprehensive set of statistical tables, please see Appendix B, page 55.

E. Market-Quality Assessment

We examine a variety of factors in assessing market quality under the Pilot. These include liquidity, trading activity, bid-ask spreads, order fill rates, execution speed, price improvement, cancellations and message traffic, volatility and quote duration.

Plentiful liquidity, particularly at the national best bid or offer (NBBO) and robust trading volume are generally thought of as positive elements of market quality. There is some debate over the benefit of additional volume in a security past a certain point, with some critics asserting that ultra-liquid securities in some developed markets are subject to excessive intermediation. However, in the thinly traded securities covered by the Pilot, excessive intermediation is not an issue. Therefore, more-robust volumes can be interpreted as a sign of better market quality. Additionally, tight bid-ask spreads are widely thought of as hallmarks of market quality, as they result in lower prices paid by investors buying shares and higher prices attained by sellers. Generally, tighter spreads mean investors keep more of their returns, with less going to intermediaries. High fill rates and fast execution speeds also contribute to better market quality. Unexecuted orders can be subject to information leakage and price impact. High levels of order cancellations and message traffic are thought by many to be undesirable, as they can burden systems, leading to delays that introduce risk to open orders. This impact, however, is likely seen more with actively traded securities than with the largely less-liquid issues covered by the Pilot. Volatility and quote duration are one way to measure the stability and orderliness of the market. Excessive short-term price fluctuations may lead to higher transaction costs for investors, even as they help fuel market-maker profits.

With respect to liquidity, the primary effect of the wider trading increment seems to be a clustering of more displayed trading interest at the fewer available price points. Whereas with one-cent-wide increments, displayed trading interest in a five-cent range might be scattered over five price points, with five-cent increments that same trading interest must be displayed at a single price point. This phenomenon is seen most directly in the number of shares posted at the NBBO, a basic measurement of market liquidity in a security, illustrated in Fig 7 below.

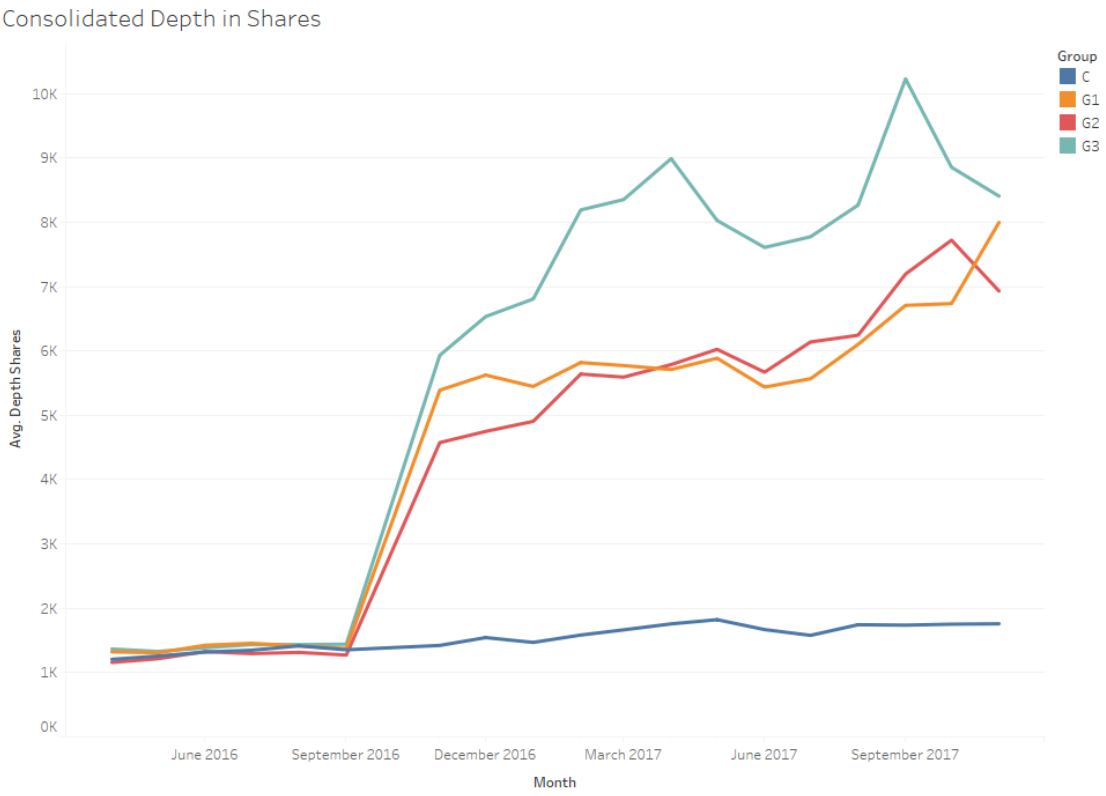
Fig 7: Average Depth at NBBO During Pre-Pilot and Pilot Periods (shares; weighted by order size)

Group	Pre	Post	% chg
C	1,321	1,658	25.46%
G1	1,386	6,021	334.56%
G2	1,267	5,946	369.14%
G3	1,400	7,995	471.03%

The Control Group experienced a 25.46% increase in average NBBO depth, to 1,658 shares, under the Pilot compared with the Pre-Pilot period. But the test groups see dramatic increases in NBBO depth. Test Groups 1 and 2 show increases of 335% and 369%, respectively. The gain is far more pronounced — 471% — for Test Group 3 (see Fig 7, above). A time series chart of size at the NBBO for the various Pilot groups shows a wider range of variance for Group 3, despite a substantial increase over the other Test Groups during the Pilot (see Fig 8, next page). A difference-in-difference test also shows statistically significant gains for Group 1 compared with

the Control Group, as well as for Group 3 compared with Group 2 (see Table 1, Appendix B, page 60).

Fig 8: Consolidated Average Depth at NBBO, by Group, in Shares



Looking at consolidated NBBO depth in dollar-value terms (see Fig 9, below) also reveals similar, substantial increases for the Test Groups, with more liquidity at the inside for Group 3 than Groups 1 and 2. But the disparities are not as pronounced, suggesting that low-priced securities may be skewing the NBBO-depth-in-shares figures. Furthermore, a difference-in-difference test reveals statistically significant increases for Group 1 compared with the Control Group, as well as for Group 3 compared with Group 2 (see Table 2, Appendix B, page 60).

Fig 9: NBBO Depth in Dollar Terms, by Group and Period

Group	Pre	Post	% chg
C	18,902	22,463	18.84%
G1	20,104	71,349	254.90%
G2	19,571	72,478	270.33%
G3	20,421	88,522	333.49%

Indeed, examining the 21 market-capitalization, share-price and average-daily-volume strata within each Group reveals that low-priced, high-volume securities are inflating the size displayed at the NBBO. Further, the effect seems to be more pronounced for Group 3, likely because the trade-at prohibition limits matching the NBBO off-exchange. In Group 1, for example, the biggest gains in depth at the inside occurred in five of the six low-price strata that survived the

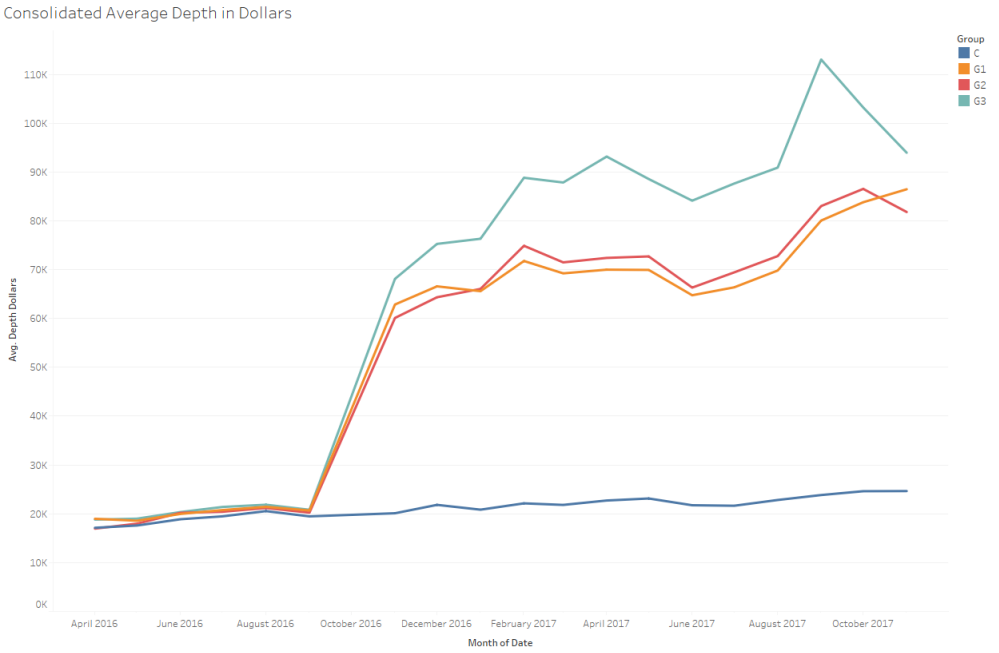
random stratification process described in Sections B and C (HLH, LLH, LLM, MLH and MLM). Three of these are high-volume strata and two medium-volume. The only low-price strata to not see an outsized gain in size at the inside was LLL, which combined low share prices with low volume. Conversely, of the four Group 1 strata with the lowest increases in size at the NBBO, all feature low volume and three are composed of stocks with high share prices (HHL, LHL and MHL), while one includes medium-priced issues (LML). A similar pattern can be seen in the Group 2 strata. The highest NBBO depth increases in HLH, LLH, MLH and MLM, while the lowest gains are seen in LHL, MHL, HHL and LML). This effect is also seen in Group 3, with strata HLH, LLH, MLH, LLM and MLM all seeing outsized gains in size at the NBBO, whereas HHL, LHL, MHL and LML saw the smallest increases. However, the biggest single increase in NBBO depth for Group 3 came in the MLL stratum, which did not experience dramatic gains in NBBO depth beyond the group averages for the other Test Groups (see Fig 50, Appendix A, p 45).

It is possible that the trade-at prohibition had a self-reinforcing effect on the number of shares displayed at the NBBO in Group 3 securities. In addition to the effect of clustering liquidity from previously penny price points at nickel increments, the trade-at prohibition likely spurred more on-exchange quoting at the NBBO from market participants who otherwise may have matched the NBBO off-exchange. This may explain the more-pronounced increases in size at the inside seen in Group 3. Additionally, the increased number of shares displayed at the best available prices for all Test Group securities made the inter-market price-time priority queue longer for liquidity providers, who likely shifted a portion of their activity to off-exchange and inverted-fee venues to improve their queue position (see pp 29-31 for a more-detailed discussion of this phenomenon). But in Group 3, liquidity providers seeking to improve queue position by moving off-exchange were limited by the trade-at prohibition, likely diverting that activity to inverted-fee exchanges, which further contributed to the larger number of shares displayed at the NBBO.

Depth at the NBBO is one of several measurements of market quality (as well as market-maker behavior and market transparency) for which notably different results are observed for Test Group 3 securities than for the other Test Groups and the Control Group. One likely explanation for Group 3 securities seeing greater aggregate displayed size at the inside than the other Test Groups is the trade-at prohibition. Market participants wanting to buy at the National Best Bid or sell at the National Best Offer in Group 3 stocks must — with some exceptions, like for block trades — do so by displaying a public price quotation.[10] Still, this would not necessarily explain the growth in the size of the gap between Group 3 and the other two Test Groups, with respect to depth at the NBBO, as the Pilot progresses. One possible reason for this may be that market makers adjusted over time to the greater degree of protection they had in Group 3 securities against small trades occurring off-exchange, without pre-trade price transparency, at prices equal to or near the NBBO, relative to other Pilot stocks (see Section F, Market-Maker Participation and Profits, p 32), and felt more confidence displaying greater size at the inside in these names. This is particularly notable in light of the fact that Group 3 saw, on average, slightly fewer market makers per security during the Pilot period (see Section F, Market Maker Participation and Profits, page 32). It may also be due to the self-reinforcing effect that the trade-at prohibition could have had on size at the inside in Group 3, as discussed earlier.

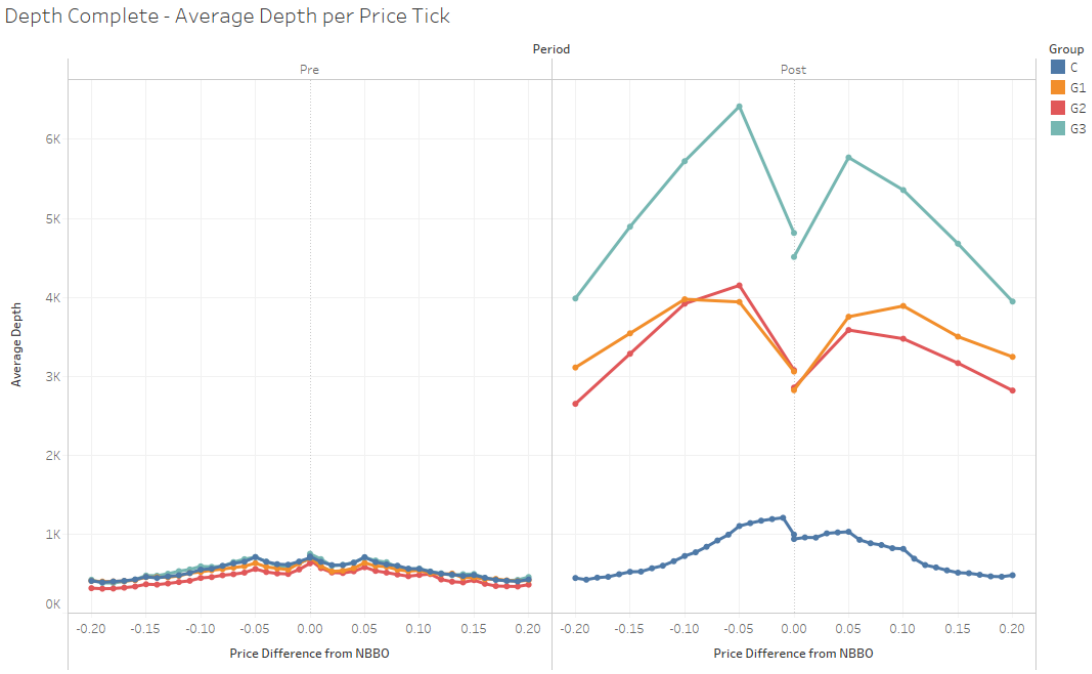
[10] See Section B of this Assessment, titled "Key Attributes and Details of the Plan" (pp 5-7), for a more-detailed description of the rules governing each Test Group.

Fig 10: Consolidated Average Depth at NBBO, by Group, in Dollars



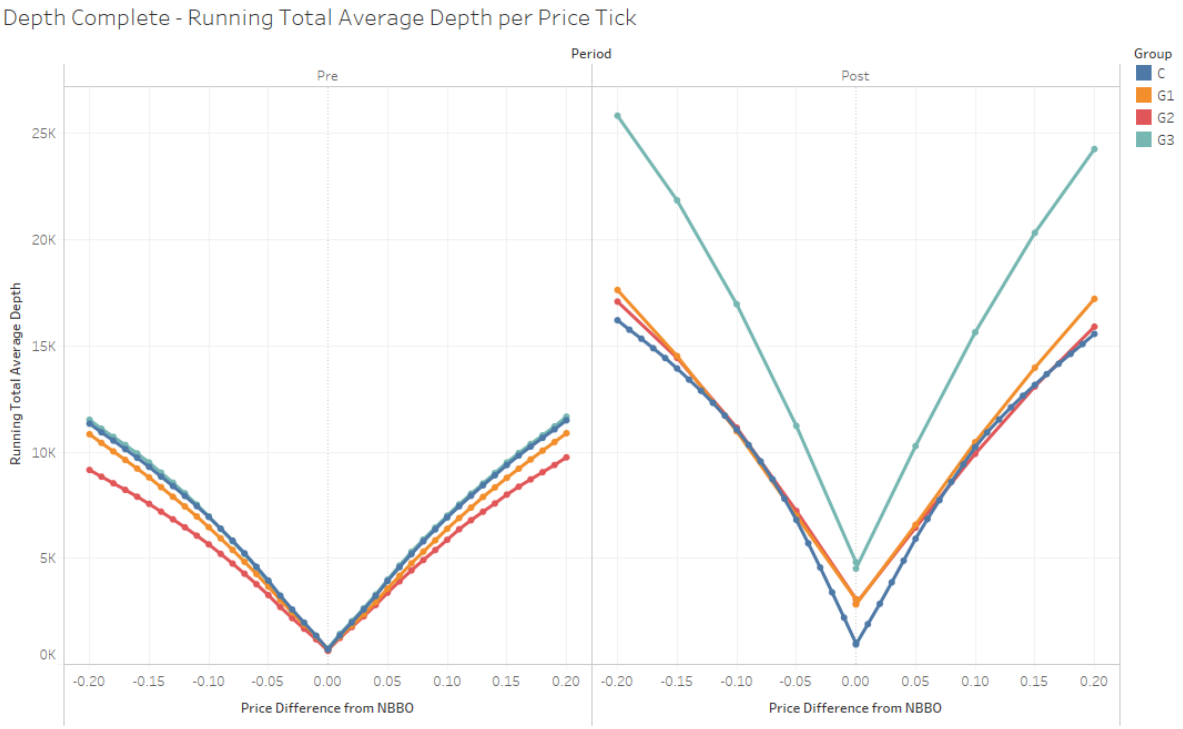
The effect of fewer price points on displayed liquidity is also seen deeper in the inter-market order book. Our analysis of the consolidated order book, out to 20 cents away from the NBBO on each side (20 ticks for the Control group; four for the Test Groups) shows substantial increases in displayed liquidity at each price point for the Test Groups compared with the Control Group — again, with Group 3 benefiting disproportionately (see Fig 11 and Fig 12, below and next page, respectively).

Fig 11: Consolidated Order-Book Liquidity; Average Displayed Size Per Tick, in shares



Note: data are based on one month each of pre-Pilot (August 2016) and Pilot (April 2017) data

Fig 12: Consolidated Order-Book Liquidity; Average Running Total of Displayed Size



Note: data are based on one month each of pre-Pilot (August 2016) and Pilot (April 2017) data

The consolidated order-book liquidity statistics show the effect of fewer price points on displayed liquidity in the test groups, not just at the NBBO, but at various price levels. However, the markedly higher levels of posted liquidity for Group 3, compared with Groups 1 and 2 suggest that the trade-at prohibition applied only to Group 3 may have encouraged market participants to display price quotations, at multiple price levels, more frequently in these securities than for issues without the trade-at prohibition. This would be consistent with the potentially self-reinforcing effect of the trade-at prohibition that we identified earlier.

As seen in the "post" portion of Fig 12, above, the *overall* liquidity displayed at various price points is not that much different for Groups 1 and 2 compared with the Control Group. Both G1 and G2 see more displayed at the NBBO, but the disparity is largely absent at five and 10 cents away. At 15 and 20 cents away, G1 and G2 show more displayed on the bid side, whereas only G1 has more size on the offer side. For G3, however, the running total of liquidity displayed at each nickel tick is substantially higher than both the Control Group and the other two Test Groups. Market makers and other liquidity providers in Group 3 securities may have been responding to the inability to match displayed prices off-exchange (with some exemptions), as well as greater confidence that their own prices would not be matched on off-board venues, thereby making them more likely to seek counterparties in displayed order books.

Trading activity can also be an indicator of the robustness of the market for an individual security. When examining this, it is important to look at both share volume and value traded. Share volume is the standard indicator of activity in the US equity market, but can be skewed by a variety of factors, most notably fluctuations in share prices (rising share prices tend to result in lower share volume, and vice-versa).

Overall, the Pilot securities generally experienced increases in average daily volume and average daily value traded, perhaps owing to heightened interest in smaller-cap equities during the market rally that followed the US presidential election in November 2016. Volume growth for Test Group securities, however, lagged that of the Control Group, with Group 1 even seeing a small decline in ADV during the Pilot period compared with the Pre-Pilot period. Difference-in-difference tests reveal the volume decline for Group 1 compared with the Control Group, as well as the gains for Group 2 compared with Group 1 and Group 3 versus Group 2, to be statistically significant (see Table 3, Appendix B, page 60).

Increases in value traded for symbols in Test Groups 1 and 2 also fell short of the Control Group, but by a lesser margin. Growth in Value Traded for Test Group 3 exceeded that of Control Group (see Fig 13, Average Daily Volume and Value Traded by Group and Period, below). Difference-in-difference tests reveal a statistically significant decline in value traded for G1 vs C, and statistically significant increases for G2 vs G1 and G3 vs G2 (see Table 4, Appendix B, page 60).

Fig 13: Consolidated Average Daily Volume and Value Traded, by Group and Period

Group	CADV (Pre)	CADV (Pilot)	% chg	CADVT (Pre)	CADVT (Pilot)	% chg
C	157,345	188,071	19.53%	3,845,544	4,778,747	24.27%
G1	165,535	160,683	-2.93%	3,955,093	4,402,092	11.30%
G2	156,226	167,988	7.53%	3,840,269	4,627,604	20.50%
G3	157,843	186,184	17.95%	3,874,595	5,065,482	30.74%

Note: figures are averages per symbol-date combination, to ensure comparability between groups with different numbers of securities

Fig 14: Consolidated Average Daily Volume, Test Groups vs Control Group

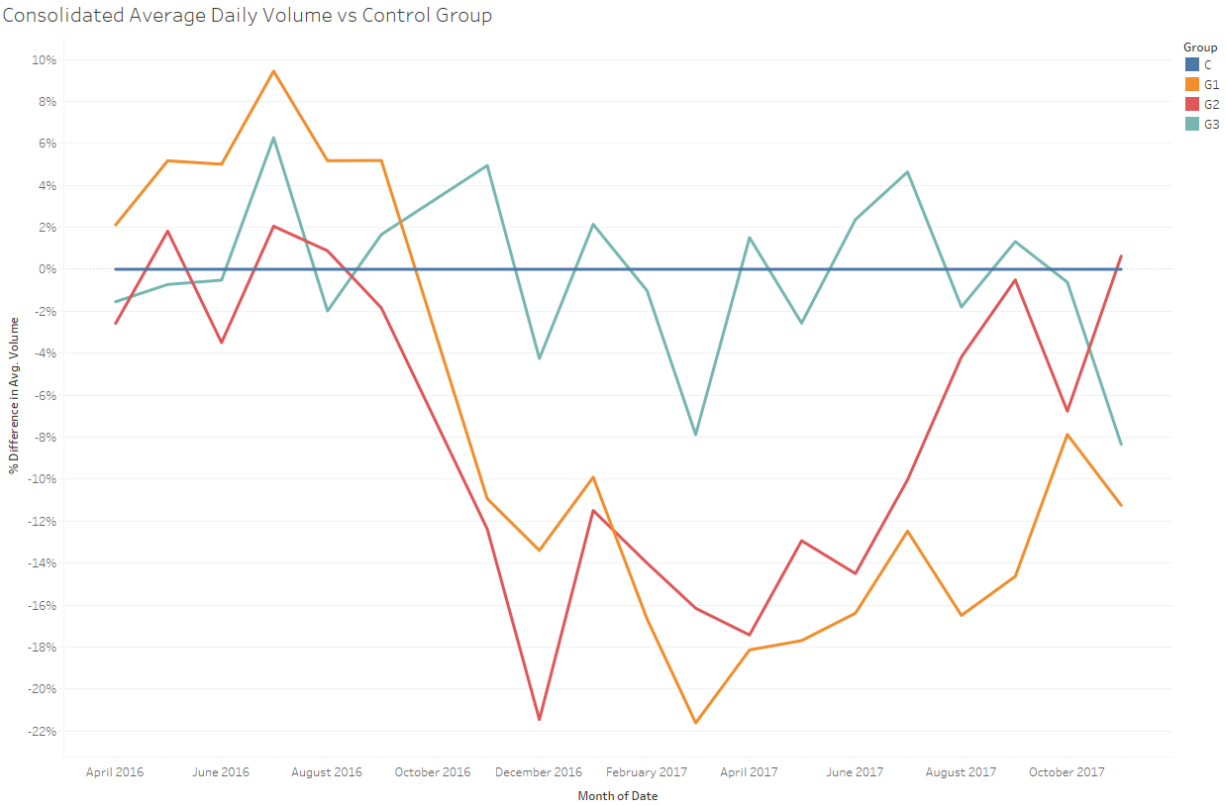
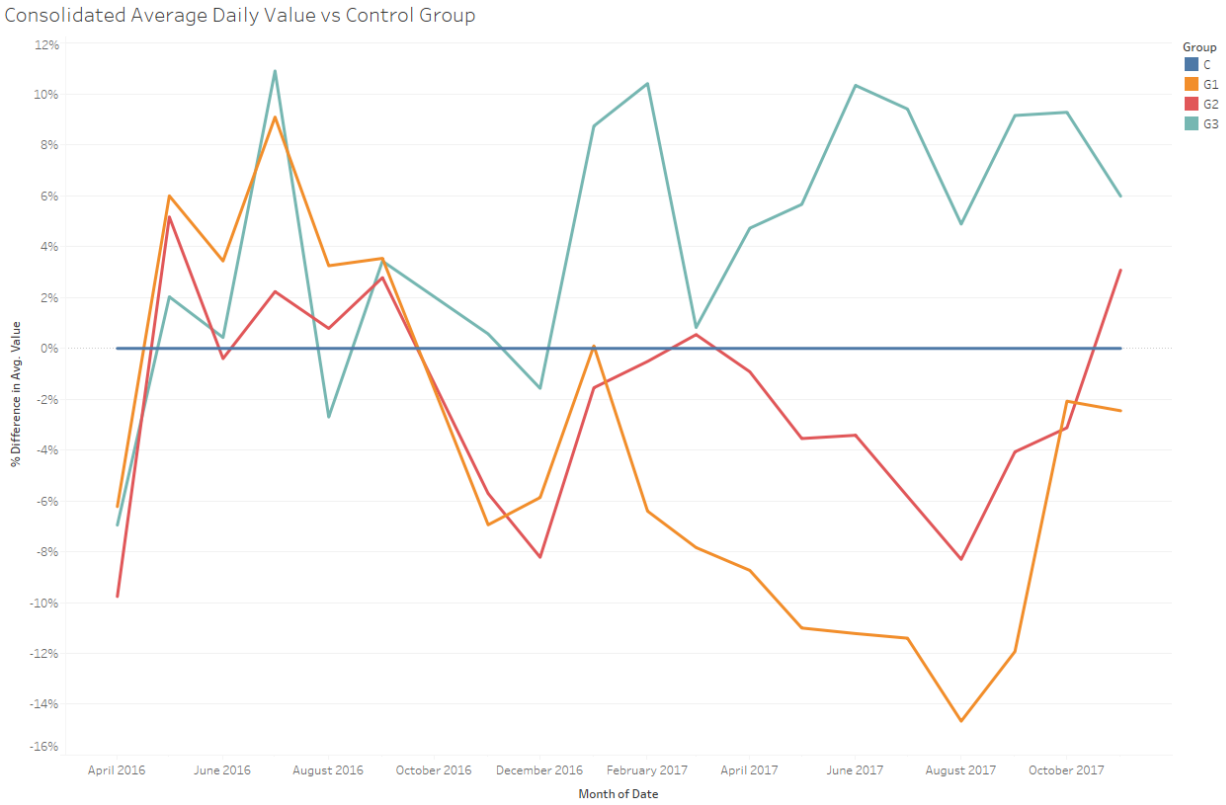


Fig 15: Consolidated Average Daily Value Traded, Test Groups vs Control Group



When looking at time-series data for volume and value traded that use the Control Group as a base of reference, Group 3 also appears to have fared better than the other Test Groups, though the gap narrows toward the end of the period we analyze (see Fig 14, Consolidated Average Daily Volume vs Control Group, previous page). Group 3 also fares better than the other Test Groups when looking at value traded over time, though the gap is narrower in the early portion of the Pilot period and gaps out for the first seven months of 2017 before narrowing somewhat toward the end of the period we observe (see Fig 15, Consolidated Average Daily Value Traded vs Control Group, above). This underscores the possibility that fluctuations in share prices may have skewed the volume figures.

Interestingly, the Pilot appears to have resulted in fewer, larger transactions taking place in the Test Groups than for the Control Group. Average daily trade count increased 23% for the Control Group during the Pilot period, compared with the Pre-Pilot period. Test Groups 1 and 2 saw 9% and 3% fewer trades per day, respectively, whereas Group 3 experienced a far smaller increase of 10% (see Fig 16, Average Daily Trade Count by Group and Period, next page, and Fig 17, Consolidated Average Daily Trade Count vs Control Group, next page). Difference-in-difference testing reveals a highly statistically significant decrease in trade count for Group 1 compared with the Control Group, with smaller, but still statistically significant, increases for Group 2 compared with Group 1 and Group 3 compared with Group 2 (see table 5, Appendix B, page 60).

At the same time, average trade size for each of the Test Groups rose in percentage terms compared with the Control Group. Average trade size fell by 2% for the Control Group, compared with increases of 7% and 8% for Groups 1 and 3, respectively and 11% for Group 2 (see Fig 18, below). These changes, however, were not statistically significant (see Table 6, Appendix B, page 60).

Fig 16: Average Daily Trade Count by Group and Period

Group	Pre-Pilot	Pilot	% chg
C	1,368	1,676	22.53%
G1	1,444	1,307	-9.44%
G2	1,373	1,330	-3.14%
G3	1,375	1,508	9.64%

Fig 17: Average Daily Trade Count vs Control Group

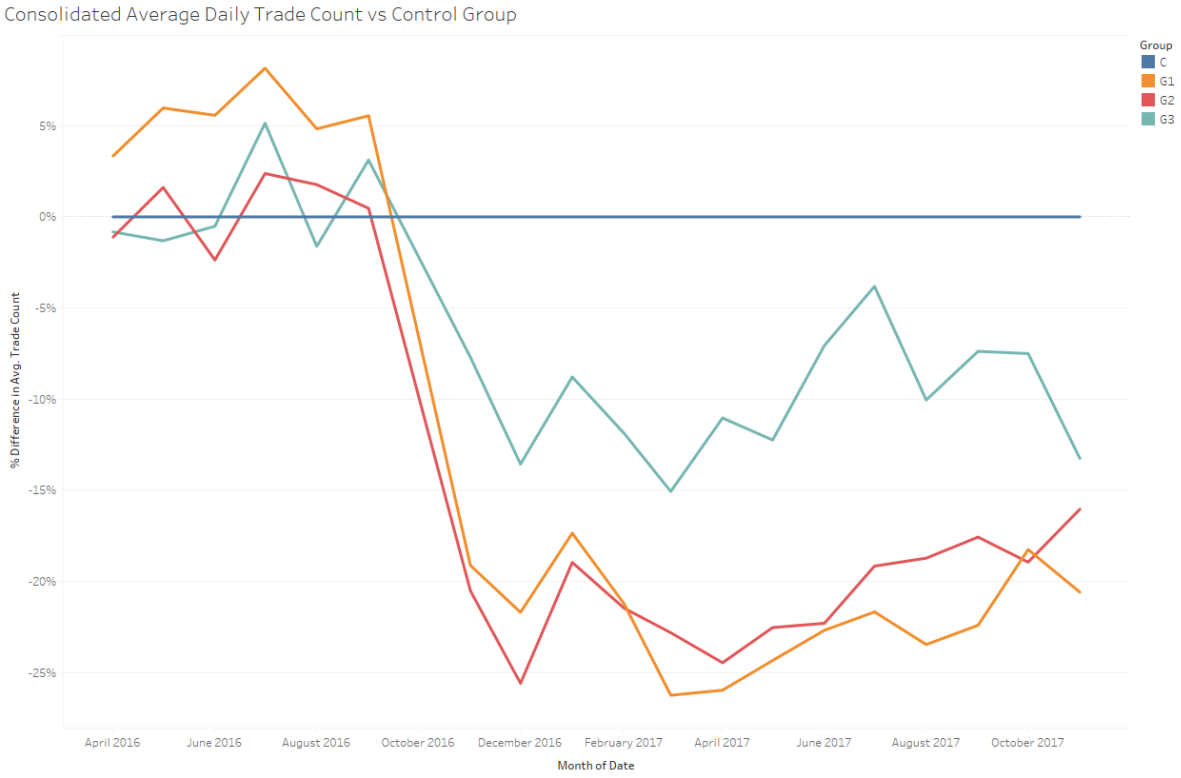


Fig 18: Average Trade Size, by Group and Period

Group	Pre-Pilot	Pilot	% chg
C	115.02	112.20	-2.45%
G1	114.66	122.91	7.19%
G2	113.76	126.29	11.01%
G3	114.78	123.49	7.58%

Another key measurement of market quality, which must be considered alongside liquidity metrics, is the bid-ask spread. The difference between the best quoted prices at which market participants can buy and sell a given security represents a transaction cost for consumers of market liquidity. Historically in the US equity market, institutional and individual investors have mostly been liquidity consumers. A transformation in market structure over the past two decades has enabled customers to participate to a greater degree than previously possible as passive liquidity providers at the NBBO. However, many of these same structural changes have intensified the longstanding premium put on speed, particularly with most exchanges operating on pure price/time priority when allocating incoming marketable interest among market participants quoting on the order book. This means that sophisticated proprietary trading firms, who invest substantial sums in technology, often are likelier to be first or among the first posting the best prices, resulting in their passive orders being filled more often than those of "natural" investors. Brokers representing institutional and individual investors, in such instances, often wind up consuming liquidity provided by these prop-trading firms. For these investors, narrower bid-ask spreads mean they're buying at lower prices and selling at higher prices than they would if spreads were wider. Across large numbers of shares, the magnitude of the spread can have a very large effect on an investor's total transaction cost — in many cases far outweighing any commissions and fees paid to brokers or other intermediaries.

Beyond this basic explanation, there are several ways to measure spreads. Quoted spread, also referred to as NBBO spread, is a simple measurement of the difference between the National Best Bid and the National Best Offer (or between the best bid and offer on individual trading centers). Effective spread takes into account any difference between the execution price and the NBBO at that time. An effective spread less than the quoted spread indicates that the liquidity consumer received a better price than whatever was being quoted at the far side of the NBBO.[11] Realized spread takes things a bit further, measuring price reversion by comparing the NBBO at the time of execution with the NBBO at some point shortly thereafter. Finally, a widely used measurement of execution quality, particularly for individual investors, is Effective Spread divided by Quoted Spread, often called Effective over Quoted, or E/Q Ratio.

Quoted Spreads for all Test Group securities increased substantially compared with the Control Group. When looking at quoted spreads in basis-point terms, which controls for the effect of differences in share prices between Pilot securities, Groups 1 and 2 appear to have been affected similarly (each with a roughly 14% increase in quoted average spread during the Pilot period compared with the Pre-Pilot period, vs. a 0.73% increase for the Control Group). There is, however, an outsized effect seen for Group 3 (quoted spread up 24%; see Fig 19, Average Quoted Spread in Pilot Securities, by Group and Period, next page). This is a similar pattern — Group 3 affected to a greater degree than Groups 1 and 2 — to that seen for several other market-quality factors, including liquidity at the NBBO. Additionally, a difference-in-difference test of this metric shows a large, statistically significant increase for Group 1 compared with the

[11] Effective spread is calculated by taking the difference between the NBBO midpoint and the execution price, and multiplying by two. For a sell order, the execution price is subtracted from the midpoint and doubled. For a buy order the midpoint is subtracted from the execution price and doubled. For example, a customer crossing the quoted spread and selling stock at 10.00 when the NBB was 10.00 and the NBO was 10.05 achieved an effective spread of 0.05 (10.025 midpoint – 10.00 execution price = 0.025 x2 = 0.05). Had the customer sold at 10.01, the effective spread would have been 0.03 (10.025 midpoint – 10.01 execution price = 0.015 x2 = 0.03). An effective spread of zero indicates a midpoint transaction.

Control Group, with no further statistically significant changes for G2 vs G1 or G3 vs G2 (see Table 7, Appendix B, page 61.

Fig 19: Average Quoted Spread in Pilot Securities, in Basis Points, by Group and Period

Group	Avg. Spread bps (Pre-Pilot)	Avg Spread bps (Pilot)	% chg
C	83.2	83.8	0.73%
G1	86.4	98.9	14.46%
G2	92.3	105.0	13.68%
G3	80.8	99.9	23.58%

It is worth noting here that the average share-weighted quoted spread during the six-month period *before* the Test Group rules took effect was already greater than the five-cent minimum quoting increment applied to each of the Test Groups. Each Test Group and the Control Group had average quoted spreads of about six cents per share during this period. Accordingly, some of the biggest changes in market-quality metrics, including quoted spreads and depth at the NBBO, came in Test-Group securities that had pre-Pilot quoted spreads of less than five cents.

Fig 20: Changes in Average Quoted Spread, in bps, by Pre-Pilot Spread Class

		Avg. Quoted Spread bps		
Group	Pre-Pilot Spread Class	Pre	Post	% chg
C	Very Tight	26.59	28.12	5.75%
	Closer to <5 cents	38.32	38.48	0.42%
	Nearer to >5 cents	60.33	53.38	-11.53%
	Nearer to 10 cents or greater	156.47	153.76	-1.73%
G1	Very Tight	26.26	73.70	180.65%
	Closer to <5 cents	38.15	64.15	68.16%
	Nearer to >5 cents	49.52	69.68	40.72%
	Nearer to 10 cents or greater	162.31	135.08	-16.78%
G2	Very Tight	24.37	73.78	202.71%
	Closer to <5 cents	43.56	70.20	61.14%
	Nearer to >5 cents	42.01	50.56	20.36%
	Nearer to 10 cents or greater	150.87	141.66	-6.10%
G3	Very Tight	27.35	80.29	193.54%
	Closer to <5 cents	36.05	61.55	70.75%
	Nearer to >5 cents	50.27	56.13	11.65%
	Nearer to 10 cents or greater	145.39	136.52	-6.11%

By far the largest increases in quoted spreads during the Pilot, for example, came in Test-Group stocks that had pre-Pilot spreads classified as either "very tight" or "closer to <5 cents," as opposed to "nearer to >5 cents" or "nearer to 10 cents or greater" (see Fig 20, above). The Test Groups still saw quoted spreads increase substantially for securities with "nearer to >5 cent" pre-Pilot spreads (41%, 20% and 12% for Groups 1, 2 and 3, respectively), compared with a 12% decrease for the Control Group. Only for stocks with pre-Pilot spreads "nearer to 10 cents or

greater" did the Test Groups perform the same or better than the Control Group, with spreads narrowing by 17%, 6% and 6% for G1, G2 and G3, respectively, compared with a 2% reduction for the Control Group.[12]

Fig 21: Changes in Average Depth at NBBO, in shares, by Pre-Pilot Spread Class

		Avg. Depth Shares		
Group	Pre-Pilot Spread Class	Pre	Post	% chg
C	Very Tight	3,035	4,163	37.15%
	Closer to <5 cents	1,169	1,454	24.33%
	Nearer to >5 cents	979	1,146	16.97%
	Nearer to 10 cents or greater	839	932	11.12%
G1	Very Tight	3,458	18,469	434.09%
	Closer to <5 cents	1,123	5,734	410.53%
	Nearer to >5 cents	949	4,565	380.83%
	Nearer to 10 cents or greater	872	1,828	109.77%
G2	Very Tight	3,117	19,762	534.04%
	Closer to <5 cents	1,129	5,916	424.26%
	Nearer to >5 cents	846	3,543	318.59%
	Nearer to 10 cents or greater	861	2,200	155.47%
G3	Very Tight	3,114	24,651	691.61%
	Closer to <5 cents	1,217	7,843	544.20%
	Nearer to >5 cents	797	3,152	295.33%
	Nearer to 10 cents or greater	965	2,785	188.69%

Similarly, depth at the NBBO increased by larger margins for Test Group securities that had Pre-Pilot spreads in the narrowest two categories (both less than a nickel) than for those in the two wider Pre-Pilot spread categories (see Fig 21, above). But the higher pre-Pilot spread categories still saw outsized gains in displayed size at the inside compared with the Control Group.

Digging further into the data to examine the 21 individual strata in each Group, it appears that pre-Pilot average daily volume and, to a lesser extent, share price had the biggest influence on gains or reductions in quoted spreads. High-volume, low-priced stocks tended to see quoted spreads widen the most, whereas low-volume, high-priced issues were among those for which spreads declined (see Figs 51-54, Appendix A, pp 46-47).

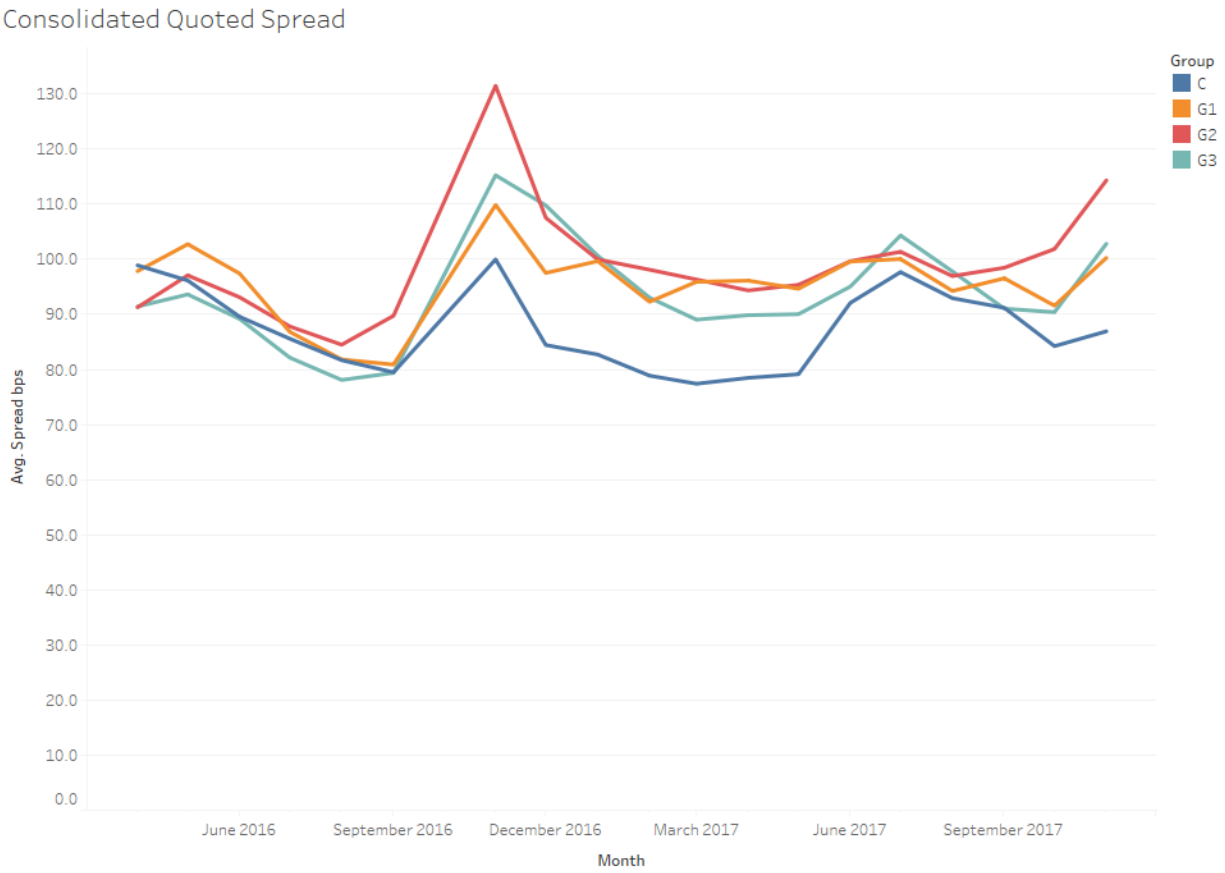
In Group 1, for example, the two biggest increases in quoted spreads came in low-share-price, high-volume strata, HLH and MLH. The next two largest were in two other high-volume strata, HMH and MHH. Spread reductions were seen in just six strata, with the five biggest coming in low-volume slices (MHL, MML, LLL, HHL and LHL). The sixth-largest was in a medium-volume segment, HHM. A similar pattern holds for Group 2, with four of the five greatest increases in quoted spread featuring either low share prices or high volume (MLH, HLH, MLM,

[12] Pre-Pilot spread categories are calculated as follows: "very tight" means less than $0.025; "Closer to <5 cents" means greater than or equal to $0.025 but less than $0.05; "Closer to >5 cents" means greater than or equal to $0.05 but less than $0.1; and "Nearer to 10 cents or greater" means $0.1 or greater.

HMH and LLH), but with no clear pattern among the five strata for which spreads narrowed. Likewise, in Group 3, five of the six strata that saw spreads widen the most featured high-volume securities (LLH, HLH, MLH, HMH, MLM and MMH), with four of the top five also composed of low-priced issues. And five of the six strata for which spreads narrowed (MLL, HHL, MML, MHM, MHL, LLL and HHM) were low-volume, whereas four featured high-priced stocks.

These patterns make sense when thinking about the impact of a fixed, cents-per-share quoting increment on securities of different prices. For low-priced securities, the fixed tick accounts for a greater percentage of the share price. This means that liquidity providers who capture spread are, on a percentage basis, earning higher gross profits than they would for higher-priced issues trading with a spread of one tick. Stocks that trade infrequently, however, are less likely than more-liquid issues to trade with a spread of one tick, as market makers generally compensate for liquidity risk by quoting wider markets and smaller size. But securities with low share prices and high average daily volume are more likely to trade with a spread of one tick. Some may even be "tick-constrained," in that market makers would be willing to quote at finer increments than the minimum tick. For these issues, the move from a one-cent to a five-cent minimum tick would naturally result in wider quoted spreads.

Fig 22: Average Quoted Spread for Pilot Securities, by Group



Conversely, less-liquid stocks — especially those with high share prices — are likelier to trade with quoted spreads wider than the minimum increment. When posting bids and offers in these names, liquidity providers must compensate for both liquidity risk and the lower percentage

returns available per tick in higher-priced securities (the flip side of the outsized returns available for lower-priced, liquid shares, as discussed above). It is possible that the reduced number of price points available for market makers resulted in quoted spreads narrowing for these securities. Consider, for example, a liquidity provider quoting an eight-cent bid-offer spread in a penny-tick environment. If that market maker judges, based on models evaluating various risks, that narrowing its quoted spread to seven cents is appropriate, it would simply do so. But in a nickel-increment market, this market maker would likely quote a 10-cent wide spread in the former instance, with the only possibility for narrowing the displayed spread going down to five cents wide. Furthermore, the cost of setting a new price level rises with nickel ticks compared with penny increments. Market makers, therefore, may be less subject to other market participants "penny jumping" their bids and offers in less-liquid securities and, therefore, feel more confident quoting narrower spreads.

Effective spreads and price improvement, in cents-per-share terms, also increased for the Test Group securities in absolute and percentage terms, while declining for the Control Group (see Fig 23 and Fig 24, below. Increases in effective spreads were smaller — and increases in price improvement were larger for Groups 2 and 3 than for Group 1. This may be because of the nickel trading increment applied to Groups 2 and 3, compared with the five-cent increment being applied solely to quoting in Group 1. This allowed transactions in Group 1 to occur at penny increments despite only being quoted in nickel increments, whereas Groups 2 and 3 favored midpoint price improvement.

Fig 23: Share-Weighted Effective Spreads for Pilot Securities, by Group and Period

Group	Pre-Pilot	Pilot	% chg
C	0.0296	0.0280	-5.45%
G1	0.0282	0.0450	59.26%
G2	0.0297	0.0458	54.08%
G3	0.0295	0.0454	53.87%

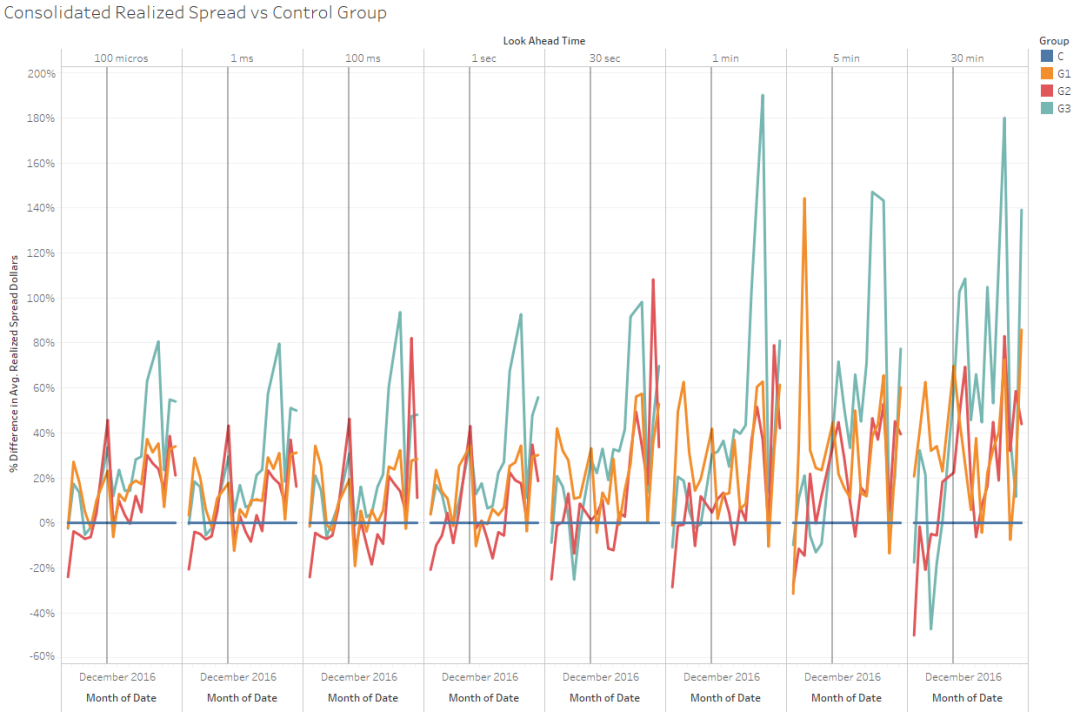
Fig 24: Share-Weighted Price Improvement for Pilot Securities, by Group and Period

Group	Pre-Pilot	Pilot	% chg
C	0.0205	0.0175	-14.66%
G1	0.0197	0.0275	39.69%
G2	0.0217	0.0329	51.88%
G3	0.0213	0.0312	46.70%

A difference-in-difference analysis shows modest increases in share-weighted average effective spreads for Test Group 1 (compared with the Control Group) and Test Group 2 (compared with Group 1), and a slight decline in effective spreads for Test Group 3 (compared with Group 2). None of the changes is statistically significant, however. There is a statistically significant increase for the Test Groups, however, in shares executed with price improvement. Test Group 1 sees a moderate, statistically significant increase in shares that are price-improved. This is offset by a smaller, statistically significant decrease for Group 2, whereas Group 3 shows a large, statistically significant increase in price-improved shares. Additionally, the amount of price improvement increases by a large, statistically significant margin for Group 1, with a moderate gain for Group 3 and a small, statistically insignificant increase in Group 2 (please see Table 9,

Appendix B, page 62). This suggests that the Test-Group treatments, particularly the wider quoting increment and the trade-at prohibition, encouraged higher levels of price improvement, but not of large enough magnitude to cause statistically significant narrowing of effective spreads.

Fig 25: Consolidated Realized Spread vs. Control Group, Pre-Pilot Through Pilot Period



Realized spreads[13] varied for the Test Groups relative to the Control Group depending on the look-ahead period used. The longest look-ahead times of 5 minutes and 30 minutes showed the biggest gaps for realized spreads between the Test Groups and the Control Group. Some shorter-term buckets, including one millisecond, 100 milliseconds and one second, saw realized spreads for at least one Test Group lower than that of the Control Group for much of the Pilot period. But in virtually all look-ahead buckets, Group 3 performed worse than the other Test Groups (see Fig 25, above).

Data on share-weighted realized spreads at 5-minute intervals following execution also were collected as part of the Pilot. Analyzing these data using a difference-in-difference framework shows Group 1 with higher 5-minute, share-weighted realized spreads than the Control Group, comparing pre-Pilot and Pilot periods. Likewise, Group 2 also shows an increase over Group 1.

[13] The Tick Size Pilot uses the Rule 605 definition of realized spread: double the amount of difference between the execution price and the midpoint of the consolidated best bid and offer five minutes after the time of order execution and, for sell orders, as double the amount of difference between the midpoint of the consolidated best bid and offer five minutes after the time of order execution and the execution price; provided, however, the midpoint of the final consolidated best bid and offer disseminated for regular trading hours shall be used to calculate a realized spread if it is disseminated less than five minutes after the time of order execution

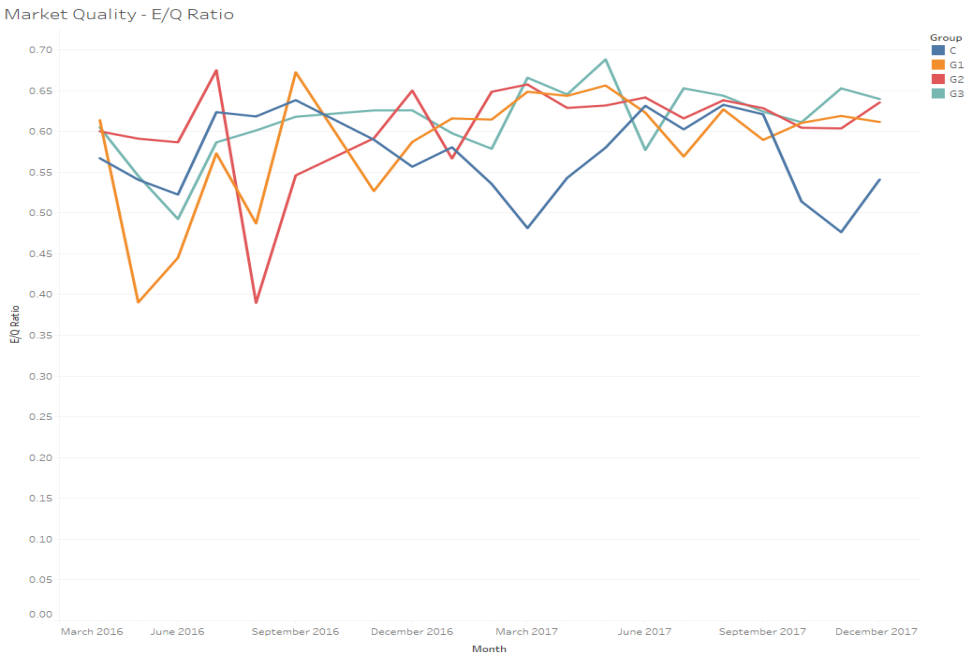
The difference in difference for Group 3 compared with Group 2 is lower, but none of the changes is statistically significant (please see Table 9, Appendix B, page 62).

Another method for measuring market quality, particularly for individual executions, is the Effective Spread to Quoted Spread ratio. Lower E/Q ratios denote orders executed at prices better than the NBBO, with cost savings accruing to the liquidity consumer. This ratio increased markedly for all the Test Groups during the Pilot period compared with the pre-Pilot period, with Group 1 suffering the biggest increase, followed in order by Groups 2 and 3 (see Fig 26, below).

Fig 26: Executed Over Quoted (E/Q) Ratio, by Group and Period

Group	Pre-Pilot	Pilot	% chg
C	0.5814	0.5593	-3.80%
G1	0.5083	0.6071	19.43%
G2	0.5402	0.6221	15.15%
G3	0.5718	0.6297	10.13%

Fig 27: E/Q Ratio, by Group, During Pre-Pilot and Pilot Periods



Other factors seen as affecting market quality include fill rates, cancellations, execution speed and message traffic. With respect to orders filled and cancelled, Group 3 again stands out as having experienced the most change between the Pre-Pilot and Pilot periods. Each of the Groups had nearly identical percentages of total ordered shares cancelled and executed during the Pre-Pilot period (1.2% filled for the Control Group and 1.1% for each of the Test Groups). During the Pilot, the Control Group and Groups 1 and 2 saw similar increases in fill rates, to 1.5% for the Control Group and Group 1 and 1.6% for Group 2. But Group 3 substantially outperformed, with an increase to 2.2% of shares executed (see Fig 28, next page).

Difference-in-Difference analysis also shows a substantial, statistically significant reduction in shares cancelled for Group 1 (compared with the Control Group). Changes for Groups 2 and 3 were not statistically significant (please see Table 9, Appendix B, page 62). This suggests that

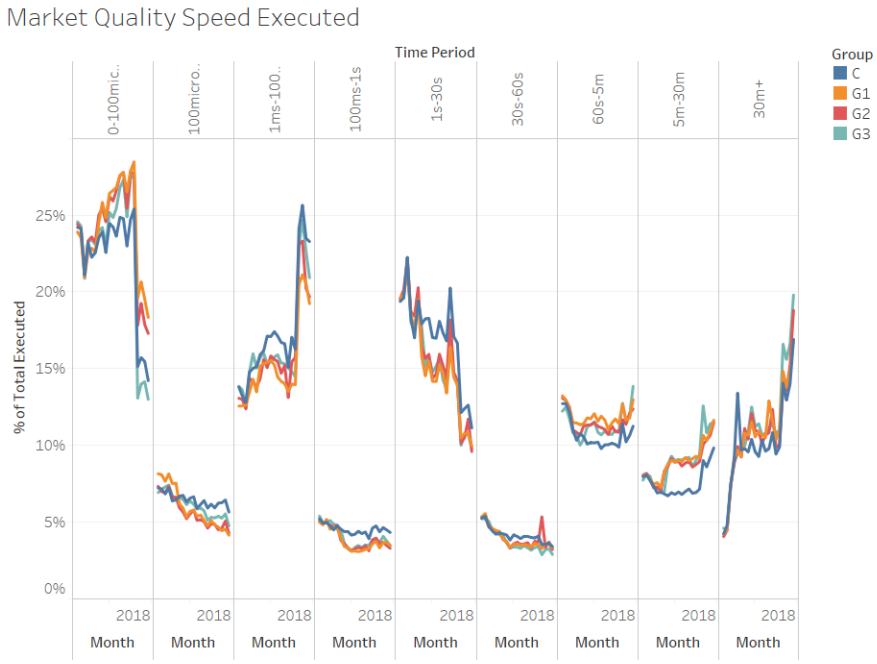
the five-cent increment for Group 1 contributed to lower cancellation levels. The 80% fewer price points under nickel increments, compared with penny ticks, may have provided liquidity providers with greater confidence that price levels would not fluctuate rapidly. That would make cancellations less necessary for the purpose of managing adverse-selection risk. And with more shares available at the inside, as illustrated earlier, shares cancelled as a result of liquidity-removing orders exhausting displayed size also would be less prevalent.

Fig 28: Cancellation and Fill Rates, by Group and Period

	% of Shares Cancelled		% of Shares Executed	
Group	Pre-Pilot	Pilot	Pre-Pilot	Pilot
C	98.8%	98.5%	1.2%	1.5%
G1	98.9%	98.5%	1.1%	1.5%
G2	98.9%	98.4%	1.1%	1.6%
G3	98.9%	97.8%	1.1%	2.2%

With respect to execution speed, Pilot data suggest that the Test Group rules caused orders to be executed more slowly than for Control Group securities. In the longer-term time frames of 1 to-5 minutes, 5 minutes to 30 minutes and 30-minutes-plus, the Test Groups all had a higher proportion of shares executed than the Control Group. Similarly, The Test Groups had fewer shares executed than the Control Group in the shorter-term time frames of 100 microseconds to 1 millisecond, 1 millisecond to 100 milliseconds, 100 milliseconds to 1 second and 1 second to 30 seconds.

Fig 29: Execution Speed, by Group and Time Bucket



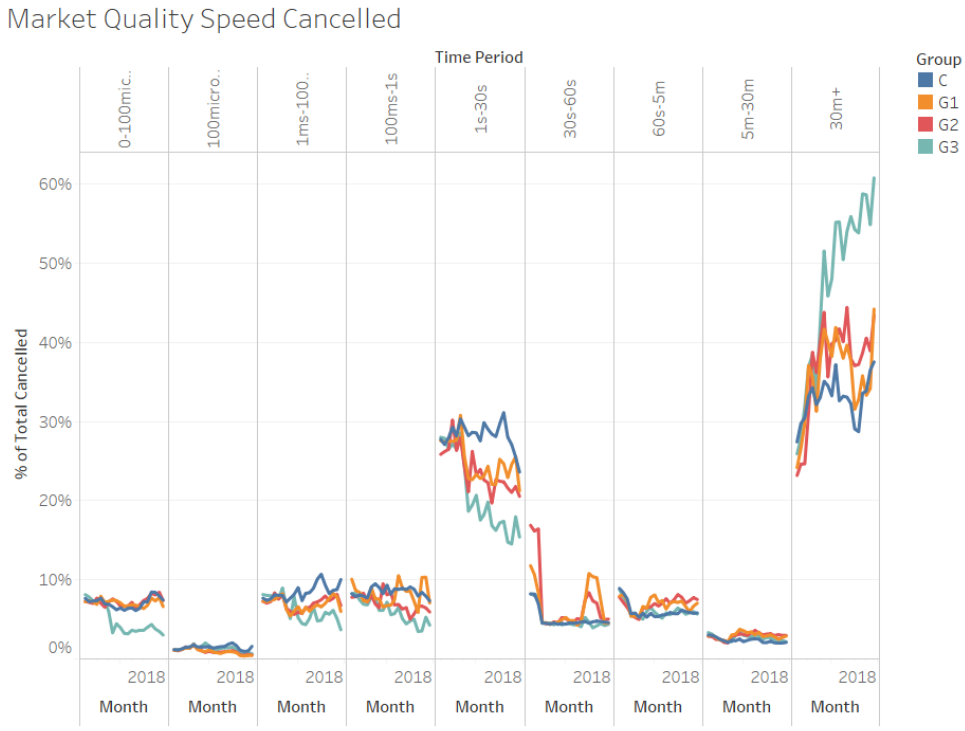
For the Groups in the Pilot Study, there is an increase in % of shares executed in the 0-100 micro seconds bucket. This is currenlty sampled data.

One partial exception was the very shortest time frame of less than 100 microseconds. At first, the Test Groups show higher proportions of shares executed than the Control Group in this bucket, but in early 2018, concurrent with volatility spiking in markets globally, the overall

proportion of shares executed in this window plummets, with Group 3 falling below the Control Group while the other two Test Groups remain at higher proportions than the Control Group. The delay in executing these orders appears to have been pushed to the 1-100-millisecond window, which sees an increase in the proportion of total shares executed during the same period. Similarly, shares executed in the 1-30-second window drop in early 2018, and appear to be pushed into the three longest time frames. But the relationships between the Groups in these time windows does not fundamentally change (see Fig 29, previous page).

Order duration also appears to lengthen as a result of the Pilot. The vast majority of cancelled orders for all Groups had a duration of at least one second. The percentage of cancellations in the four time buckets shorter than one second are almost uniformly lower for Test Groups than the Control Group once the Pilot begins (the one exception being the very shortest bucket of less than 100 microseconds, where the percentage of cancellations for Group 3 plummets compared to the other Groups, but Groups 1 and 2 essentially follow the Control Group). This trend is seen in even more dramatic fashion in the 1-to-30-second timeframe, with these cancellations for the Test Groups appearing to be pushed out to the very longest time bucket of 30-minutes-plus. Here, again, Group 3 sees disproportionate benefits, with the proportion of all cancelled shares increasing to upward of 60% by the end of the Pilot period, up from less than 40% when the Pilot begins and substantially higher than either Group 1 or Group 2 (see Fig 30, below).

Fig 30: Order Duration, by Group and Time Bucket



Group 3 has less % of shares cancelled in the 0-100 micro seconds bucket, are groups in the Pilot Study have less % of shares executed in the 1-30 seconds bucket, and increase in 30 minutes or more bucket.

Analyzing these data using a difference-in-difference approach reveals that most of the statistically significant changes in execution speed and cancellation speed occurred in Group 1, followed in order by Groups 3 and 2.

Group 1 sees statistically significant changes, most of them large, in all but three of the 18 time slices for which execution and cancellation speed were measured under the Pilot. The clear pattern for Group 1 appears to be fewer cancellations in the very shortest time buckets (measuring the difference-in-difference between Group 1 and Control and the pre-Pilot and Pilot periods), with big, statistically significant reductions in the 0-100 microsecond, 100 microsecond – 1 millisecond and 1-100 millisecond cohorts and statistically significant increases in the 60 second – 5 minute and 5-30-minute windows (see Table 9, Appendix B, page 62). Group 1 also sees big, statistically significant increases in execution speed for the shortest and third-shortest time windows, combined with big, statistically significant decreases in the second- and fourth-shortest buckets, raising the possibility that trades which would have occurred in the second- and fourth-shortest windows were instead executed more quickly, pushing them into the shortest and third-shortest buckets.

Looking at Group 3 (again, measuring the difference-in-difference between it and Group 2 and the pre-Pilot and Pilot periods), there are statistically significant changes in 10 of the 18 cancellation- and execution-speed cohorts. Cancellations decreased by a large, statistically significant margin in the 0-100 microsecond window, while increasing by a large, statistically significant margin in the 100 microsecond – 1 millisecond slice, raising the possibility that cancellations which would have occurred in the shortest window were instead pushed out to the second-shortest cohort. Other statistically-significant changes in cancellation time include large increases in the 1-30 second and 30-60 second buckets, and declines in the three longest cohorts, between 60 seconds and 30 minutes. Executions increased significantly in the 100 microsecond – 1 millisecond and 1-30 second buckets, while declining significantly in the 5-30 minute window.

In Group 2 (compared with Group 1 in the pre-Pilot and Pilot periods), there were far fewer statistically significant changes in cancellation and execution speed. These include a slight increase in cancellations during the shortest window coupled with a large decline in cancellations during the 30-60 second bucket and a big increase within the next-longest cohort of 60 seconds – 5 minutes. Executions in the second-shortest and fourth-longest windows also experienced significant increases.

Looking at these statistically significant changes in cancellation and execution speed collectively suggests that the imposition of a nickel-wide tick in Group 1, rather than the penny minimum increment in the Control Group, caused orders to be cancelled less quickly and executed more quickly. Adding the five-cent trading increment in Group 2 may have partially offset the decline in cancellations during the very shortest window of 0-100 microseconds. But the trade-at prohibition in Group 3 appears to have been a further deterrent to the shortest-term cancellations.

Message traffic, as measured by the frequency of quote updates, clearly plummeted for Test Group securities. The Control Group and Test Groups were tightly in line with respect to this data point during the Pre-Pilot period, but diverged by a large margin once the Pilot began, with Control securities experiencing approximately four to five times as many midquote updates as Test Group securities (see Fig 31, next page).

The flip side of this, however, is that price volatility per quote update increased substantially for Test Group securities. Fig 32, next page, shows a measure of quote-update volatility for Pilot securities. Quote-update volatility measures the percentage difference between the previous and new midquote every time the midquote changes. To arrive at averages for the Groups, we take the standard deviation of that difference across a symbol for the entire trading day, averaged for

all symbols in a group. The midquote, by definition, will move a greater distance in Test Group securities with nickel trading increments than it will for Control Group securities with penny increments, resulting in greater midquote volatility.

Fig 31: Average Number of Midquote Updates, by Group

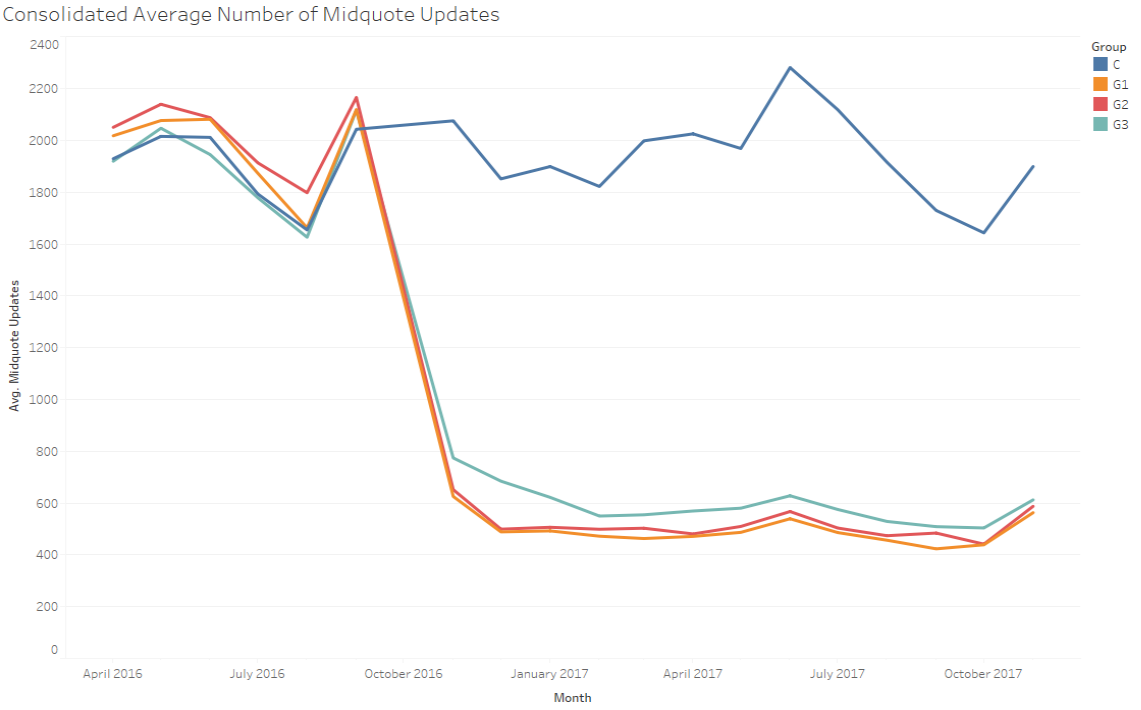
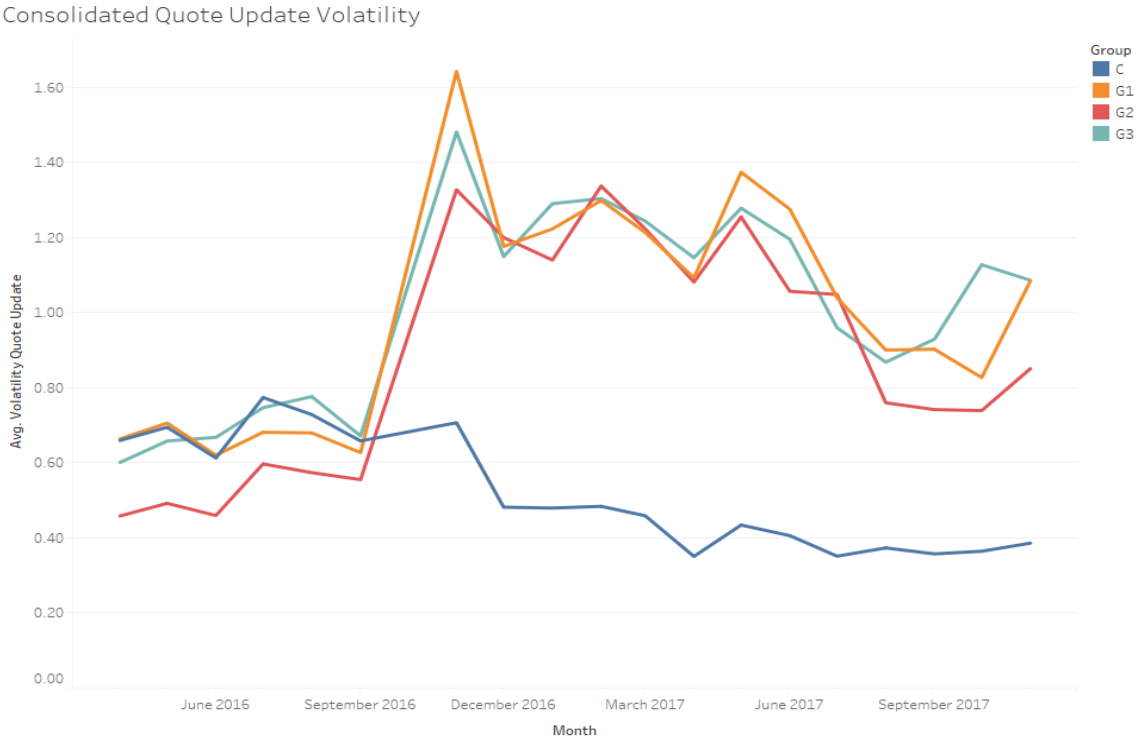


Fig 32: Price Volatility of Midquote Updates, by Group



In some cases, changes in venue market shares may come in response to shifts in market quality. And Test Group securities saw pronounced changes in venue market share compared with non-treated stocks. Issues in the Control Group saw a slight migration (564 bps of market share) away from exchanges with "maker-taker" fee schedules (those that pay liquidity providers rebates and charge removers slightly higher fees) toward other categories. These include "taker-maker," or inverted-fee markets (those that pay rebates to remove but charge liquidity providers), as well as flat-fee exchanges (which charge the same amount to both counterparties) and off-exchange venues (where fees are not subject to exchange "fair access" rules and therefore mostly negotiable according to client relationships). Maker-taker exchanges lost far more market share in Test Groups 1 and 2, however (1,768 bps and 1,658 bps, respectively), with off-exchange and taker-maker venues grabbing most of that activity. Group 3 also saw maker-taker exchanges lose more market share (1,165 bps) than the Control Group, but inverted exchanges were by far the biggest beneficiary of this move, gaining 1,144 bps of market share while off-exchange venues actually lost 493 bps (see Fig 33, below and Fig 34, next page).

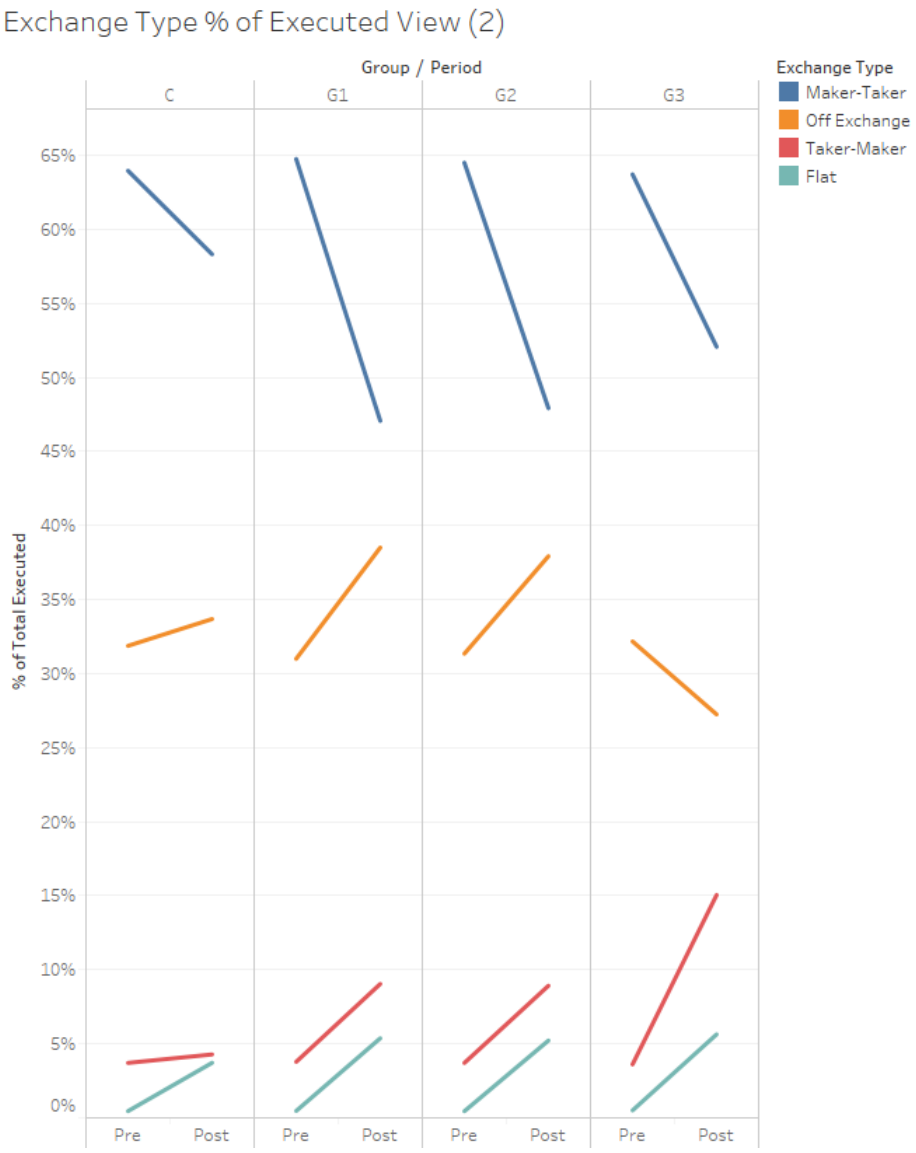
Fig 33: Market Share by Venue Type, Group and Period

		CADV		Market Share		
Group	Exchange Type	Pre	Post	Pre	Post	chg (bps)
C	Maker-Taker	162,547,488	196,311,388	63.96%	58.32%	-564
	Off-Exchange	81,007,390	113,393,673	31.87%	33.68%	181
	Taker-Maker	9,430,016	14,416,325	3.71%	4.28%	57
	Flat-Fee	1,157,922	12,512,832	0.46%	3.72%	326
G1	Maker-Taker	56,720,734	46,822,883	64.75%	47.07%	-1768
	Off-Exchange	27,156,295	38,308,551	31.00%	38.51%	751
	Taker-Maker	3,313,465	8,997,129	3.78%	9.04%	526
	Flat-Fee	408,570	5,346,973	0.47%	5.38%	491
G2	Maker-Taker	52,646,034	47,830,947	64.50%	47.92%	-1658
	Off-Exchange	25,580,713	37,855,516	31.34%	37.93%	659
	Taker-Maker	3,025,114	8,905,884	3.71%	8.92%	522
	Flat-Fee	364,650	5,211,782	0.45%	5.22%	478
G3	Maker-Taker	52,183,736	47,472,461	63.71%	52.07%	-1165
	Off-Exchange	26,353,032	24,839,617	32.17%	27.24%	-493
	Taker-Maker	2,957,279	13,722,091	3.61%	15.05%	1144
	Flat-Fee	411,830	5,142,102	0.50%	5.64%	514

There are a number of potential explanations for the more-pronounced migration from maker-taker exchanges to off-exchange and inverted market centers in Groups 1 and 2. One is that the wider tick size provides a greater incentive to trade inside the NBBO than when the minimum increment is one penny. Exchanges do offer midpoint and other hidden order types that effectively allow for such intra-spread transactions. But these exchange hidden order types typically account for approximately 7-8% of consolidated US equity volume, whereas off-exchange trading — including alternative trading systems, off-board market-making platforms and manual crossing — is close to 40%. In other words, there is far more intra-spread liquidity available off-exchange than on-exchange.

Maker-taker venues may also have suffered disproportionately in the Test Groups because of liquidity providers reacting to longer inter-market price-time priority queues. As the number of shares posted at the NBBO increases markedly with wider ticks, as demonstrated earlier in this section, it becomes more difficult for market participants posting at the NBBO to get their orders filled. Additionally, the risk of adverse selection — being filled just prior to an unfavorable price movement because one's order is too far back in the priority queue (i.e. a limit order to buy is filled immediately before the aggregated bid size is exhausted and the price ticks down) — also rises when more quoted size is forced to cluster at fewer price points.

Fig 34: Market Share by Venue Type, Group and Period



One option for improving fill rates in long queues — posting at a more-attractive price — becomes more expensive in a nickel-minimum-tick environment than in a penny-tick market. Another alternative is, essentially, increasing the speed at which orders are routed, canceled and

modified, to gain priority based on time of order entry. This option, however, is available to only the most-sophisticated market participants who invest substantial sums in market-data, computing and telecommunications infrastructure.

An easier way to cope with lengthier priority lines is to post on off-exchange and inverted-fee venues. These destinations frequently are preferred routing destinations for brokers seeking liquidity with marketable customer orders. This is in large part because brokers, rather than having to pay substantial fees to remove liquidity on "maker-taker" exchanges, receive rebates for removing on inverted markets. Likewise, many off-board venues provide free or far lower-cost executions than maker-taker exchanges. Brokers receive commissions at a fixed rate on the vast majority of customer orders, so execution fees at exchanges and other market centers represent a meaningful variable cost which, managed appropriately, can maximize profits on customer flow. For a liquidity provider, then, posting off-exchange or on an inverted venue can be a way to jump the inter-market time priority queue, as these destinations are often among the first places brokers access when routing marketable customer flow.

In Group 3, however, the trade-at prohibition makes it far more difficult to gain better inter-market queue position by just matching the NBBO on off-exchange venues that might be prioritized by liquidity-seeking brokers. This could be one reason why off-board activity declines for Group 3 and inverted exchanges gain more market share than in Groups 1 and 2.

Examining the 21 market-capitalization, share-price and average-daily-volume strata within each Group, it appears that lower-volume stocks were the least affected by the patterns of migration between venue types in Groups 1 and 2. In Group 1, five strata see far-more-muted movement of market share off-exchange. Four of these (HHL, LHL, MHL and MML) are low-volume strata and one (LLH) is a high-volume stratum. Three of these also feature high stock prices. Notably, the high-volume LLH stratum is the only one in which off-exchange had the highest pre-Pilot market share of the four venue-type categories Of the four low-volume strata that see less movement of volume off-exchange, two (LHL and LML) also see a markedly less pronounced transfer of market share to inverted-fee exchanges (see Fig 56, Appendix A, page 48). In Group 2, the six most-pronounced outliers from the overall trend toward more off-board and inverted-fee-exchange market share are low-volume strata (HHL, LHL, LLL, LML, MLL and MHL). Four of these (LLL, LML, MLL and MHL) are the only strata to see off-exchange market share fall during the Pilot period (see Fig 57, Appendix A, page 49).

In Group 3 there are several items worth pointing out in the strata data. First, the biggest increases in inverted-fee market share come in 10 strata (HLH, HMH, HMM, LLH, LLL, LLM, MLH, MLM, MMH and MMM). Only one of these is a low-volume stratum, whereas five are high-volume and four are medium-volume. Perhaps most interestingly, none of the 10 feature high share prices, whereas six have low share prices and four medium. Additionally, of the four strata with the least-pronounced reductions in maker-taker market share, three are high-share-price strata (HHL, LHL and MHL) and the other medium (LML), but all feature low volume (see Fig 58, Appendix A, page 49).

These data make sense when thinking about the impact of share price on quantity displayed at the NBBO, and the related effect on price-time priority queues. To effect equivalent dollar-amount positions, traders need to buy or sell more shares of lower-priced securities than they would of higher-priced issues. Consequently, displayed size and queue length tend to be larger for stocks with low share prices, and particularly those that have higher volumes. The opposite

effect would apply to high-priced issues. Consequently, the need to post on off-exchange or inverted venues to attain better position the inter-market price-time priority queue would be most pronounced for low-priced, high-volume stocks and least urgent for high-priced, low-volume securities. In Group 3, of course, the trade-at prohibition channels more of this queue-jumping activity to inverted-fee exchanges rather than off-exchange.

One other way that market makers can seek queue priority in thick order books is through the use of non-marketable Day Intermarket Sweep Orders. These orders are sometimes used to establish queue priority at a new price level. If market makers were responding to longer queues by using non-marketable Day ISOs, it might show up in Pilot data showing ISO usage. The tagging of ISO orders under the Pilot did not expressly distinguish between marketable and non-marketable ISOs. Still, the level of ISO usage is dramatically lower in the Test Groups than in the Control Group (see Fig 35, below; for information on usage of Trade-At ISOs, which were created for, confined to and accounted for 2.11% of all orders in Group 3, please see Fig 67, Appendix A, page 54).

Fig 35: Count of Intermarket Sweep Orders, by Group and Period

Group	ISOs - Pre	ISOs - Post	%chg
C	455,693	718,808	57.74%
G1	153,769	161,007	4.71%
G2	148,479	159,344	7.32%
G3	144,406	114,062	-21.01%

F. Market-Maker Participation and Profits

The Pilot generated an array of data on market-maker participation and profits in Pilot securities. In this section we examine data on the number of market makers in Pilot securities, as well as their liquidity provision in and profits derived from trading each of the Pilot groups.

The Pilot data show a single market maker accounting for 42.02% of all market-maker shares executed and 62.30% of the total realized profit for all market makers. The next-biggest market maker accounted for 7.51% of all market-maker shares executed and 10.84% of realized profits. Together, the top 16 firms by volume accounted for 92.76% of volume and 100.6% of realized profits.[14] Beyond this group no firm traded more than 1% of market-maker volume and only one generated more than 1% of market-maker realized profits. And the top two firms, accounting for 73.14% of realized profits, earned just above a half-penny per share (see Fig 61, Appendix A).

Fig 36: Average Number of Market Makers per Symbol, by Group and Period

	Pre	Post	% chg
C	11.87	12.25	3.22%
G1	11.92	12.30	3.19%
G2	11.77	12.20	3.59%
G3	11.71	11.36	-2.95%

[14] The total percentage of profits for these firms exceeds 100% because some market makers had negative realized profits.

Looking further into the data, the Pilot does not appear to have had a pronounced effect on the number of market makers in Pilot securities, except for in Group 3. The Control Group saw a 3.22% increase in the number of active market makers per symbol between the Pre-Pilot and Pilot periods. Groups 1 and 2 had similar increases of 3.19% and 3.59%, respectively, while Group 3 experienced a 2.95% decline (see Fig 36, previous page).

Time-series data on the number of active market makers per symbol throughout the Pre-Pilot and Pilot periods shows Group 3 declining more sharply when the Pilot begins, and recovering after about four months (see Fig 37, below). A histogram of the same data also shows fewer symbols in Group 3 having the highest number of market makers on average during the Pilot period. Only six symbols in Group 3 have 19 market makers on average, compared with 17 in Group 1 and 12 in Group 2. And there are no Group 3 symbols with 20 or 21 market makers. In Group 1, five securities have 19 market makers and one has 20. In Group 2, seven securities have 20 market makers and none have 21 (see Fig 38, next page).

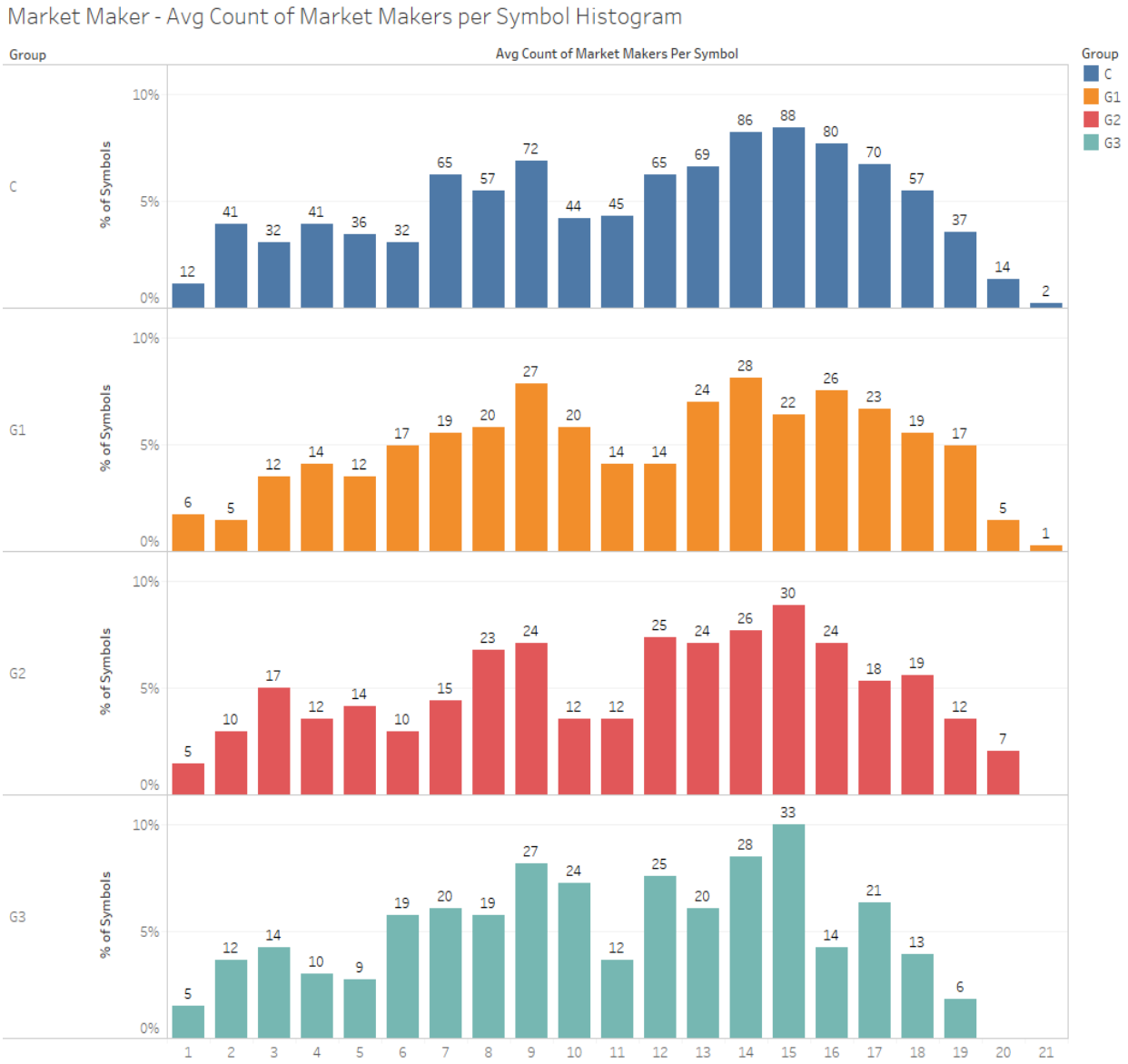
Fig 37: Average Number of Market Makers per Symbol, Monthly, by Group

Looking at the individual strata within the Test Groups, outsized gains in the number of market makers went primarily to low-volume strata, with larger-than-average reductions in market-maker count occurring in strata with lower share prices and medium-to-high volumes. In Group 1, low-volume strata (HHL, LHL, LML) experienced the three biggest increases in market-maker count, though other outsized gains came in strata HMM, MMH and MHM (see Fig 66, Appendix A, page 54). Of the six strata that saw the biggest declines in the number of market makers (LLM, HLH, MLH, MLM and LLH), five were low-priced and three were high-volume.

One possible reason for this may be that low-priced, high-volume securities saw more-pronounced increases in shares displayed at the NBBO, leading to longer price-time priority queues (see Section E, Market Quality Assessment, page 10). In Group 2, this pattern is less pronounced, though the top two gains in market-maker count came in low-volume strata (LHL and LLL), with the two next-biggest in medium-volume slices (HMM and MHM). Strata

experiencing outsized reductions in market-maker count for Group 2 were mostly low-priced (LMM, LLM, MLH and MLM). Low-volume strata also saw four of the six the biggest gains in market-maker count for Group 3 (LLL, LHL, LML, MMM, MML, MHH), though price seemed less influential. There did not appear to be a clear pattern affecting the biggest reductions in market-maker count for Group 3.

Fig 38: Market Maker Participation Histogram



Turning to market-maker trading volume, market makers in Control Group securities executed 25% more shares per symbol per day[15] during the Pilot period than in the Pre-Pilot period. Groups 1 and 2 slightly outperformed that increase, at 28% and 29%, respectively, while Group 3 managed a gain of just 16%. (see Fig 40, Market-Maker Volume per Symbol and Realized Profit

[15] Shares per symbol per day are used to adjust for the fact that the Control Group has roughly 3x more securities than each of the test groups, thereby facilitating apples-to-apples comparisons.

per Share, by Group and Period, page 36). A time series of market-maker shares executed (see Fig 39, below), also shows clearly that market-maker trading of Pilot securities increases markedly once the Test Group rules are applied in November 2016.

Market-maker profits, on the other hand, were clearly higher for all the Test Groups compared with the Control Group. While Control Group realized profit per share grew by just 9% during the Pilot period compared with the pre-Pilot period, Groups 1, 2 and 3 saw increases of 45%, 17% and 38%, respectively (see Fig 40, next page). In dollar terms, considering the ADV of market makers in each group, this meant increases in average daily profit per symbol of $352, $232 and $277 for Groups 1, 2 and 3, respectively, compared with $123 for the Control Group.

To put these in approximate aggregated terms, a hypothetical market maker trading 400 securities per group (assuming, for the sake of this exercise, that the Control Group had a similar amount of securities as the Test Groups) would have seen additional profits during the Pilot period of $49,199 per day in the Control Group, compared with $140,847, $92,632 and $110,880 for Groups 1, 2 and 3, respectively.

Fig 39: Market-Maker Average Shares Executed, Pre- and Post-Pilot

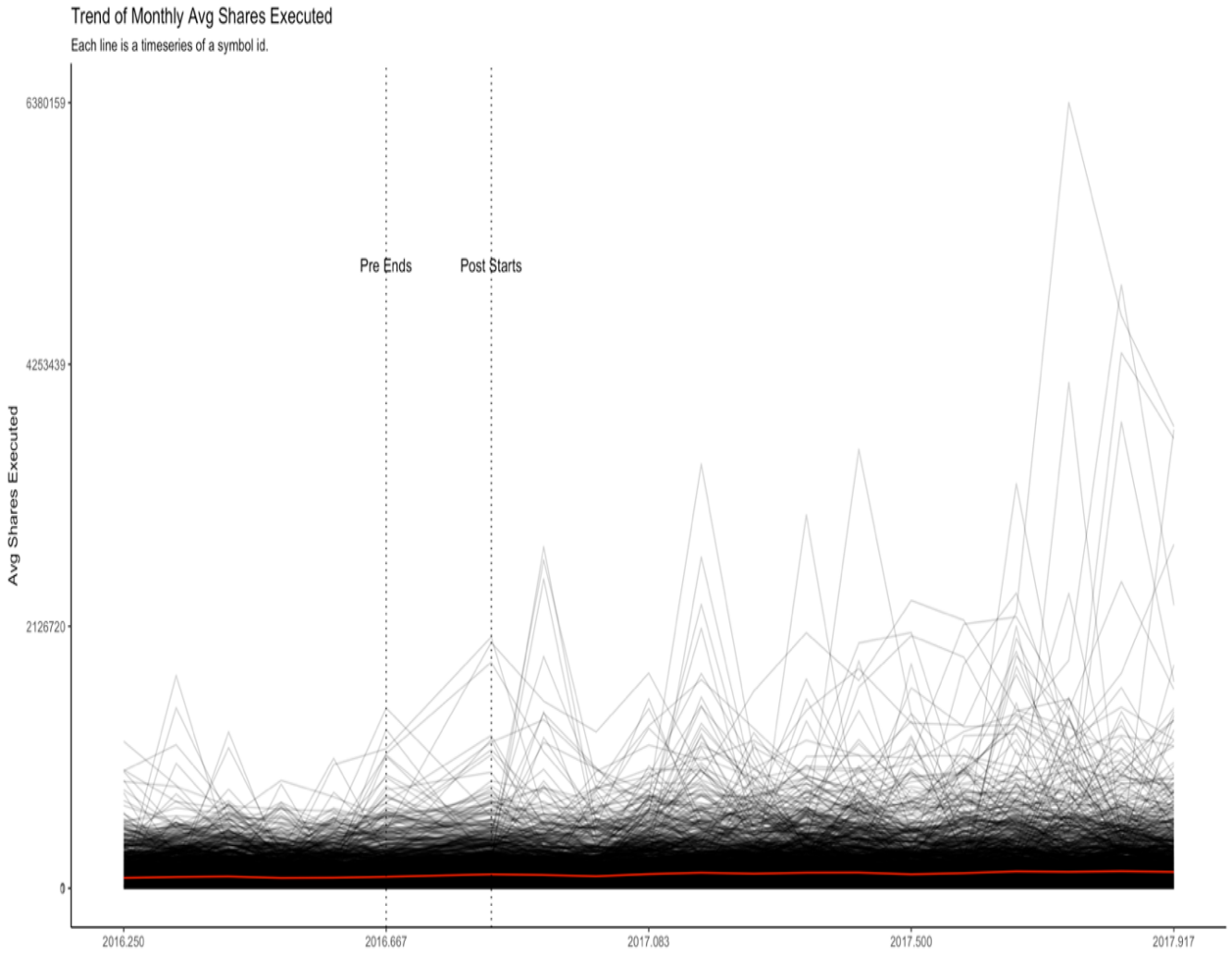


Fig 40: Market-Maker ADV per Symbol and Realized Profit per Share, by Group and Period

Group	ADV per Symbol (Pre)	ADV Per Symbol (Pilot)	% chg	Realized Profit Per Share (Pre)	Realized Profit Per Share (Pilot)	% chg
C	108,765	136,149	25.18%	0.0030	0.0033	8.54%
G1	108,934	139,847	28.38%	0.0037	0.0054	45.43%
G2	111,438	144,113	29.32%	0.0040	0.0047	17.30%
G3	103,436	120,052	16.06%	0.0044	0.0061	38.45%

One interesting question for the entire Pilot, and for market-maker behavior particularly, is what effect the "trade-at" prohibition applied to Test Group 3 has on behavior and outcomes. Examining the prices at which market makers traded relative to the NBBO reveals a smaller level of participation at the NBBO (meaning the market maker is buying at the bid or selling at the offer, capturing the entire spread) for Group 3 during the Pilot period (32%) compared to Groups 1 (39%) and 2 (41%). The change in trading at the NBBO between the Pre-Pilot and Pilot periods is also notable, with Groups 1 and 2 experiencing substantial increases (528 and 806 bps, respectively) and Group 3 showing a much smaller gain (45 bps). For reference, the Control Group saw a 40 bps decline in market makers trading at the NBBO (see Fig 41, below). The trade-at prohibition may have cut down on the percentage of market-maker trading that captured the full spread in Group 3. However, this reduction in trading at the NBBO did not coincide with lower realized profits for market makers in Group 3, as previously illustrated.

The Pilot also appears to have influenced market makers' overnight inventories. Data recording the average end-of-day excess or deficit of shares held by market makers reveals a 37% decrease in net end-of-day inventory for the Control Group. All the Test Groups saw market makers retaining substantially higher end-of-day inventories compared with the Control Group, with Groups 2 and 3 seeing far smaller decreases (3% and 6%, respectively) and Group 1 experiencing a 15% gain (see Fig 42, below).

Fig 41: Market-Maker Trading At, Inside, Across and Outside the NBBO, by Period and Group

	% Shares At			% Shares Cross			% Shares Inside			% Shares Outside		
Group	Pre	Post	chg (bps)	Pre	Post	chg (bps)	Pre	Post	chg (bps)	Pre	Post	chg (bps)
C	31.1%	30.7%	-40	28.1%	28.5%	39	39.4%	39.6%	19	1.7%	1.4%	-38
G1	33.4%	38.7%	528	28.7%	31.1%	244	36.7%	30.3%	-639	1.5%	0.5%	-100
G2	33.0%	41.1%	806	28.9%	30.4%	145	37.1%	28.4%	-874	1.6%	0.6%	-98
G3	31.9%	32.3%	45	27.8%	30.7%	297	38.9%	36.8%	-211	1.7%	0.6%	-103

Fig 42: Market-Maker Average per-Symbol End-of-Day Net Inventory, by Period

Group	Pre	Post	% chg
C	1,513.2	951.6	-37.11%
G1	1,438.5	1,653.7	14.96%
G2	1,593.8	1,547.3	-2.92%
G3	1,723.7	1,626.4	-5.64%

Applying statistical significance tests to the Pilot data on market-maker volume and profits reveals statistically significant increases in market-maker trading volume, realized profit and the

value of overnight inventory (see Table 8, Appendix B, Page 61). The most statistically significant increases affected realized profit and the value of positions carried overnight (shown as "Vwap," for the volume-weighted average price of the excess end-of-day share excess or deficit held by market makers, in Table 8) for Test Group 1 compared with the Control Group. Market-maker shares executed also increased in Group 2 compared with Group 1, as well as for Group 3 compared with Group 2, but not by statistically significant margins using difference-in-difference analysis. Realized profit declined slightly for Group 2 compared to Group 1 and rose slightly for Group 3 compared to Group 2, but neither change was statistically significant. There were no statistically significant changes between Group 2 and Group 1. Comparing Group 3 to Group 2, the only statistically significant change was a reduction in the value of positions carried overnight by market makers.

This pattern suggests that the widening of the trading increment to five cents, as applied to Group 1, was sufficient to boost both market-maker volume and profit, with little additional effect attributable to the successively stricter rules governing Groups 2 and 3. However, the statistically significant reduction in the value of market makers' overnight positions observed for Group 3 relative to Group 2 (but not for Group 2 compared with Group 1) could mean that the trade-at prohibition applied to Group 3 spurred market makers to retain less overnight risk.

Looking at results for the 21 revised strata within the various Test Groups, nine have statistically significant outcomes for market-maker realized profit, using a difference-in-difference analysis. Of these, three — MLH, HMH and MMH — show statistically significant increases for Group 1 only, with high statistical significance for MLH and HMH and low statistical significance for MMH. One stratum — LLH — shows a medium-significance gain for G1 vs. C and a medium-significance reduction in profit for G3 vs. G2. One — HHH — records a high-significance increase in market-maker profit for G3 only. And four strata — LHL, MLL, HHL and LML — all show significant reductions in realized profit for G3 only, with LML registering medium significance while the others are high (please see Table 10, Appendix B, page 63). This pattern suggests that high-volume stocks (as a reminder, the order of the strata criteria are market capitalization, share price and average daily volume) may see profit gains for G1 compared with C, as a result of the wider quoting increment, that remain consistent in the other test groups. At the same time, the wider increment alone does not appear sufficient to spur profit gains in low-volume securities, but the combination of a wider quoting increment, nickel trading increment and trade-at prohibition in G3 may produce markedly higher market-maker profits.

G. Market Transparency

Pilot data allow for two main approaches to examine the percentages of overall trading activity occurring with and without pre-trade price transparency. First, we examine the percentages of volume for each Group being executed on-exchange and off-exchange. Generally, the vast majority of on-exchange transactions involve a displayed quotation, with any "hidden" orders integrated with the displayed book. Conversely, most off-exchange trades do not involve pre-trade price transparency.

The on/off-exchange split for Pilot securities varies by Group. Control-Group issues saw a 181 bps increase in off-exchange market share during the Pilot period compared with the Pre-Pilot period. Test Groups 1 and 2 each saw substantially greater off-exchange migration of volume, with gains of 751 bps and 659 bps, respectively. Group 3, however, is once again an outlier, with off-exchange market share declining by 493 bps (see Fig 43, next page).

As we mentioned in Section E (Market Quality Assessment), it is possible that market participants responded to the wider trading increment introduced with Test Group 1 by seeking opportunities to trade within the nickel quoted spread on off-exchange venues, including alternative trading systems and broker internalization. Additionally, the clustering at fewer price points of liquidity that before the Pilot was available in penny increments created longer price-time priority queues, potentially influencing liquidity providers to post on off-board venues that charge lower fees than the major exchanges and are therefore prioritized by brokers when routing liquidity-seeking orders. Furthermore, analysis of the 21 market-capitalization, share-price and average-daily-volume strata in each Test Group suggest that this behavior, designed to gain better position in longer intermarket price-time priority queues, was most pronounced in low-priced, high-volume issues, for which order books generally are thicker, and least prevalent in high-priced, low-volume securities (please see further discussion in Section E, page 29-31). However, the trade-at prohibition in Group 3 severely restricted liquidity providers' ability to match the NBBO off-exchange. This could be one reason why off-exchange market share declined for Group 3 and not for the other Test Groups.

Fig 43: Off-Exchange Market Share, by Group and Period

Group	% off-exchange (Pre)	% off-exchange (Pilot)	chg (bps)
C	31.87%	33.68%	181
G1	31.00%	38.51%	751
G2	31.34%	37.93%	659
G3	32.17%	27.24%	-493

We also evaluate data for trades executed on exchanges, but using orders with a "hidden" status (such as pegged orders or non-displayed limit orders). These data show that the Control Group went from having 37.81% of orders with hidden status in the Pre-Pilot period to 35.03%, a reduction of 277 bps, during the Pilot period. Test Groups 1 and 2 saw slightly larger reductions of 371 and 348 bps, respectively, while Group 3 registered a bigger decline of 913 bps (see Fig 44, below). A similar pattern is seen when looking at average daily value traded (see Fig 45, below).

Fig 44: Percentage of Average Daily Volume Executed Using Hidden Orders, by Period

Group	% ADV Hidden (Pre)	% ADV Hidden (Pilot)	chg (bps)
C	37.81%	35.03%	-277
G1	37.25%	33.54%	-371
G2	37.48%	33.99%	-348
G3	37.03%	27.90%	-913

Fig 45: Percentage of Average Daily Value Traded Executed Using Hidden Orders, by Period

Group	% ADVT Hidden (Pre)	% ADVT Hidden (Pilot)	chg (bps)
C	39.27%	37.37%	-190
G1	39.20%	33.58%	-562
G2	39.52%	33.91%	-561
G3	39.05%	28.73%	-1,031

Examining the 21 market-capitalization, share-price and average-daily-volume strata for each Test Group shows that the biggest reductions in hidden volume for Group 1 came in low-volume strata (HHL, LHL, LLL, LML, MML and MHL), while the market-capitalization and share-price criteria appeared to be less influential. Increases in hidden volume, on the other hand, came only for high-volume strata (HLH, HMH and MLH), again with other criteria appearing less meaningful (please see Fig 63, Appendix A, page 52). For Group 2, the largest reductions also were seen in low-volume strata (HHL, MHL and MML), along with one medium-volume stratum (LLM), while increases also were concentrated in high-volume names (HLH, HMH and MLH). This pattern was also seen for Group 3, with the biggest reductions in hidden volume occurring in low-volume strata (HHL, LHL, LML, MHL and MML), while the smallest declines (there were no strata with higher Pilot-period hidden ADV compared with the pre-Pilot period in Group 3) came in high-volume strata (HLH, HMH, LLH, MLH and MMH).

One other way to assess market transparency is examining the level of liquidity displayed at the best available prices, as well as at other price levels in order books. As stated in Section E (Market Quality), displayed size at the best bid and offer prices market-wide increased substantially for Test Group securities from the pre-Pilot to Pilot period (335%, 369% and 471% for Groups 1, 2 and 3, respectively) compared with the Control Group (25%). Further, Group 3 saw a substantial increase in *overall* displayed liquidity, not just at the NBBO but out to 20 cents away on each side of the consolidated order book (see Fig 12, page 14), potentially due to the trade-at prohibition applied only to that Test Group.

Additionally, a difference-in-difference analysis of share-weighted average consolidated size at the NBBO suggests that the imposition of nickel-wide ticks encouraged the display of more shares at the best prices market-wide. But the trade-at prohibition in Group 3 appears to have offset some of those gains.

A difference-in-difference analysis of Pilot data on "original hidden percentage" and "final hidden percentage," confirms a reduction in hidden-order usage for Test-Group securities. Original hidden percentage — the portion of shares not displayable upon order entry — sees statistically significant declines in Group 1 (compared with Control) and Group 3 (compared with Group 2), for the Pilot period compared with the pre-Pilot period. In Group 2 (compared with Group 1), there is a statistically significant increase in original hidden percentage. The same pattern is seen for final hidden percentage — the portion of shares not displayed prior to final execution or cancellation (see Table 9, Appendix B, page 62). These results suggest that the wider tick size introduced with Group 1 may have discouraged the use of non-displayed orders for treated securities, with the biggest effects seen for Groups 1 and 3.

H. Foreign Routing

One interesting potential effect of the Pilot pertains to the approximately 182 securities that are dual-listed in the United States and Canada. Common language, time zone and market conventions (such as per-share pricing and volume reporting, in contrast to value-traded-based measurements in most of the rest of the world) mean that market participants in each country routinely select among the most-favorable venues in both countries for routing orders in inter-listed securities. Liquid foreign-exchange markets for US and Canadian dollars make necessary FX conversions relatively easy, further facilitating cross-border routing and arbitrage strategies.

Of the 2,399 Pilot securities, 95 are dual-listed in Canada. Of this group, 31 appeared in one of the Test Groups during the Pilot — eight in Group 1, six in Group 2 and 17 in Group 3. The

remainder were in the Control Group. Given the aforementioned factors supporting cross-border routing in inter-listed securities, it is possible that any degradation to trading outcomes in dual-listed names resulting from the Test Group rules may have prompted market participants to seek better executions in those securities on Canadian venues, where the Pilot did not apply. Examining the portion of volume executed in Canada and the US for the inter-listed Test Group securities may show any such behavior changes during the Pilot.

Fig 46: Pilot-Period Change to US Market Share for Test-Group Stocks Dual-Listed in Canada

Name	Ticker US	Ticker CAD	Chg US (pct pts)
CPI CARD GROUP I	PMTS	PMTS	-1.4%
TRILLIUM THERAPE	TRIL	TRIL	-1.6%
SIERRA WIRELESS	SWIR	SW	-6.3%
DHX MEDIA-VAR VO	DHXM	DHX/A	45.1%
NORTH AMERICAN E	NOA	NOA	-3.5%
MOUNTAIN PROVINC	MPVD	MPVD	1.0%
DESCARTES SYS	DSGX	DSG	9.5%
SEARS CANADA INC	SRSC	SCC	1.0%
MERCER INTERNATI	MERC	MERC/U	0.05%
RESOLUTE FOREST	RFP	RFP	-2.61%
NOBILIS HEALTH C	HLTH	NHC	41.01%
NORSAT INTL INC	NSAT	NII	5.69%
COLLIERS INTERNA	CIGI	CIGI	1.30%
HUDBAY MINERALS	HBM	HBM	7.61%
TUCOWS INC-A	TCX	TC	-0.66%
KINGSWAY FINL	KFS	KFS	-1.95%
HYDROGENICS CORP	HYGS	HYG	-1.54%
AETERNA ZENTARIS	AEZS	AEZS	-2.45%
SUNOPTA INC	STKL	SOY	-0.90%
SEABRIDGE GOLD	SA	SEA	-3.03%
ATLANTIC POWER	AT	ATP	1.02%
APTOSE BIOSCIENC	APTO	APS	15.44%
METHANEX CORP	MEOH	MX	-3.60%
EXFO INC	EXFO	EXF	-25.57%
RICHMONT MINES	RIC	RIC	-9.24%
STARS GROUP INC/	TSG	TSGI	-1.73%
CRH MEDICAL CORP	CRHM	CRH	1.92%
ADVANTAGE OIL &	AAV	AAV	3.66%
DRAGONWAVE INC	DRWI	DRWI	6.45%
STANTEC INC	STN	STN	1.61%
TRANSALTA CORP	TAC	TA	-1.67%

Group 1** / **Group 2** / **Group 3;

Sources: Rosenblatt Securities, Bloomberg, FINRA

Of the 31 instances of inter-listed securities appearing in one of the Test Groups, 16 (52%) resulted in US venues gaining market share on Canadian venues during the Pilot period compared with the Pre-Pilot period, and 15 (48%) saw market share shift north of the border. This is broadly similar to the 48%-46% split between US market-share gainers and losers for inter-listed stocks in the Control Group (6% saw no change between the Pre-Pilot and Pilot periods). Additionally, the magnitude of market-share changes for inter-listed Test Group securities also appeared to slightly favor US venues. Of the 16 inter-listed Test Group symbols for which the US gained market share, there were three instances of 10-percentage-point or greater gains and two instances in which gains were 40 percentage points or more. By comparison, of the 15 dual-listed Test Group securities for which the US lost market share, just one instance was by 10 percentage points or more.

When looking deeper into market-share patterns for individual Test Groups, consideration needs to be given to the very small number of inter-listed securities in each one, as mentioned above. With this caveat in mind, it is interesting to note that there are marked differences among the Test Groups. Group 1 roughly mimics the pattern seen in the Control Group, with its eight dual-listed names evenly split among those gaining and losing market share in the US following the start of the Pilot. Five of the six dual-listed stocks in Group 2 saw market-share gains in the US under the Pilot. But in Group 3, 11 of the 17 inter-listed securities saw market share migrate north of the border during the Pilot period.

Overall, the pilot does not appear to have driven a material level of trading market share in dual-listed stocks away from US venues to Canada. It is possible, however, that the stricter rules applied to Test Group 3 played a role in the preponderance of inter-listed names in that group which saw trading shift north of the border during the Pilot period compared with the Pre-Pilot period. It's also worth noting that as a rule, the dual-listed issues in the pilot were not among the highest-volume stocks that trade in both countries. This may have led market participants to conclude that any improvements in execution quality to be gained from adjusting routing to favor Canadian venues, which were not subject to the Test Group restrictions, would be so small as to not be worth the time, effort and money invested.[16] In general, the large number of issuers that are listed in both countries and the ease and frequency with which market participants engage in cross-border routing of these securities, are factors that both US and Canadian regulators must keep in mind when making any changes to market rules, either on a permanent or pilot basis.

I. Conclusion

We have identified numerous data points, patterns and trends in sections E (Market Quality Assessment), F (Market-Maker Participation and Profits) and G (Market Transparency) above, that may be worth considering when judging the effectiveness of the Pilot and informing any future changes to public policy. In this section, we summarize these findings and discuss other issues.

The Pilot appears to have increased liquidity displayed at the NBBO, as well as at other prices throughout the inter-market order book, particularly for Test Group 3, which featured a trade-at prohibition in addition to the wider quoting and trading increments applied to Groups 1 and 2. Test-Group stocks generally saw less volume, executed in fewer, larger transactions with less

[16] None of the inter-listed Pilot securities was among the top 20 most actively traded inter-listed securities during the Pilot period.

message traffic, short-term order cancellations and quote volatility. However, quoted spreads increased in absolute and percentage terms relative to the Control Group, particularly for Group 3. Price improvement increased, but not by a large-enough margin to counteract the wider tick, resulting in higher effective spreads, though the increases were not statistically significant. Increased size displayed at the inside also lengthened inter-market price-time priority queues, shifting trading activity toward off-exchange venues and "inverted-fee" exchanges. The application of the trade-at prohibition to Group 3, in addition to the effect of liquidity clustering at fewer price points, may have had a self-reinforcing effect that both exaggerated the increase in size at the NBBO and diverted trading to inverted-fee exchanges (while discouraging off-exchange trading).

With respect to market-making activity, the Pilot did not appear to increase the number of market makers, on average, in Test-Group securities. Group 3 even saw a reduction in the number of market makers per security during the Pilot period. But the increase to a five-cent quoting increment coincided with a statistically significant increase in market-maker share volume, realized profit and the value of overnight positions, evidenced by increases in these metrics for Test Group 1 compared with the Control Group. The addition of a five-cent quoting increment in Test Group 2 and a trade-at prohibition in Test Group 3 did not result in further statistically significant increases in these metrics. And the trade-at prohibition may have caused a reduction in the value of overnight risk held by market makers.

Considering market transparency, the Pilot appears to have led to more off-exchange trading in the Test Groups than in the Control Group, with the exception of Group 3, likely due to its trade-at prohibition. There was a statistically significant reduction in the use of on-exchange hidden orders for Test Group securities, attributable to the wider quoting increment. Trading moved away from displayed quotes on exchanges with "maker-taker" fee schedules, perhaps due to lower position for liquidity providers in inter-market price-time priority queues, and toward off-exchange venues, inverted-fee markets and hidden orders. One reason for this likely was a desire to trade inside the wider increment using midpoint and other hidden orders. Another may have been a desire by liquidity providers to improve inter-market price-time priority by posting off-exchange and on inverted-fee exchanges (this also may have discouraged the use of hidden orders, which cede priority to displayed orders at the same price level). However, the flip side of these phenomena is that the Pilot appeared to encourage the display of more size at the NBBO, as well as throughout the order book. And the trade-at prohibition, applied exclusively to Group 3, coincided with less off-exchange and hidden trading for those securities.

The effects of the Pilot treatments also varied according to the market-capitalization, share-price and average-daily-volume strata within each Test Group, as well as whether Pilot stocks had narrow or wide pre-Pilot quoted spreads. These effects can be seen particularly for NBBO depth, quoted spreads, the number of market makers per security, market-maker realized profits, the use of hidden orders and the shift in market share among various types of execution venues. The strata effects tend to be most pronounced for share price and volume, which are tied most closely to the behavior of liquidity providers in markets with fixed cents-per-share quoting increments. Market capitalization, in contrast, appears to have little influence.

Specifically, Test-Group strata featuring lower-priced and higher-volume securities experienced the largest increases in NBBO depth, quoted spreads and shifts in market share away from major exchanges to off-exchange venues and "inverted-fee" exchanges. Conversely, higher-priced, lower-volume stocks saw the smallest gains in NBBO depth and the biggest reductions in quoted

spreads, while being less likely to experience market-share shifts toward off-exchange and inverted-fee market centers.

These developments seem closely linked with pre-Pilot spread classes for Test Group securities. Because of the dynamics surrounding systematic liquidity provision in markets with a fixed, cents-per-share tick size, low-priced, high-volume issues are likely to have quoted spreads of less than five cents in a penny-tick market. Conversely, high-priced, low-volume names are likely to have spreads wider than five cents. By far the largest increases in NBBO depth and quoted spreads for Test-Group stocks were for securities in the tightest two of four pre-Pilot spread classes. Quoted spreads for Test-Group stocks with the widest pre-Pilot spreads, on the other hand, declined by greater margins than did similar issues in the Control Group. And NBBO depth still increased disproportionately with the Control Group for Test-Group securities in the two widest pre-Pilot spread categories.

In summary, lower-priced, higher-volume securities with the tightest pre-Pilot spreads experienced wider quoted spreads, longer inter-market price-time priority queues and greater fragmentation of trading volume as a result of the Pilot treatments. These issues also appeared likelier to see a reduction in the average number of market makers per symbol during the Pilot period. In contrast, higher-priced, lower-volume stocks with the widest pre-Pilot spreads tended to experience the biggest reductions in quoted spreads and were not as affected by greater fragmentation caused by longer queues. Additionally, outsized gains in the number of market makers per security went mostly to low-volume strata.

APPENDIX A: Additional Charts and Tables

Fig 47: Strata Analysis of NBBO Depth in Dollars, Control Group

Group	Revised Stratum	Pre	Post	% chg
C	H-H-H	31,849	35,737	12.21%
	H-H-L	32,108	40,286	25.47%
	H-H-M	27,883	32,561	16.78%
	H-L-H	36,857	59,960	62.68%
	H-M-H	29,064	34,020	17.05%
	H-M-M	17,293	23,210	34.22%
	L-H-L	22,759	26,021	14.33%
	L-L-H	11,049	12,614	14.16%
	L-L-L	7,893	7,986	1.19%
	L-L-M	7,267	8,706	19.80%
	L-M-L	14,125	15,319	8.45%
	L-M-M	10,791	13,142	21.78%
	M-H-H	16,589	21,018	26.70%
	M-H-L	25,597	29,788	16.37%
	M-H-M	19,888	25,703	29.24%
	M-L-H	18,187	23,258	27.88%
	M-L-L	14,183	20,726	46.13%
	M-L-M	12,357	18,954	53.39%
	M-M-H	17,171	20,406	18.84%
	M-M-L	11,482	15,195	32.34%
	M-M-M	13,151	16,388	24.61%

Fig 48: Strata Analysis of NBBO Depth in Dollars, Group 1

Group	Revised Stratum	Pre	Post	% chg
G1	H-H-H	31,345	115,658	268.99%
	H-H-L	35,660	60,978	71.00%
	H-H-M	33,669	74,445	121.11%
	H-L-H	40,957	272,077	564.31%
	H-M-H	37,144	155,970	319.91%
	H-M-M	15,347	82,907	440.23%
	L-H-L	18,026	27,581	53.01%
	L-L-H	9,454	53,672	467.70%
	L-L-L	8,137	20,138	147.48%
	L-L-M	8,466	68,198	705.58%
	L-M-L	14,971	24,031	60.52%
	L-M-M	10,075	31,878	216.40%
	M-H-H	27,167	85,212	213.66%
	M-H-L	24,825	44,712	80.11%
	M-H-M	20,462	62,603	205.95%
	M-L-H	20,272	111,775	451.36%
	M-L-M	8,093	50,699	526.43%
	M-M-H	16,426	85,648	421.41%
	M-M-L	10,497	33,551	219.62%
	M-M-M	13,411	53,174	296.50%

Fig 49: Strata Analysis of NBBO Depth in Dollars, Group 2

Group	Revised Stratum	Pre	Post	% chg
G2	H-H-H	29,658	110,140	271.37%
	H-H-L	34,011	81,230	138.83%
	H-H-M	28,464	76,824	169.90%
	H-L-H	27,889	252,842	806.59%
	H-M-H	39,430	172,319	337.03%
	H-M-M	19,537	91,147	366.54%
	L-H-L	21,908	24,646	12.50%
	L-L-H	12,534	96,218	667.64%
	L-L-L	8,323	21,480	158.07%
	L-L-M	6,658	29,472	342.64%
	L-M-L	12,973	25,939	99.94%
	L-M-M	11,905	41,459	248.27%
	M-H-H	18,664	73,417	293.35%
	M-H-L	27,740	41,395	49.23%
	M-H-M	21,333	56,330	164.06%
	M-L-H	19,151	123,700	545.93%
	M-L-L	5,560	30,471	448.06%
	M-L-M	9,444	67,679	616.60%
	M-M-H	17,007	102,654	503.59%
	M-M-L	9,814	31,779	223.80%
	M-M-M	12,152	62,113	411.11%

Fig 50: Strata Analysis of NBBO Depth in Dollars, Group 3

Group	Revised Stratum	Pre	Post	% chg
G3	H-H-H	30,452	132,585	335.39%
	H-H-L	91,422	116,664	27.61%
	H-H-M	30,440	83,655	174.82%
	H-L-H	39,482	367,406	830.58%
	H-M-H	30,420	193,657	536.61%
	H-M-M	23,724	167,235	604.93%
	L-H-L	36,080	37,326	3.45%
	L-L-H	13,006	124,352	856.12%
	L-L-L	7,139	24,164	238.46%
	L-L-M	8,219	58,376	610.27%
	L-M-L	18,167	31,435	73.04%
	L-M-M	9,294	27,312	193.87%
	M-H-H	21,652	91,934	324.60%
	M-H-L	17,824	42,239	136.97%
	M-H-M	18,329	57,000	210.98%
	M-L-H	17,077	147,527	763.91%
	M-L-L	23,532	357,426	1418.92%
	M-L-M	14,637	108,529	641.46%
	M-M-H	17,506	105,568	503.05%
	M-M-L	10,790	41,682	286.31%
	M-M-M	12,847	60,391	370.06%

Fig 51: Strata Analysis of Quoted Spreads (bps), Control Group

Group	Revised Stratum	Pre	Post	% chg
C	H-H-H	15.40	15.55	1.02%
	H-H-L	88.98	84.09	-5.50%
	H-H-M	26.44	26.88	1.67%
	H-L-H	27.84	24.69	-11.30%
	H-M-H	16.02	14.67	-8.42%
	H-M-M	38.24	31.27	-18.24%
	L-H-L	246.40	258.90	5.07%
	L-L-H	58.25	63.53	9.08%
	L-L-L	261.51	217.93	-16.66%
	L-L-M	86.90	83.14	-4.32%
	L-M-L	218.10	219.79	0.78%
	L-M-M	59.89	71.42	19.26%
	M-H-H	23.86	27.70	16.09%
	M-H-L	137.15	222.48	62.22%
	M-H-M	39.00	40.68	4.30%
	M-L-H	30.78	31.20	1.37%
	M-L-L	93.32	68.78	-26.30%
	M-L-M	55.25	48.03	-13.07%
	M-M-H	26.00	23.92	-8.02%
	M-M-L	79.99	102.14	27.69%
	M-M-M	36.53	31.64	-13.40%

Fig 52: Strata Analysis of Quoted Spreads (bps), Group 1

Group	Revised Stratum	Pre	Post	% chg
G1	H-H-H	14.30	20.58	43.90%
	H-H-L	65.72	55.89	-14.96%
	H-H-M	27.63	26.82	-2.94%
	H-L-H	19.87	54.29	173.25%
	H-M-H	14.10	34.29	143.22%
	H-M-M	32.70	57.73	76.54%
	L-H-L	310.40	299.55	-3.50%
	L-L-H	119.43	138.32	15.82%
	L-L-L	256.05	215.41	-15.87%
	L-L-M	88.71	151.62	70.92%
	L-M-L	186.52	193.03	3.49%
	L-M-M	65.07	80.31	23.41%
	M-H-H	18.09	38.59	113.38%
	M-H-L	174.84	133.12	-23.86%
	M-H-M	41.18	41.84	1.60%
	M-L-H	30.25	95.08	214.27%
	M-L-M	55.39	100.00	80.52%
	M-M-H	22.23	39.36	77.08%
	M-M-L	93.71	75.28	-19.67%
	M-M-M	39.38	50.44	28.08%

Fig 53: Strata Analysis of Quoted Spreads (bps), Group 2

Group	Revised Stratum	Pre	Post	% chg
G2	H-H-H	14.83	20.50	38.26%
	H-H-L	53.74	57.73	7.44%
	H-H-M	25.28	24.45	-3.29%
	H-L-H	21.67	61.25	182.63%
	H-M-H	14.58	34.05	133.65%
	H-M-M	53.03	52.62	-0.78%
	L-H-L	309.09	433.45	40.23%
	L-L-H	55.05	112.75	104.80%
	L-L-L	254.87	218.81	-14.15%
	L-L-M	85.60	161.21	88.32%
	L-M-L	218.67	224.85	2.83%
	L-M-M	46.90	78.03	66.35%
	M-H-H	16.92	32.20	90.36%
	M-H-L	127.04	128.99	1.54%
	M-H-M	46.13	40.97	-11.18%
	M-L-H	31.34	91.25	191.13%
	M-L-L	97.52	111.75	14.59%
	M-L-M	44.59	111.13	149.22%
	M-M-H	28.91	38.71	33.91%
	M-M-L	80.50	76.25	-5.29%
	M-M-M	45.71	57.29	25.34%

Fig 54: Strata Analysis of Quoted Spreads (bps), Group 3

Group	Revised Stratum	Pre	Post	% chg
G3	H-H-H	14.72	19.20	30.43%
	H-H-L	79.61	70.00	-12.08%
	H-H-M	25.83	24.85	-3.77%
	H-L-H	16.44	51.00	210.12%
	H-M-H	14.28	38.95	172.75%
	H-M-M	26.21	47.53	81.36%
	L-H-L	278.79	329.35	18.13%
	L-L-H	46.02	160.21	248.16%
	L-L-L	213.58	193.13	-9.57%
	L-L-M	123.70	172.02	39.06%
	L-M-L	226.68	241.97	6.74%
	L-M-M	54.14	88.28	63.05%
	M-H-H	17.59	26.56	50.98%
	M-H-L	94.97	85.60	-9.87%
	M-H-M	45.36	40.56	-10.57%
	M-L-H	26.93	73.56	173.20%
	M-L-L	152.38	112.30	-26.30%
	M-L-M	52.40	132.67	153.19%
	M-M-H	21.16	45.27	114.00%
	M-M-L	78.37	69.03	-11.91%
	M-M-M	40.69	46.70	14.78%

Fig 55: Strata Analysis of Market-Share Migration by Venue Type, Control Group

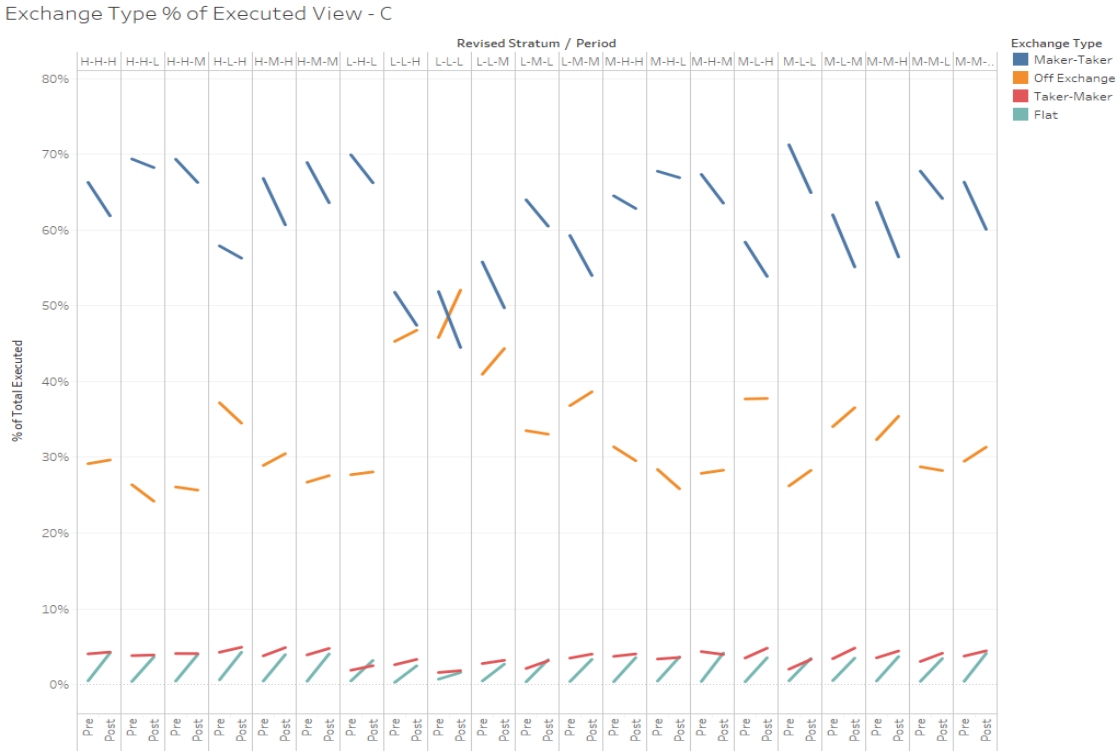


Fig 56: Strata Analysis of Market-Share Migration by Venue Type, Group 1

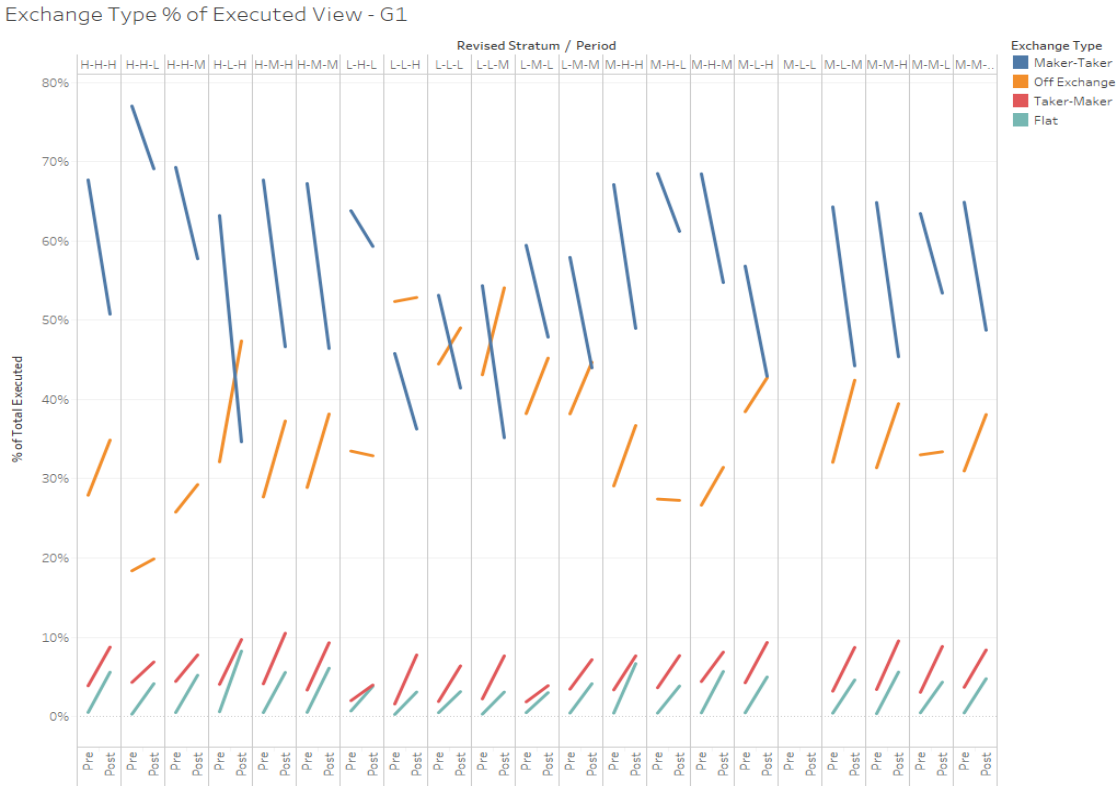


Fig 57: Strata Analysis of Market-Share Migration by Venue Type, Group 2

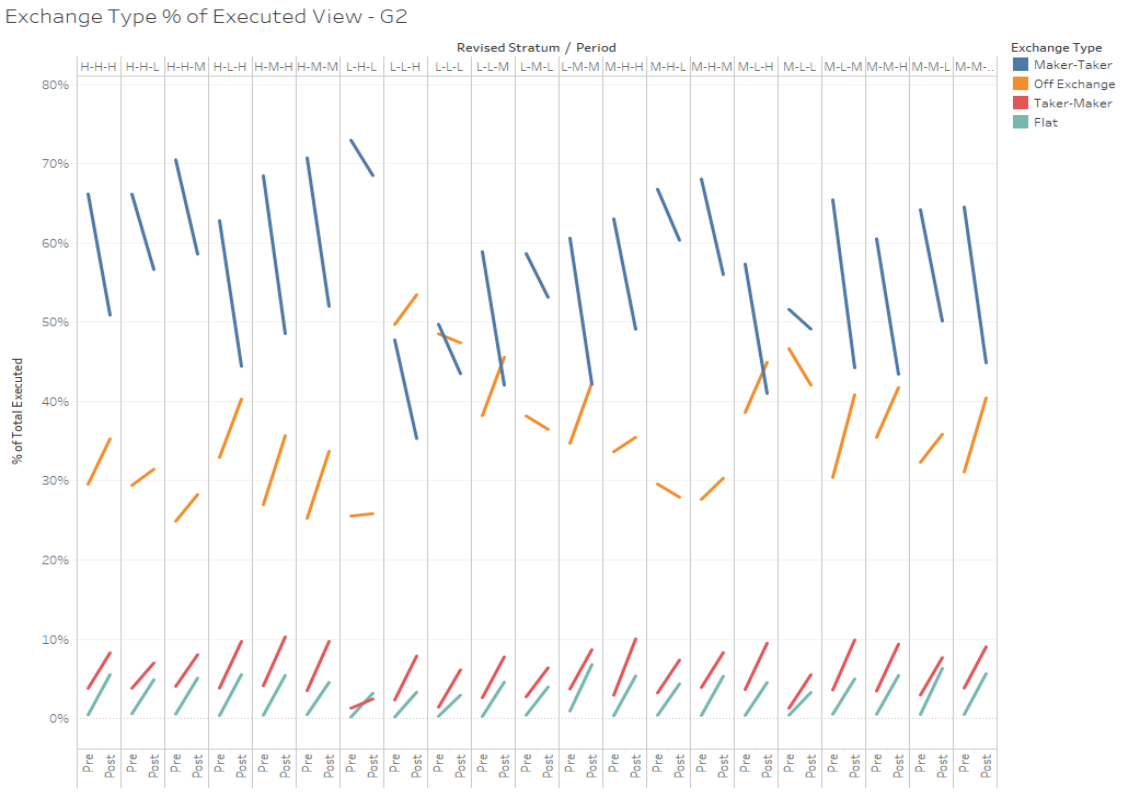


Fig 58: Strata Analysis of Market-Share Migration by Venue Type, Group 3

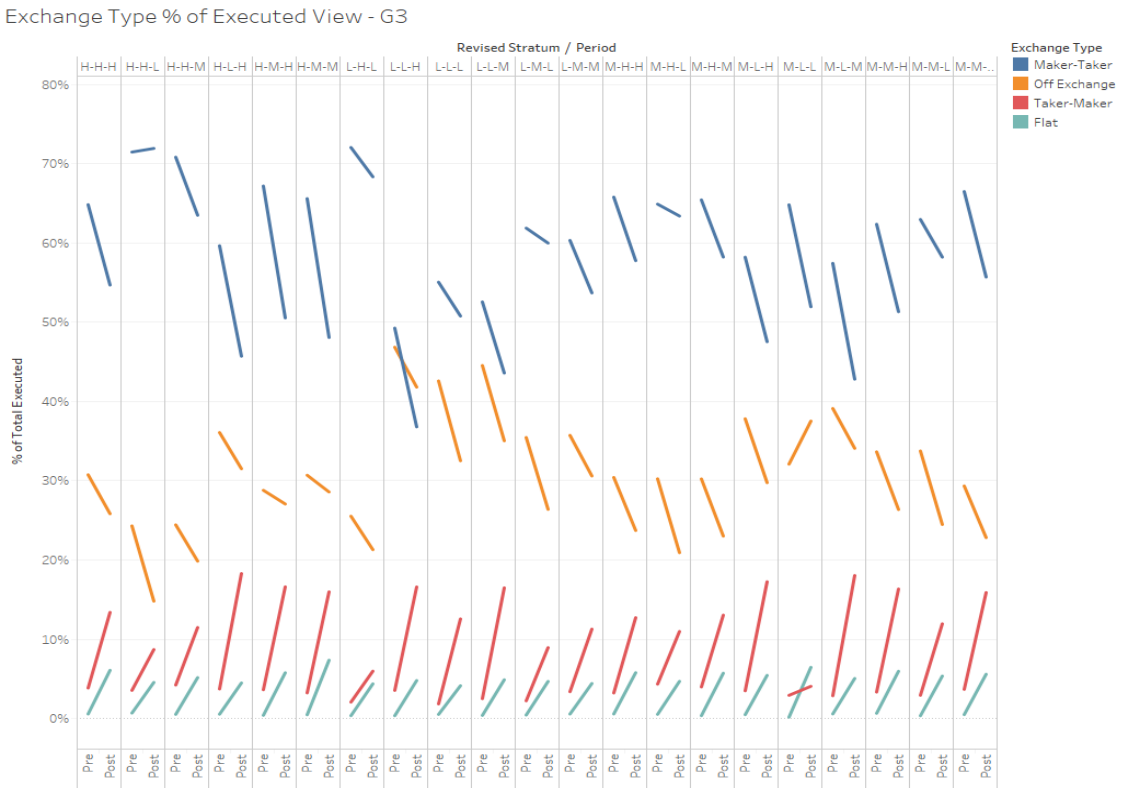


Fig 59: Share-Weighted Effective Spreads (cents per share), by Group and Period

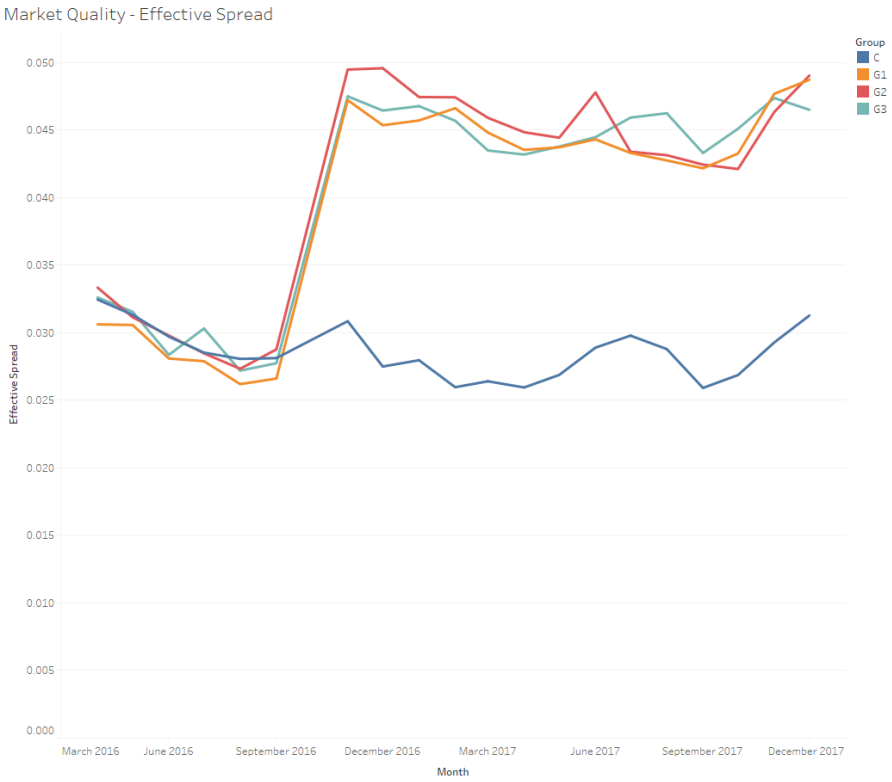


Fig 60: Share-Weighted Price Improvement (cents per share), by Group and Period

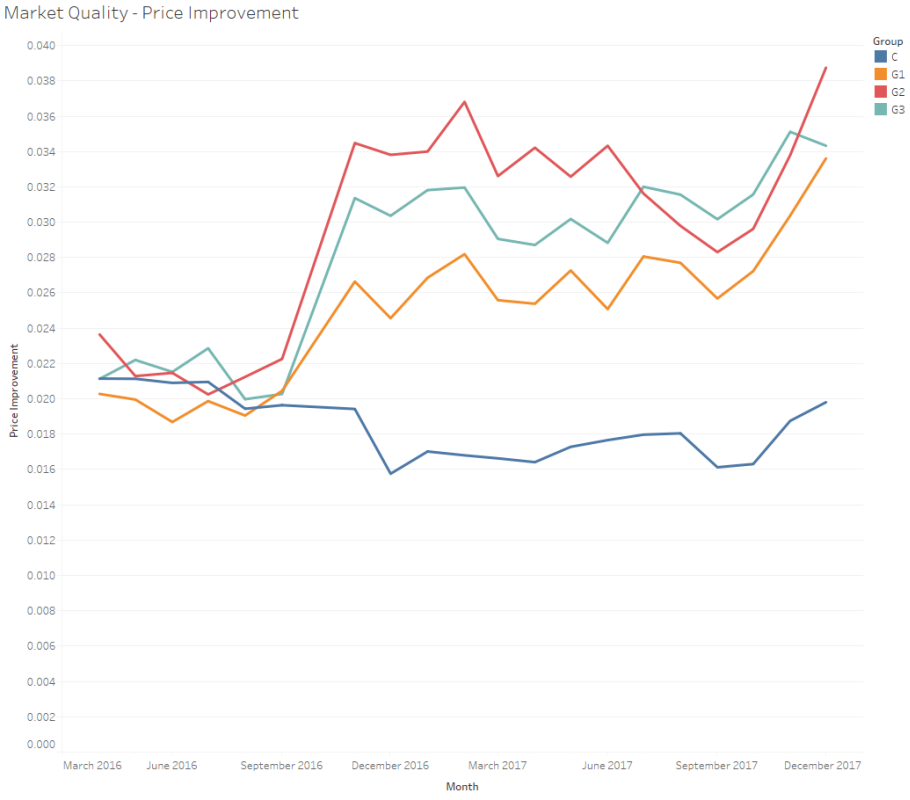


Fig 61: % Shares Executed, Realized Profits and Unrealized Profits for All Market Makers

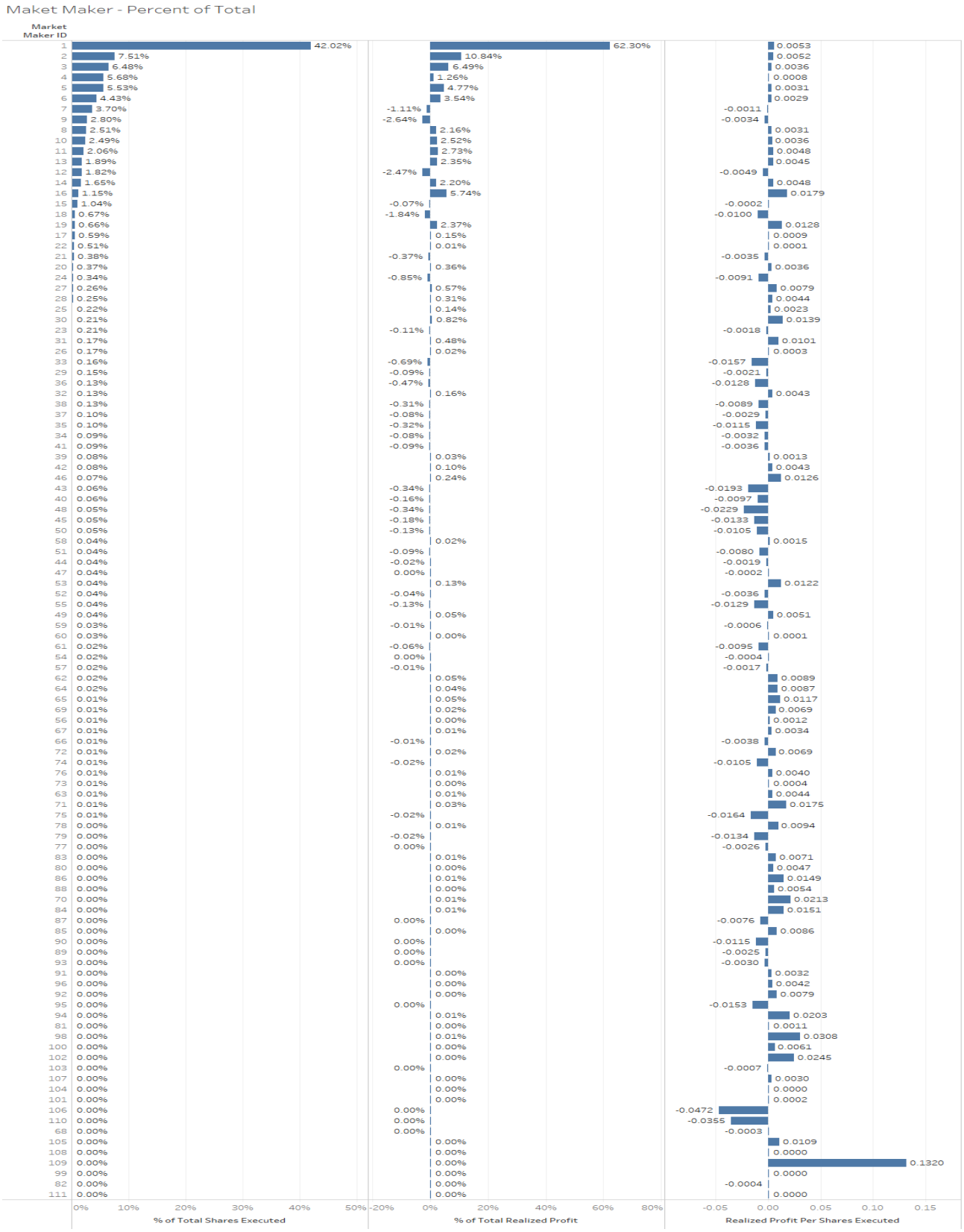


Fig 62: Strata Analysis of Hidden-Order Volume, Control Group

Group	Revised Stratum	% ADV Hidden (Pre)	% ADV Hidden (Pilot)	chg
C	H-H-H	39.47%	36.74%	-2.73%
	H-H-L	50.79%	43.04%	-7.75%
	H-H-M	40.50%	39.95%	-0.55%
	H-L-H	34.49%	34.90%	0.41%
	H-M-H	34.21%	32.09%	-2.11%
	H-M-M	37.71%	34.81%	-2.91%
	L-H-L	64.12%	55.66%	-8.46%
	L-L-H	34.95%	33.10%	-1.85%
	L-L-L	45.17%	36.40%	-8.77%
	L-L-M	41.82%	36.59%	-5.23%
	L-M-L	53.56%	49.60%	-3.96%
	L-M-M	41.36%	37.95%	-3.41%
	M-H-H	39.00%	37.44%	-1.55%
	M-H-L	53.40%	49.10%	-4.30%
	M-H-M	43.41%	40.08%	-3.34%
	M-L-H	33.76%	30.80%	-2.96%
	M-L-L	52.63%	39.41%	-13.22%
	M-L-M	40.22%	33.86%	-6.36%
	M-M-H	35.09%	32.43%	-2.66%
	M-M-L	50.38%	43.54%	-6.84%
	M-M-M	38.48%	35.33%	-3.16%

Fig 63: Strata Analysis of Hidden-Order Volume, Group 1

Group	Revised Stratum	% ADV Hidden (Pre)	% ADV Hidden (Pilot)	chg
G1	H-H-H	37.82%	33.02%	-4.79%
	H-H-L	54.27%	39.46%	-14.81%
	H-H-M	44.29%	34.46%	-9.83%
	H-L-H	32.91%	33.95%	1.04%
	H-M-H	33.95%	34.11%	0.16%
	H-M-M	37.07%	32.65%	-4.42%
	L-H-L	62.74%	51.64%	-11.11%
	L-L-H	37.64%	34.97%	-2.67%
	L-L-L	46.29%	35.50%	-10.79%
	L-L-M	40.10%	34.21%	-5.89%
	L-M-L	55.01%	42.43%	-12.58%
	L-M-M	39.29%	31.18%	-8.11%
	M-H-H	39.66%	32.76%	-6.89%
	M-H-L	50.79%	39.17%	-11.62%
	M-H-M	42.89%	32.73%	-10.15%
	M-L-H	32.99%	34.86%	1.87%
	M-L-M	43.13%	34.90%	-8.23%
	M-M-H	35.89%	31.01%	-4.88%
	M-M-L	51.60%	35.03%	-16.57%
	M-M-M	39.77%	31.67%	-8.11%

Fig 64: Strata Analysis of Hidden-Order Volume, Group 2

Group	Revised Stratum	% ADV Hidden (Pre)	% ADV Hidden (Pilot)	chg
G2	H-H-H	38.63%	33.31%	-5.32%
	H-H-L	50.08%	31.38%	-18.70%
	H-H-M	43.25%	33.95%	-9.31%
	H-L-H	30.67%	31.76%	1.08%
	H-M-H	33.35%	35.36%	2.01%
	H-M-M	37.78%	33.30%	-4.49%
	L-H-L	66.80%	57.91%	-8.89%
	L-L-H	36.58%	32.77%	-3.81%
	L-L-L	44.99%	36.21%	-8.78%
	L-L-M	47.15%	35.43%	-11.72%
	L-M-L	50.20%	41.75%	-8.45%
	L-M-M	42.68%	33.29%	-9.39%
	M-H-H	37.24%	30.77%	-6.47%
	M-H-L	54.12%	42.45%	-11.67%
	M-H-M	43.49%	34.04%	-9.45%
	M-L-H	33.01%	34.22%	1.20%
	M-L-L	42.98%	33.59%	-9.39%
	M-L-M	38.18%	35.94%	-2.24%
	M-M-H	35.92%	32.41%	-3.52%
	M-M-L	49.26%	35.75%	-13.51%
	M-M-M	39.07%	33.76%	-5.31%

Fig 65: Strata Analysis of Hidden-Order Volume, Group 3

Group	Revised Stratum	% ADV Hidden (Pre)	% ADV Hidden (Pilot)	chg
G3	H-H-H	37.14%	27.04%	-10.10%
	H-H-L	53.48%	35.87%	-17.61%
	H-H-M	43.43%	30.45%	-12.98%
	H-L-H	35.23%	29.41%	-5.81%
	H-M-H	35.66%	28.99%	-6.67%
	H-M-M	32.59%	22.87%	-9.72%
	L-H-L	63.79%	43.64%	-20.14%
	L-L-H	34.45%	28.33%	-6.11%
	L-L-L	47.63%	30.42%	-17.21%
	L-L-M	40.64%	27.08%	-13.57%
	L-M-L	54.68%	35.74%	-18.94%
	L-M-M	44.66%	30.11%	-14.55%
	M-H-H	36.65%	25.71%	-10.94%
	M-H-L	49.63%	31.63%	-18.00%
	M-H-M	41.22%	27.58%	-13.64%
	M-L-H	32.86%	26.07%	-6.79%
	M-L-L	48.29%	37.33%	-10.96%
	M-L-M	35.35%	28.07%	-7.28%
	M-M-H	33.58%	26.73%	-6.85%
	M-M-L	47.10%	30.04%	-17.06%
	M-M-M	39.24%	27.28%	-11.95%

Fig 66: Strata Analysis, Average Number of Market Makers per Symbol, Control Group

	C			G1			G2			G3		
Revised Stratum	Pre	Post	%chg	Pre	Post	%chg	Pre	Post	%chg	Pre	Post	%chg
H-H-H	17.81	18.21	2.29%	17.97	18.55	3.19%	18.12	18.49	2.08%	17.49	16.79	-3.99%
H-H-L	9.40	9.47	0.74%	7.52	9.05	20.32%	9.39	10.00	6.54%	10.27	8.94	-12.90%
H-H-M	14.39	15.11	4.99%	14.34	15.06	5.00%	14.61	15.40	5.37%	14.30	13.78	-3.64%
H-L-H	14.84	16.10	8.50%	17.72	17.13	-3.35%	15.56	16.06	3.23%	17.23	16.29	-5.47%
H-M-H	16.53	17.61	6.59%	17.28	17.71	2.45%	16.48	17.08	3.70%	17.40	16.61	-4.52%
H-M-M	12.25	13.61	11.02%	11.79	13.04	10.58%	11.69	13.27	13.47%	11.35	11.34	-0.15%
L-H-L	3.89	4.24	9.00%	4.43	5.27	19.15%	3.55	4.24	19.38%	4.08	4.31	5.48%
L-L-H	12.82	12.11	-5.52%	10.82	10.68	-1.28%	12.76	12.78	0.21%	13.28	12.01	-9.57%
L-L-L	5.56	5.82	4.70%	6.04	6.36	5.20%	5.20	5.97	14.69%	5.62	6.37	13.29%
L-L-M	10.22	9.92	-2.97%	10.62	9.73	-8.36%	9.69	9.22	-4.82%	10.29	9.58	-6.93%
L-M-L	5.31	5.57	5.00%	4.86	5.39	10.95%	5.04	5.47	8.53%	5.05	5.29	4.89%
L-M-M	11.36	10.27	-9.54%	10.96	10.01	-8.71%	11.12	10.48	-5.71%	11.09	9.28	-16.37%
M-H-H	15.99	15.57	-2.60%	16.96	17.63	3.95%	15.42	16.01	3.85%	14.96	15.06	0.72%
M-H-L	8.25	8.20	-0.64%	8.23	8.46	2.79%	8.20	8.53	4.07%	8.73	7.89	-9.55%
M-H-M	12.49	12.90	3.27%	12.51	13.50	7.94%	11.39	12.45	9.38%	12.48	11.96	-4.15%
M-L-H	15.42	15.68	1.70%	15.78	15.35	-2.72%	15.01	14.35	-4.36%	15.21	14.11	-7.23%
M-L-L	6.64	7.88	18.65%			NULL	8.05	7.90	-1.87%	5.56	4.26	-23.31%
M-L-M	11.28	11.79	4.55%	11.40	11.22	-1.54%	12.70	12.18	-4.10%	10.34	9.82	-5.00%
M-M-H	15.67	16.57	5.75%	14.97	16.47	10.03%	15.70	16.58	5.63%	16.19	15.28	-5.57%
M-M-L	8.43	8.75	3.81%	8.90	9.19	3.27%	8.52	9.11	6.91%	8.59	8.82	2.68%
M-M-M	12.22	13.14	7.55%	12.17	12.90	5.98%	11.88	12.57	5.75%	11.33	11.64	2.78%
Grand Total	11.87	12.25	3.22%	11.92	12.30	3.19%	11.77	12.20	3.59%	11.71	11.36	-2.95%

Fig 67: Use of Trade-At ISO Orders in Group 3

	Pre	Post	% chg	% Total - Pre	% Total - Post
Count of Orders	7,319	54,737	647.89%	0.37%	2.11%
Order Size	1,131,435	12,043,225	964.42%	0.08%	0.85%
Cancelled Shares	8,567	3,218,122	37464.51%	0.00%	0.24%
Executed Shares	898,184	8,298,748	823.95%	2.13%	14.75%
Routed Shares	0	127	N/A	0.00%	0.00%

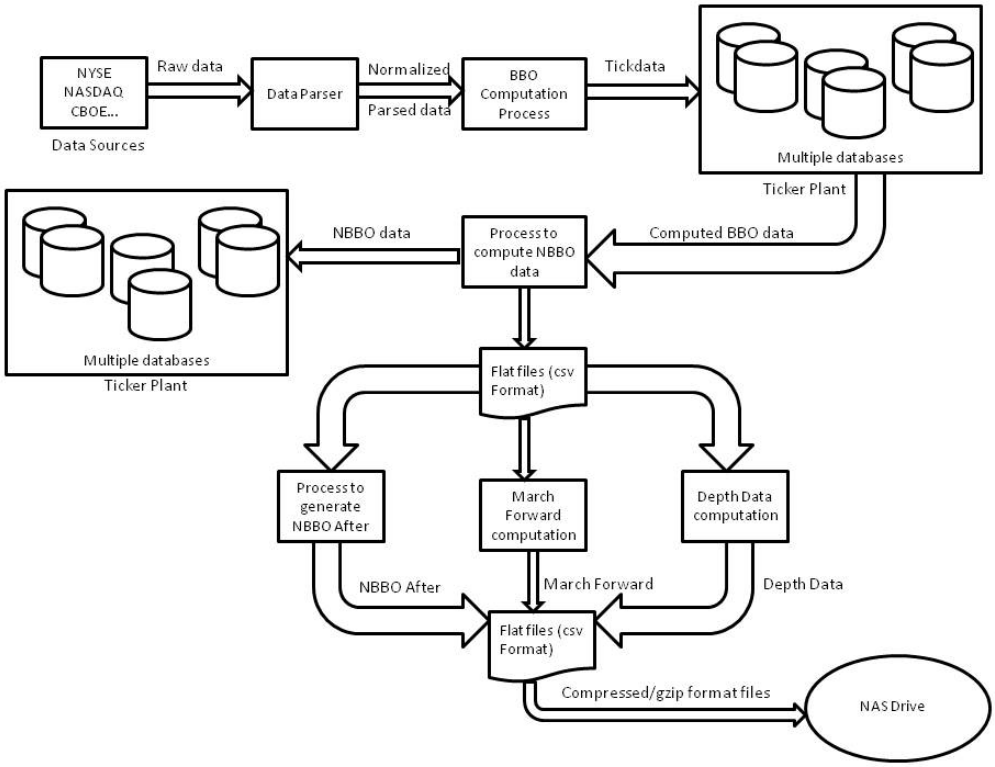
APPENDIX B: Methodology; Statistical Summary and Statistical-Significance Tables

Our Assessment of the Pilot occurred over several months, requiring many concurrently different disciplines including market structure expertise, data science, project-design principles, analytical modeling, visualization, programming languages, econometrics, and flexibility.

Care was taken in the onboarding, munging, and safeguarding of all public, confidential and order-book data and model creation; however, due to the magnitude of the data, set-up and processing time for certain aspects of the project, any notification of changes after April 30, 2018, were weighed against the dataset, field(s) in question and overall expected impact to the analysis as to whether they were later incorporated.

Unless specifically mentioned, the project was performed using four high-performance servers with up to 120 cores and 512 GB of RAM specifically purchased and used for the Assessment and also used to rebuild the inter-market order book from April 2016 through December 2017, as well as high-performance Apple and Lenovo personal computers. Total data capacity across all systems of multiple SSDs and SAS drives was 90 TB.

Access to the project and data was only granted to the team working on it, and non-public data was masked and remained as such in any downstream exploratory data analysis, modeling or ultimate reporting. Tools and techniques used for the databases, order-book rebuild, and custom calculations were highly sophisticated. We used C++ and Percona TokuDB, powered by Fractal Tree Indexing, among others. The graphic below demonstrates the process employed.



One advantage of putting so much computational power in these databases was the downstream ability for other skilled practitioners to then munge additional datasets and prepare them for

further analysis. Further data preparation occurred primarily in Alteryx and R. Exploratory data analysis, visualization, and calculations occurred in Alteryx, Tableau, and R.

The majority of statistical analysis occurred in R, which is a functional programming language with several widely used and well-maintained libraries of statistical computing and graphical packages. A great deal of custom functional programming in R occurred, despite commonly available packages, to set up R to properly work with the very large size of this data and varied datasets, and number of variables in a highly automated fashion while managing memory in parallel to expedite the results and rapidly iterate through our analyses.

This approach enabled us to focus on the most statistically significant results and then also to create spotlight regressions on strata, for example, or custom panel regressions on any combination of left-hand and right-hand side variables with or without interaction effects.

While we are aware of the terrific Stargazer Package in R for the creation of quality output tables worthy of academic journal publication, the volume of regressions run and nature of our process of filtering and re-fitting results, required writing out comma-delimited files for rapid insights and conclusions.

Additional variables were added from our proprietary ticker plant to consider spillover effects.

Data Acquisition and Data Set-Up

Public data was accessed via the website maintained by FINRA for the Pilot or provided by exchange contacts. Proprietary data was provided by exchange contacts or FINRA directly. Order book data was provided by each respective exchange.

Sector classification, VIX Close, Market Capitalization, Average Daily Volume, SPX Close were provided by Rosenblatt's ticker plant or analytic processes. The sector classification uses a common method of classifying securities by typical trading desk set-up. We use 6 common sector groupings for manageability. These are: Energy / Utilities; Financial / REITS; Health Care; Industrials / Materials; Retail / Consumer; and, Technology / Media / Telecom. These are used in some tables with sector codes E, F, H, I, R and T, respectively.

We created a fixed-effect variable called Period which covers the Pre-Pilot and Post-Pilot periods, exclusive of October 2016 throughout. We created a fixed-effect variable called Pre_Spread_Class to distinguish securities into four spread classifications. We created a variable called Source for Exchanges or collectively Finra to include Trading Centers as another variable, as well as maker-taker, taker-maker, and zero-rebate. For certain datasets, we subset the data by order-type and analyze accordingly. We created a symbol ID to enable proper handling of corporate actions such as name or ticker changes.We created a fixed-effect variable called Stratum to follow the strata classification from the Operating Committee.

Certain variables are weighted and the order of operations follows a method to ensure proper panel regression processing. Calculations follow best practices such as those mentioned in Rindl and Werner (2017).

Data-Prep Analysis for R

Raw data from Alteryx contain fields of three different natures with regard to time: fixed over time; changes daily (exactly 1 observation per day); and, changes within a day (multiple observations per day).

We next roll up the observation of the multiple observation variables to daily levels by either summing if it's a count, size, dollar, or shares variable or averaging if it's a price or percent variable (or a variable that doesn't make sense to sum). We did this for C.I, B.II, TAQ, and B.IV data. For B.I data, we first calculated the daily sums for each multiple observations variable. Then, we weight several variables. Whenever 0 / 0, we set the result as 0, or non-zero, we set the result to NA.

We then merge the rolled-up multiple observation variables and single observation variables by symbol id and date. We then calculate weekly and monthly mean of the aforementioned variables. For this report, we found meaningful insights were gleaned at the monthly level throughout. We then create a time index for the time frequency of interest such as daily, weekly or monthly, as well as a seasonality adjustment where practical.

Panel Data Linear Models (PLM)

The Panel Data Econometrics in R (The PLM Package in R is used among many others.)

Prep Data for Model Fitting

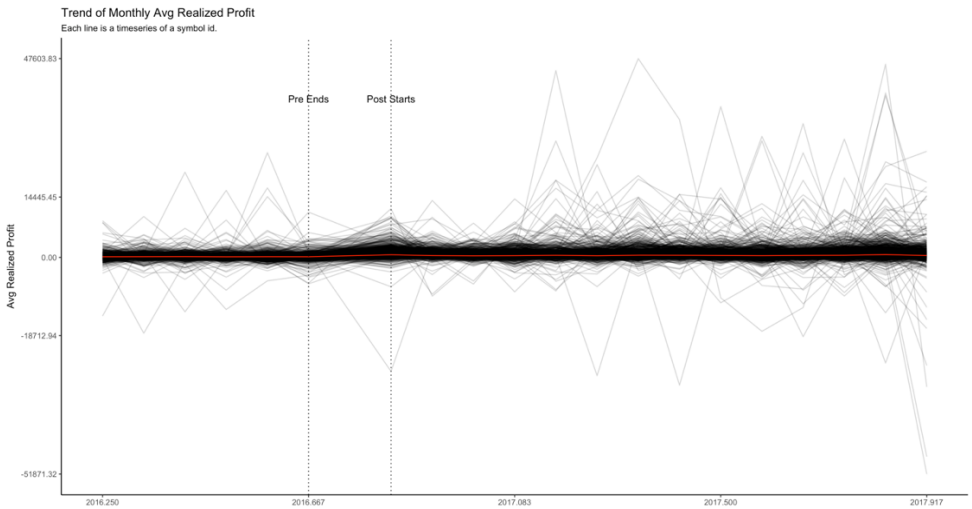
We prepare the data for random effects model fitting (our method of analysis to preserve categorical variables) by joining the fixed fields and the daily varying fields, and removing records with NA or NaN in the y-variables. We drop constant variables, variables missing 80+% of their values, standardize the continuous x-variables by subtracting the mean and dividing by one standard deviation. We find the continuous x-variables that are highly correlated (0.8+) with all the others and exclude them when auto-selecting the best model.

Exploratory Analysis

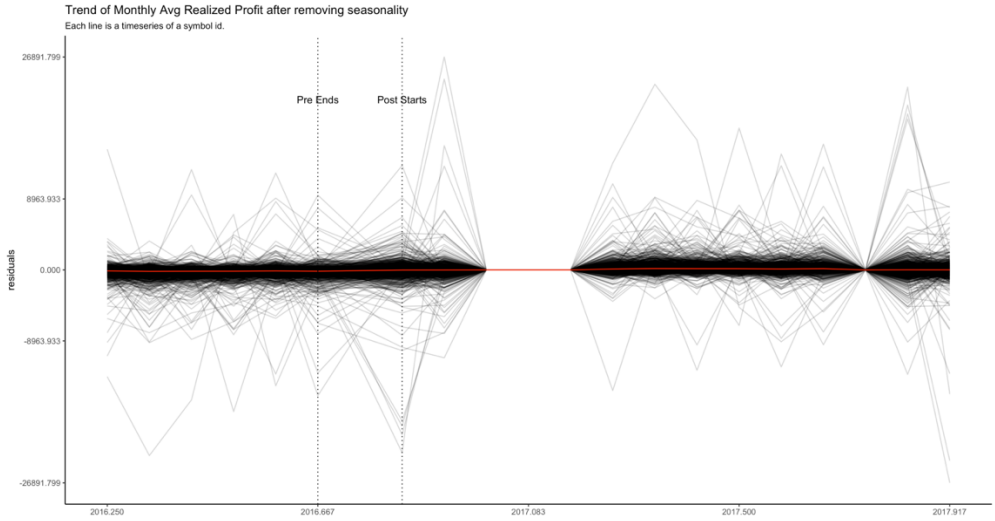
We plot each y over time for each symbol id and highlight their average trend in red, and then we remove the seasonality effect and plot the residual y over time, once again, for each symbol id and highlight their average trend in red.

By comparing these two plots, we can decide if it makes sense to include or not seasonality in model fitting. If the seasonality adjusted plot shows a clearer trend than the first-pass, we include seasonality in the model.

Sample trend plot for realized profit.



Sample seasonality-adjusted plot for realized profit.



Model Fitting

We auto-select the best model, described generally below, due to the very large number of combinations, and possible regressors. We first segment the data by each level of stratum, and run a simple interaction model of group*period to test the DID effects within each level of stratum since spotlighting this was important to the pilot. The user can repeat this for sector or pre_spread_class.

We also fit models of our own specification whereby we can specify the LHS (any y-variable in the data) and RHS such as "stratum + sector + pre_spread_class + group*period".

The Best Model

When fitting a model, if we're interested in a set of regressors, we'd always include them. Let's call them primary regressors. In our case, the primary regressors are stratum, sector, pre_spread_class, group, and group*period interaction. All of them are categorical.

And, we're interested in the differences amongst their levels. So, our first attempt is to build a model with only primary regressors.

However, we also have other data fields provided or pre-calculated. These we will call ancillary regressors. In the presence of (or adjusted by) some or all of the ancillary regressors, what are their differences amongst the levels of the primary regressors? To answer this, we throw all the ancillary regressors in the model in addition to the primary ones.

The resulting model is a full model because it includes all available fields, but we don't use the full model as the final model because some of the ancillary regressors are not significant.

We aim for the most parsimonious model, so we exclude the not-significant ancillary regressors and refit. We repeat this process until all terms in the model are significant. This is "The Best Model." Its best in the sense that it includes all primary regressors and all the ancillary regressors included are significant. While it is analogous to machine learning, we are not using it for

prediction per se; rather, we just use the statistical significance to drop regressors until all remaining are significant.

Standard errors are as reported and not explicitly adjusted for clustering. We utilize a hierarchical modeling approach and believe it adjusts this automatically because they will cluster based on id.

The following tables summarize the various statistics we calculated from both Pilot data and our own tick data for the US equity market, as well as differences between Test Groups and the Control Group, plus the individual Strata within each, and the statistical significance of any such differences.

Summary tables show the various statistics we calculated. Some of these display differences between the Control Group and the Test Groups. Others illustrate stratum-level differences. There also are several tables showing statistical significance of these differences for the various factors we measured in assessing the Pilot.

These tables begin on the next page.

Table 1: NBBO Depth (shares), Difference-in-Difference Statistical Test

term	estimate	se	sig
Post G1 - C DIFF Pre G1 - C	0.41322788	0.02080336	***
Post G2 - G1 DIFF Pre G2 - G1	0.00291417	0.02555912	
Post G3 - G2 DIFF Pre G3 - G2	0.1774078	0.02588621	***

Table 2: NBBO Depth (dollars), Difference-in-Difference Statistical Test

term	estimate	se	sig
Post G1 - C DIFF Pre G1 - C	0.77770739	0.02012822	***
Post G2 - G1 DIFF Pre G2 - G1	0.03502717	0.02472959	
Post G3 - G2 DIFF Pre G3 - G2	0.24156415	0.02504582	***

Table 3: Average Daily Volume, Difference-in-Difference Statistical Test

term	estimate	se	sig
Post G1 - C DIFF Pre G1 - C	-0.1385355	0.0180126	***
Post G2 - G1 DIFF Pre G2 - G1	0.04945192	0.02212888	**
Post G3 - G2 DIFF Pre G3 - G2	0.08774806	0.02241149	***

Table 4: Average Daily Value Traded, Difference-in-Difference Statistical Test

term	estimate	se	sig
Post G1 - C DIFF Pre G1 - C	-0.0737214	0.01574166	***
Post G2 - G1 DIFF Pre G2 - G1	0.037061	0.01933902	*
Post G3 - G2 DIFF Pre G3 - G2	0.05837186	0.0195862	***

Table 5: Average Daily Trade Count, Difference-in-Difference Statistical Test

term	estimate	se	sig
Post G1 - C DIFF Pre G1 - C	-0.2384819	0.01425649	***
Post G2 - G1 DIFF Pre G2 - G1	0.03622174	0.01751445	**
Post G3 - G2 DIFF Pre G3 - G2	0.1092214	0.01773832	***

Table 6: Average Trade Size, Difference-in-Difference Statistical Test

term	estimate	se	sig
Post G1 - C DIFF Pre G1 - C	0.00575021	0.02770937	
Post G2 - G1 DIFF Pre G2 - G1	-0.0046871	0.03404118	
Post G3 - G2 DIFF Pre G3 - G2	0.02648479	0.03447446	

Table 7: Quoted Spread, in bps, Difference-in-Difference Statistical Test

term	estimate	se	sig
Post G1 - C DIFF Pre G1 - C	0.13095916	0.0135577	***
Post G2 - G1 DIFF Pre G2 - G1	0.01337113	0.01665712	
Post G3 - G2 DIFF Pre G3 - G2	-0.0151571	0.01687059	

Table 8: Market-Maker Activity, Difference-in-Difference by Group

	Dependent Variable				
	Shares Executed	Realized Profit	Unrealized Profit	Eod	Vwap
Post G1 - C DIFF Pre G1 - C	5492.562** (2547.632)	272.621*** (39.397)	80.937 (78.27)	36.93 (290.185)	7.969*** (1.38)
Post G2 - G1 DIFF Pre G2 - G1	2996.713 (2764.683)	-27.149 (45.611)	-85.285 (96.494)	193.152 (335.516)	-0.113 (1.463)
Post G3 - G2 DIFF Pre G3 - G2	2829.942 (2845.362)	75.009 (46.356)	-24.565 (97.618)	384.656 (339.935)	-8.196*** (1.515)
R-squared	0.694	0.119	0.018	0.105	0.867
Adjusted R-squared	0.693	0.118	0.016	0.103	0.867

[a] *p<0.1; **p<0.05; ***p<0.01

Eod = End-of-Day Excess/Deficit (inventory held), in shares; Vwap = dollar value of Eod; Standard Errors in parenthesis

Table 9: Statistical Tests, Group Level, for Pilot B.I (Market Quality) Data

Table of coefficients for the DID terms

B.I

2018-06-21

Model choice: Random effects PLM models fitted using the PLM R package.

Table 1: The dependent variables are monthly means, Number of stocks: 2073, Number of observations per stock: 20

Dependent Variable					
	Post G1 - C DIFF Pre G1 - C	Post G2 - G1 DIFF Pre G2 - G1	Post G3 - G2 DIFF Pre G3 - G2	R-squared	Adjusted R-squared
Cncl 0 100micros	-153823.521*** (41205.143)	86258.285* (49994.208)	-370489.543*** (58216.793)	0.284	0.282
Cncl 100micros 1ms	-200441.695*** (8383.093)	14787.763 (9990.407)	62330.059*** (11706.458)	0.279	0.276
Cncl 100ms 1s	-187480.675 (159192.011)	-264853.997 (192108.287)	81261.259 (221548.497)	0.069	0.067
Cncl 1ms 100ms	-622764.073*** (53537.434)	44408.208 (63956.955)	-119612.689 (74816.745)	0.245	0.243
Cncl 1s 30s	-1456429.435*** (216269.503)	-59250.737 (258979.105)	829766.778*** (298734.039)	0.218	0.216
Cncl 30m	209202.897 (355013.596)	530781.816 (427343.807)	-1162576.622** (487610.501)	0.175	0.173
Cncl 30s 60s	42744.373 (221029.31)	-1093320.015*** (266048.17)	1819679.045*** (304916.051)	0.026	0.025
Cncl 5m 30m	75255.35*** (11733.045)	-3408.249 (14203.663)	-107100.746*** (16664.333)	0.41	0.409
Cncl 60s 5m	95906.177** (38026.186)	125823.358*** (45514.623)	-241103.86*** (52546.629)	0.368	0.366
Cncl Shrs Ct	-2149780.685*** (652657.648)	-656523.65 (773789.876)	1079371.345 (894707.308)	0.278	0.276
Exctn 0 100micros	4937.838*** (1184.919)	-957.111 (1416.291)	1669.981 (1650.939)	0.831	0.831
Exctn 100micros 1ms	-6607.958*** (407.582)	2900.482*** (483.905)	2857.792*** (575.989)	0.591	0.589
Exctn 100ms 1s	-1357.536*** (408.469)	253.258 (488.801)	874.407 (559.974)	0.702	0.701
Exctn 1ms 100ms	4052.816** (1625.645)	847.263 (1949.945)	-960.903 (2240.653)	0.734	0.734
Exctn 1s 30s	-9440.358*** (1233.793)	1435.445 (1474.134)	3665.169** (1706.449)	0.705	0.704
Exctn 30m	-1099.297* (590.631)	213.78 (703.853)	-1025.501 (819.495)	0.687	0.686
Exctn 30s 60s	-2757.583*** (376.526)	1150.202** (451.355)	-54.356 (515.438)	0.632	0.63
Exctn 5m 30m	2394.68*** (519.321)	-32.686 (618.545)	-1436.943** (721.679)	0.702	0.701
Exctn 60s 5m	-1398.621** (637.55)	252.962 (758.649)	702.225 (890.204)	0.697	0.696
Final Hidden Pt	-140.838*** (24.872)	95.631*** (29.899)	-1122.594*** (35.381)	0.961	0.961
Opp Sd Qt Sz	351425.657*** (27609.615)	-51695.928 (32888.223)	-116791.343*** (38724.585)	0.284	0.282
Order Count	-21897.334*** (693.734)	2239.318*** (824.508)	-6927.225*** (978.356)	0.593	0.592
Order Shares Ct	-2165478.77*** (653316.647)	-659523.221 (774575.858)	1159475.997 (896250.211)	0.286	0.284
Orders Ex Away	-2493.94 (1548.162)	870.698 (1847.629)	16.434 (2134.273)	0.753	0.752
Orders Ex Tc	-10614.684*** (3788.195)	5960.391 (4532.974)	6936.281 (5205.514)	0.845	0.844
Orders Un Ex	186180.621 (352695.365)	586175.363 (424525.491)	-1103557.67** (484238.138)	0.163	0.161
Orgnl Hidden Pt	-525.063*** (35.197)	401.076*** (41.859)	-932.198*** (49.376)	0.979	0.979
Orgnl Order Sz	9.083*** (1.252)	4.943*** (1.492)	-7.768*** (1.763)	0.942	0.941
Out Qt Ex Ct	-1718.814*** (247.369)	377.42 (295.665)	808.303** (341.358)	0.517	0.515
Out Qt Ex Wa Tm Pd	-425.079* (217.834)	-273.267 (266.071)	-666.942** (270.197)	0.31	0.308
Out Qt Ex Wa	-0.448 (0.401)	0.15 (0.486)	-0.96* (0.535)	0.011	0.01
Price Imp Ct	2029.682** (948.573)	-2194.984* (1132.782)	7411.323*** (1311.3)	0.718	0.717
Qt Ex Wa Tm Pd	236.463*** (51.425)	39.961 (61.783)	-612.259*** (63.194)	0.144	0.141
Quote Ex Ct	-5601.008*** (582.142)	4218.406*** (694.015)	-4470.421*** (818.533)	0.645	0.644
Same Sd Qt Sz	380983.648*** (29721.15)	-60110.863* (35417.349)	-105900.979** (41680.538)	0.276	0.273
Wa Bbo Spd	66.113 (41.346)	91.573* (50.452)	173.856*** (56.254)	0.015	0.013
Wa Eff Spd	0.325 (0.378)	0.145 (0.46)	-0.741 (0.466)	0.06	0.058
Wa Nbbo Spd	-39.047 (38.239)	54.279 (46.92)	10.033 (47.557)	0.008	0.007
Wa Price Imp	0.18*** (0.016)	0.006 (0.018)	0.055** (0.022)	0.59	0.589
Wa Time Pd	-165.81** (79.404)	-191.258** (96.553)	360.063*** (111.01)	0.236	0.234
Wars Ex Tc	0.174 (0.284)	0.139 (0.35)	-0.242 (0.354)	0.056	0.055

[a] *p<0.1; **p<0.05; ***p<0.01

Table 10: Stratum-Level DID Tests for Pilot C.I (Market-Maker Participation & Profits) Data

C1

Stratum	Term	eod	realized_profit	shares_executed	unrealized_profit	vwap
stratum_H_H_H	Post G1 - C DIFF Pre G1 - C	42.631926 908.778564	163.533585 175.964040	43,220.068691 9,342.159849 ***	332.627250 376.540257	-6.051589 13.814806
	Post G2 - G1 DIFF Pre G2 - G1	1,018.723624 1,111.849246	125.340898 215.284001	6,134.814805 11,429.707734	-751.917096 460.679881	54.402048 16.901787 ***
	Post G3 - G2 DIFF Pre G3 - G2	-618.774867 1,118.687545	720.090451 216.608080 ***	-39,057.694037 11,500.004819 ***	-210.343500 463.513239	-7.240694 17.005739
stratum_H_H_L	Post G1 - C DIFF Pre G1 - C	952.121550 708.229734	-64.139788 106.107951	-3,535.591207 4,568.247799	-10.978904 253.366178	95.301285 61.868954
	Post G2 - G1 DIFF Pre G2 - G1	-269.106996 844.510134	-1.118909 126.525668	14,228.915776 5,447.288322 ***	-25.738689 302.119912	-131.632272 73.774026 *
	Post G3 - G2 DIFF Pre G3 - G2	103.886309 781.864456	-367.670952 117.140006 ***	-16,306.384865 5,043.209018 ***	-416.775374 279.708687	-53.209329 68.301476
stratum_H_H_M	Post G1 - C DIFF Pre G1 - C	67.539447 743.040621	-44.460210 99.541268	-3,637.631361 2,401.254731	11.864138 150.556738	-0.776884 14.315487
	Post G2 - G1 DIFF Pre G2 - G1	525.018569 896.576213	-47.647978 120.109628	6,628.183159 2,897.429578 **	-10.445338 181.666501	-6.179288 17.273517
	Post G3 - G2 DIFF Pre G3 - G2	-274.631573 903.326399	-68.358534 121.013915	-13,303.096566 2,919.243884 ***	-54.254525 183.034241	-13.092251 17.403567
stratum_H_L_H	Post G1 - C DIFF Pre G1 - C	-27,917.478605 10,473.632406 ***	211.958646 618.701438	34,319.840459 117,893.248614	910.471809 914.112712	36.509211 12.697951 ***
	Post G2 - G1 DIFF Pre G2 - G1	19,844.218206 12,324.289850	216.454574 728.024009	-113,100.617148 138,724.609662	85.916067 1,075.633514	-31.437479 14.941639 **
	Post G3 - G2 DIFF Pre G3 - G2	5,619.616319 12,324.289850	-115.886106 728.024009	-77,741.801158 138,724.609662	986.172455 1,075.633514	-27.733689 14.941639 *
stratum_H_M_H	Post G1 - C DIFF Pre G1 - C	-345.519680 1,655.563254	716.232970 165.470947 ***	21,211.210699 15,415.859785	-11.819422 235.212364	-23.084342 6.594532 ***
	Post G2 - G1 DIFF Pre G2 - G1	-51.853994 2,065.762640	169.486724 206.469731	-14,330.628322 19,235.451812	213.767191 293.490999	8.406503 8.228462
	Post G3 - G2 DIFF Pre G3 - G2	4,002.912761 2,148.632912 *	-311.537052 214.752485	6,815.938605 20,007.102480	-457.393914 305.264704	-43.396680 8.558555 ***
stratum_H_M_M	Post G1 - C DIFF Pre G1 - C	-784.494185 1,342.543646	105.679714 86.537437	19,173.600458 7,657.410578 **	-264.611603 166.106815	9.211896 9.127140
	Post G2 - G1 DIFF Pre G2 - G1	1,260.359290 1,711.414062	-71.314528 110.314020	-7,402.779977 9,761.321490	363.908588 211.745473 *	22.548587 11.634867 *
	Post G3 - G2 DIFF Pre G3 - G2	-77.070556 1,753.162003	-31.918889 113.005002	-26,249.989569 9,999.437494 ***	-233.162108 216.910755	-72.235560 11.918686 ***
stratum_L_H_L	Post G1 - C DIFF Pre G1 - C	-206.748972 228.773710	-22.691399 18.983619	-129.276587 438.601156	72.120799 145.218202	-3.051443 11.131110
	Post G2 - G1 DIFF Pre G2 - G1	-81.529263 277.058722	24.594876 22.990304	-453.754216 531.172379	-98.259499 175.867977	1.118983 13.480444
	Post G3 - G2 DIFF Pre G3 - G2	48.749741 286.783022	-61.434688 23.797226 ***	1,038.984853 549.815647 *	8.740848 182.040651	-21.232743 13.953585
stratum_L_L_H	Post G1 - C DIFF Pre G1 - C	1,335.703325 2,145.670251	702.917298 301.240790 **	-108,699.872578 50,114.088502 **	-461.219448 771.111569	6.365856 6.434827

Table 10: Stratum-Level DID Tests for Pilot C.I Data, cont'd

C1

Stratum	Term	eod	realized_profit	shares_executed	unrealized_profit	vwap
stratum_L_L_H		1,474.222629	296.986666	111,589.124708	402.724196	9.793650
	Post G2 - G1 DIFF Pre G2 - G1	2,740.734877	384.784726	64,012.366345 *	984.966058	8.219415
		414.582231	-986.324145	-62,901.279392	-734.020521	-25.735621
	Post G3 - G2 DIFF Pre G3 - G2	3,213.796515	451.200086 **	75,061.152982	1,154.975081	9.638119 ***
stratum_L_L_L		-586.975892	-97.040171	-34,267.898917	-32.790703	6.204124
	Post G1 - C DIFF Pre G1 - C	307.821442 *	62.403749	10,314.719885 ***	102.580599	1.246455 ***
		313.467423	35.822498	-168.105597	-37.014930	9.401850
	Post G2 - G1 DIFF Pre G2 - G1	380.086483	77.052977	12,735.955439	126.662976	1.539036 ***
		84.735644	-10.790910	4,477.809458	-13.779114	-6.015401
	Post G3 - G2 DIFF Pre G3 - G2	380.086483	77.052977	12,735.955439	126.662976	1.539036 ***
stratum_L_L_M		161.255218	8.714423	-31,224.462950	-178.094354	-10.435460
	Post G1 - C DIFF Pre G1 - C	896.994633	131.697645	21,361.977114	225.254988	3.684451 ***
		-122.366994	-217.989705	-3,280.178931	-64.560462	14.470545
	Post G2 - G1 DIFF Pre G2 - G1	1,219.333189	179.023713	29,038.487780	306.201255	5.008474 ***
		-300.751942	185.281616	15,321.953393	85.160630	-7.992190
	Post G3 - G2 DIFF Pre G3 - G2	1,320.429962	193.866842	31,446.113051	331.588868	5.423734
stratum_L_M_L		-59.353829	8.303557	753.575247	5.044007	10.231807
	Post G1 - C DIFF Pre G1 - C	180.409012	17.641623	1,161.527103	47.751409	3.109039 ***
		-74.047124	27.499664	160.198255	-21.849147	-9.481076
	Post G2 - G1 DIFF Pre G2 - G1	217.123373	21.232439	1,397.964191	57.468885	3.741916 **
		57.582610	-50.675473	367.435252	68.620137	-4.472002
	Post G3 - G2 DIFF Pre G3 - G2	217.165848	21.236717 **	1,398.249246	57.480081	3.742681
stratum_L_M_M		134.871443	-84.086667	10,364.564164	-88.395814	18.716383
	Post G1 - C DIFF Pre G1 - C	615.699769	75.803149	5,421.614333 *	107.914247	8.658886 **
		250.869682	53.392422	-5,112.362436	12.582358	-27.559178
	Post G2 - G1 DIFF Pre G2 - G1	754.075135	92.839518	6,640.094350	132.167420	10.604926 ***
		441.825584	16.561567	-1,781.983184	-18.323629	1.713283
	Post G3 - G2 DIFF Pre G3 - G2	754.075135	92.839518	6,640.094350	132.167420	10.604926
stratum_M_H_H		1,319.510338	1,391.573014	113,118.630666	254.836602	-177.168805
	Post G1 - C DIFF Pre G1 - C	1,847.804628	999.122266	28,483.463877 ***	1,452.145545	46.977175 ***
		-1,868.070851	-647.301282	-95,069.025968	1,323.095351	79.600186
	Post G2 - G1 DIFF Pre G2 - G1	2,208.548956	1,194.179517	34,044.250919 ***	1,735.645900	56.148464
		-1,253.645883	1,110.269931	61,500.269377	-722.954582	31.518544
	Post G3 - G2 DIFF Pre G3 - G2	2,208.548956	1,194.179517	34,044.250919 *	1,735.645900	56.148464
stratum_M_H_L		-149.780767	-19.011915	-662.299501	-116.163559	28.854282
	Post G1 - C DIFF Pre G1 - C	247.887212	63.926290	676.236508	290.291103	13.850805 **
		-20.820037	14.113228	508.047306	47.764468	4.369486
	Post G2 - G1 DIFF Pre G2 - G1	305.928916	78.892553	834.543542	358.265056	17.093257
		-43.585627	-59.098151	-743.685601	-42.078731	-49.178923
	Post G3 - G2 DIFF Pre G3 - G2	305.928916	78.892553	834.543542	358.265056	17.093257 ***
stratum_M_H_M		146.298715	-31.394853	10,865.947210	80.652551	60.214073
	Post G1 - C DIFF Pre G1 - C	1,035.129010	90.286497	4,049.138528 ***	369.396890	16.183987 ***
		1,594.127024	-85.000845	-957.136546	537.763428	-68.482120
	Post G2 - G1 DIFF Pre G2 - G1	1,250.037039	109.031303	4,889.799326	446.089125	19.544021 ***

Table 10: Stratum-Level DID Tests for Pilot C.I Data, cont'd

C1

Stratum	Term	eod	realized_profit	shares_executed	unrealized_profit	vwap
stratum_M_H_M		-2,444.699958	75.692656	-11,470.921584	-935.881680	-21.033323
	Post G3 - G2 DIFF Pre G3 - G2	1,250.037039 *	109.031303	4,889.799326 **	446.089125 **	19.544021
stratum_M_L_H		699.072488	600.893531	-60,798.273580	312.306113	35.182297
	Post G1 - C DIFF Pre G1 - C	2,377.690057	147.261883 ***	23,350.390111 ***	416.030060	6.468877 ***
	Post G2 - G1 DIFF Pre G2 - G1	-2,144.407028 3,161.395461	-2.707347 195.800562	23,568.042658 31,046.862941	-325.383938 553.156850	-14.627309 8.601070 *
	Post G3 - G2 DIFF Pre G3 - G2	2,191.125659 3,161.395461	37.470245 195.800562	40,028.036960 31,046.862941	115.411410 553.156850	-2.595920 8.601070
stratum_M_L_L		-322.682623	15.277723	-16,697.924592	4.443899	-5.253100
	Post G2 - G1 DIFF Pre G2 - G1	6,266.622983	59.358351	18,880.610292	365.951806	9.894419
	Post G3 - G2 DIFF Pre G3 - G2	6,858.324428 8,782.858709	-240.868290 83.192497 ***	66,622.273196 26,461.737522 **	186.326894 512.892353	-15.296523 13.867322
stratum_M_L_M		2,643.716800	343.481295	-12,405.363202	1,054.621641	6.615976
	Post G1 - C DIFF Pre G1 - C	2,041.860222	223.582013	18,094.459570	516.973927 **	5.829437
	Post G2 - G1 DIFF Pre G2 - G1	-1,149.058337 2,428.047217	-159.813316 265.869952	2,907.377850 21,516.588149	-960.903490 614.754407	-12.484931 6.931926 *
	Post G3 - G2 DIFF Pre G3 - G2	452.893027 2,298.456616	-37.682691 251.679846	18,507.819618 20,368.197143	-227.240814 581.943516	-5.197797 6.561953
stratum_M_M_H		-1,197.994023	659.688761	-42,909.649653	-715.416295	35.864408
	Post G1 - C DIFF Pre G1 - C	1,530.374393	354.982956 *	28,052.478709	751.209841	10.930580 ***
	Post G2 - G1 DIFF Pre G2 - G1	-1,745.599106 1,847.655121	-242.002145 428.578837	102,240.043244 33,868.382914 ***	462.013784 906.952387	-1.706546 13.196733
	Post G3 - G2 DIFF Pre G3 - G2	3,001.003358 1,878.196944	-112.621323 435.663265	-167,096.508652 34,428.228823 ***	1,966.656544 921.944352 **	-40.156532 13.414876 ***
stratum_M_M_L		-86.535661	7.993781	2,104.653847	32.761622	15.428290
	Post G1 - C DIFF Pre G1 - C	407.376722	42.056926	2,258.462319	121.769184	6.198936 **
	Post G2 - G1 DIFF Pre G2 - G1	-85.321916 506.435718	-7.169895 52.283619	3,416.650606 2,807.637065	-107.206161 151.378958	-2.700969 7.706288
	Post G3 - G2 DIFF Pre G3 - G2	-0.236653 506.435718	56.302297 52.283619	391.289795 2,807.637065	99.654273 151.378958	7.658614 7.706288
stratum_M_M_M		446.952031	84.774266	9,587.827051	412.689145	2.962697
	Post G1 - C DIFF Pre G1 - C	635.462915	124.295446	11,636.516361	290.232913	5.698941
	Post G2 - G1 DIFF Pre G2 - G1	-589.973463 778.279946	19.785737 152.230210	23,424.048190 14,251.763734	-284.830293 355.461272	3.271645 6.979749
	Post G3 - G2 DIFF Pre G3 - G2	247.894145 792.561503	-151.308140 155.023658	-47,754.460740 14,513.285799 ***	-156.086897 361.984041	-5.081627 7.107828

Table 11: "Best Model" Tests for Pilot B.I (Market Quality) Data

Best Model - B.I

		Order Type													
Term	Yvar	10	11	12	13	14	15	16	17	18	19	20	21	22	all
Post G1 - C DIFF Pre G1 - C	cnd_0_100micros-coefs		-4,393.7992 1,222.1363 ***	-33,154.8194 2,302.2348 ***	-19,062.0851 1,498.2572 ***	-16,051.3654 1,266.0241 ***	-723.0621 25.5626 ***	-41,176.2667 1,513.4329 ***	-1,340.1573 155.8437 ***					-2,794.2564 1,468.5218 *	-140,174.5874 41,505.6399 ***
	cnd_1ms_100ms-coefs			-221,407.0767 5,355.5863 ***	-326,976.9811 9,959.0032 ***	-81,037.5884 4,326.7938 ***	-866.9235 95.6672 ***	-172,423.0227 4,024.7001 ***	-14,198.5730 2,380.5967 ***			-863.5011 443.8406 *	-2,381.1660 1,284.8847 *	-22,179.6092 4,236.6268 ***	-662,212.4493 53,281.6604 ***
	cnd_1s_30s-coefs	24,584.8687 8,060.5939 ***		-521,688.4194 10,317.3620 ***	-544,709.1008 10,930.9263 ***	-206,588.5916 8,903.8807 ***	-665.4534 94.7417 ***	-364,895.8693 6,651.5983 ***	-20,916.8008 4,431.2158 ***				-2,118.9117 876.6232 **	-164,148.9968 20,161.9562 ***	-1,442,076.7240 215,116.5417 ***
	cnd_5m_30m-coefs		4,959.3580 811.4861 ***	-17,747.9637 369.9042 ***	-22,884.1805 1,177.6368 ***	-18,884.6448 991.1689 ***	-93.9580 10.7137 ***	8,364.0239 219.0256 ***	749.7007 429.1522 *	98,840.7527 10,267.7634 ***			-755.5598 160.8879 ***		78,986.3755 11,737.6337 ***
	cnd_30m-coefs		-245,786.8772 143,161.0178 *	-383,295.7291 90,229.6115 ***	248,310.7300 51,882.5913 ***	94,324.0454 12,770.2037 ***	306.5287 167.5087 *	2,384.5101 75.9670 ***		-313,811.0682 102,364.0938 ***		-33,419.5784 1,674.0466 ***		23,234.9842 11,674.3270 **	
	cnd_30s_60s-coefs		-23,733.3464 8,720.4872 ***	-47,486.0129 2,366.6777 ***	-40,491.4687 4,529.4264 ***	-32,711.8410 2,218.0665 ***	-79.3711 8.5318 ***	-12,917.4381 482.6463 ***						-22,660.6901 2,999.0529 ***	
	cnd_60s_5m-coefs			-54,909.8707 2,106.3783 ***	-29,666.1695 3,365.9526 ***	-50,781.7682 2,905.0221 ***	-138.3170 15.4504 ***	5,625.3380 541.3858 ***		182,030.3536 34,479.4598 ***			-668.0206 108.4439 ***	-22,533.2143 4,344.2879 ***	100,299.9466 37,937.8666 ***
	cnd_100micros_1ms-coefs		-3,782.4549 358.3775 ***	-44,625.0321 2,200.8180 ***	-85,462.1190 3,917.4635 ***	-41,558.5836 1,932.0367 ***	-505.7090 77.2009 ***	-67,831.6366 1,951.3033 ***						-8,626.6441 841.4130 ***	-216,106.4973 8,325.8666 ***
	cnd_100ms_1s-coefs			-131,497.8496 3,518.6096 ***	-165,250.0608 4,781.4992 ***			-103,174.6842 2,541.9498 ***		-111,136.9481 37,704.9215 ***		-1,603.6868 328.7534 ***	-518.1042 214.7524 **		
	cnd_shrs_ct-coefs	31,867.1853 18,828.9838 *		-1,395,265.4330 94,619.0945 ***	-1,019,287.6130 60,621.1740 ***	-332,832.1676 25,877.1423 ***	-2,838.4074 314.3899 ***	-746,683.9966 15,387.0515 ***				-36,601.6652 2,503.1346 ***		-136,242.8971 71,701.6581 *	-2,351,206.8570 649,831.9095 ***
	exctn_0_100micros-coefs	239.3737 55.8207 ***	-5,746.0501 776.2228 ***			53.2630 20.1299 ***	11.2769 1.4686 ***	-0.1738 0.0668 ***	1,006.7065 133.9314 ***	6,026.4227 301.0912 ***					
	exctn_1ms_100ms-coefs	3,025.0142 783.9107 ***	5,609.3325 672.6590 ***	367.4084 73.2299 ***	-865.3004 54.0849 ***	-101.9570 13.1788 ***	-15.6376 5.1645 ***	-25.9993 5.5274 ***		957.6645 197.8549 ***				6.8472 2.7744 **	3,692.2288 1,628.7423 **
	exctn_1s_30s-coefs		649.7856 225.7128 ***	-479.6580 151.4965 ***	-8,943.7994 301.6379 ***	-1,141.0630 122.9590 ***		-58.1529 10.8902 ***	-232.6060 79.6424 ***	823.8943 204.0485 ***			19.6182 3.9266 ***	61.8814 24.5790 **	-12,447.7101 1,225.9435 ***
	exctn_5m_30m-coefs		88.3599 51.9336 *		1,307.4513 154.9536 ***	-367.3481 91.0899 ***	-28.4465 3.9504 ***		138.1076 25.5623 ***	1,185.3466 273.0984 ***				234.7816 130.8393 *	1,330.8553 515.4504 ***
	exctn_30m-coefs		-225.4170 101.7770 **	-224.5372 31.0144 ***		-230.5388 76.5870 ***	-9.9255 1.4774 ***			1,111.3441 480.4307 **			42.3164 13.5898 ***	281.5276 93.1098 ***	-2,927.3292 584.2363 ***
	exctn_30s_60s-coefs			-127.3190 31.4493 ***	-2,613.0056 89.6365 ***	-528.6113 48.6924 ***	-8.4227 2.0103 ***	-12.5014 1.9009 ***	-58.2871 22.3799 ***	444.6405 78.3158 ***					-3,284.9006 375.4653 ***
	exctn_60s_5m-coefs		127.4197 57.9316 **	-88.9503 47.4619 *	-1,784.1848 186.1163 ***	-1,161.7910 109.4976 ***	-27.7900 4.7625 ***	-14.3894 3.7651 ***	112.0082 35.1068 ***	1,581.8570 202.8859 ***			10.0103 4.4191 **		-2,669.3661 634.0152 ***
	exctn_100micros_1ms-co...		-6,771.6079 378.5361 ***	314.0392 95.0540 ***	-493.9249 134.9604 ***		-13.3681 4.8399 ***	-0.5900 0.2756 **		-100.9971 13.9453 ***				18.0035 8.0859 **	-7,497.3954 406.2530 ***
	exctn_100ms_1s-coefs		864.6295 129.2780 ***	-106.0187 54.1876 *	-1,173.7360 63.4022 ***	-128.8869 13.2437 ***		-9.7106 4.7114 **		217.4873 74.7357 ***		-167.9393 69.1370 **	36.9354 6.3777 ***		-1,578.6976 406.9203 ***
	final_hidden_pt-coefs	-0.2892 0.0956 ***	-0.2491 0.0682 ***	-3.2919 0.3725 ***	0.9967 0.4626 **	1.1439 0.6434 *	0.0392 0.0129 ***	2.6812 0.9299 ***				0.5309 0.2599 **	-1.4345 0.4898 ***	-4.4357 1.1887 ***	-2.5564 0.4472 ***
	opp_sd_qt_sz-coefs		-1.7255 0.5423 ***								0.0009 0.0003 ***			0.0634 0.0096 ***	0.0416 0.0025 ***
	order_count-coefs		413.7651 79.2852 ***	-9,813.2369 173.4616 ***	-3,072.2916 90.8955 ***	-3,946.8048 127.0037 ***	-25.4685 2.5493 ***	-1,895.9029 42.1574 ***	-481.2866 33.3519 ***	-5,400.7569 360.5211 ***		-19.0573 4.4020 ***		-1,799.7629 101.2259 ***	-24,252.2866 688.7690 ***
	order_shares_ct-coefs	34,678.9826 18,882.2984 *	-335,522.8135 199,639.4258 *	-1,396,481.6460 94,683.8832 ***	-1,031,314.6860 60,725.6251 ***	-335,773.9013 25,965.5200 ***	-2,935.2331 322.2577 ***	-746,806.6625 15,390.0295 ***				-37,019.0071 2,752.9349 ***		-134,184.0602 71,708.5351 *	-2,348,108.7010 650,390.9163 ***
	orders_ex_away-coefs		2,760.5213 548.6478 ***	420.1304 86.3536 ***	-285.2520 130.6238 **								22.1692 7.0105 ***	263.5625 67.7926 ***	-5,073.3094 1,538.4342 ***
	orders_ex_tc-coefs	2,878.7924 668.6213 ***	-8,212.2491 1,364.7962 ***	-722.9113 389.6990 *	-14,223.8755 628.5961 ***	-3,590.8453 307.9793 ***	-95.5714 24.8253 ***	-127.7779 24.0930 ***	962.2265 314.5318 ***	12,465.4256 783.7871 ***			133.3491 36.8192 ***	440.8838 254.1706 *	-20,324.9734 3,766.7251 ***
	orders_un_ex-coefs		-245,053.5366 143,150.2449 *	-375,992.5783 90,226.1762 ***	270,103.9332 51,845.3659 ***	102,257.9684 12,711.1758 ***	338.4256 167.6927 **			-330,132.1837 99,633.2491 ***		-33,301.2982 1,855.7731 ***		21,578.0195 11,273.3455 *	

Table 11: "Best Model" Tests for Pilot B.I (Market Quality) Data, cont'd

Best Model - B.I

		OrderType													
Tprm	Yvar	10	11	12	13	14	15	16	17	18	19	20	21	22	all
Post G1 - C DIFF Pre G1 - C	orgnl_hidden_pt-coefs		-0.1557 0.0382 ***				-0.9606 0.1522 ***		0.0440 0.0152 ***			-0.0234 0.0078 ***	-0.0079 0.0017 ***	0.0008 0.0002 ***	0.0009 0.0001 ***
	orgnl_order_sz-coefs	-0.2143 0.0743 ***	-2.0367 0.2801 ***	-2.3618 0.2399 ***	-3.5933 0.2739 ***	-2.0243 0.1669 ***	0.1269 0.0143 ***	0.3405 0.0173 ***	-0.0901 0.0456 **	2.9087 0.1967 ***					-13.7758 1.2546 ***
	out_qt_ex_ct-coefs														-1,800.2560 247.4573 ***
	out_qt_ex_wa_tm_pd-coe...	90.6258 24.7775 ***													168.4716 19.0812 ***
	out_qt_ex_wa-coefs	0.0115 0.0029 ***													0.0090 0.0026 ***
	price_imp_ct-coefs	2,618.0548 556.5019 ***	987.1147 364.3486 ***												2,622.4849 947.1899 ***
	qt_ex_wa_tm_pd-coefs	47.3097 6.9869 ***													
	quote_ex_ct-coefs	321.7770 104.7221 ***	-5,864.6762 499.0402 ***												-6,524.3466 579.3212 ***
	same_sd_qt_sz-coefs		-1.9424 0.9122 **				3.7658 1.5262 **				0.0009 0.0003 ***			0.0679 0.0107 ***	0.0469 0.0027 ***
	wa_bbo_spd-coefs				0.0020 0.0011 *										0.0005 0.0003 *
	wa_eff_spd-coefs														-0.0004 0.0001 ***
	wa_nbbo_spd-coefs							0.0002 0.0001 **						0.0001 0.0000 *	
	wa_price_imp-coefs														0.0002 0.0001 *
	wars_ex_tc-coefs				-0.0006 0.0003 **	-0.0005 0.0003 *									-0.0004 0.0002 ***
Post G2 - G1 DIFF Pre G2 - G1	cncl_0_100micros-coefs				3,295.0185 1,773.0332 *	-2,974.7909 1,522.8009 *									85,158.2692 49,929.4571 *
	cncl_1ms_100ms-coefs		-30,583.6322 15,199.6683 **		23,374.9768 11,739.6789 **		252.7446 115.5694 **						-3,895.0103 1,583.4407 **	-9,835.6565 4,943.5314 **	
	cncl_1s_30s-coefs	-30,778.3673 9,756.2957 ***			26,755.9461 12,827.8963 **		230.4873 114.4932 **			-386,591.4212 211,222.2497 *		973.0142 330.6221 ***			
	cncl_5m_30m-coefs	-2,606.3975 1,219.9367 **			2,899.9962 1,376.6098 **	4,354.3664 1,192.8259 ***		667.5743 270.7807 **					884.1671 198.0312 ***	7,398.9598 2,639.4970 ***	
	cncl_30m-coefs							-215.9956 93.9206 **				6,372.2678 2,310.8963 ***	-36,644.3213 20,466.7706 *	-22,785.0140 13,791.5957 *	
	cncl_30s_60s-coefs	-4,371.8347 2,199.4882 **	27,569.6601 10,533.6449 ***		12,197.9191 5,404.3180 **	4,723.4021 2,673.3289 *	-26.1757 10.3919 **	1,188.3488 596.7021 **		-1,260,712.1130 265,242.0424 ***				12,193.5045 3,532.2540 ***	-1,106,330.8690 266,014.3242 ***
	cncl_60s_5m-coefs	-6,437.4622 3,409.9400 *	11,184.3311 5,140.5002 **		10,062.5979 3,958.5688 **		-46.7039 18.6620 **	2,125.4792 669.3249 ***					342.7996 123.4897 **	12,748.0662 5,042.7466 **	124,164.1714 45,515.3766 ***
	cncl_100micros_1ms-coefs		1,463.2012 434.5964 ***												
	cncl_100ms_1s-coefs					-47,597.3872 12,672.0329 ***	240.1266 56.8194 ***		-117,547.5715 44,936.3515 ***			1,505.6172 405.3761 ***	-967.8302 264.0559 ***	-146,146.1958 58,536.7974 **	
	cncl_shrs_ct-coefs	-44,667.5796 23,193.8116 *				-55,657.7719 31,145.6620 *	770.7391 379.9402 **		-1,798,693.9460 461,687.1668 ***			9,068.1043 3,086.5510 ***	-43,139.9680 21,424.8417 **	-182,023.2024 85,566.5611 **	
	exctn_0_100micros-coefs								-1,000.1200 355.8974 ***		2,038.5552 1,113.0815 *	-231.9852 109.0656 **			
	exctn_1ms_100ms-coefs					40.0955 15.8997 **	-20.1697 6.2481 ***							-7.1370 3.3208 **	

Table 11: "Best Model" Tests for Pilot B.I (Market Quality) Data, cont'd

Best Model - B.I

		Order Type													
Term	Yvar	10	11	12	13	14	15	16	17	18	19	20	21	22	all
Post G2 - G1															
DIFF Pre G2 - G1	exctn_1s_30s-coefs				824.1569 353.7024 **		-32.9532 8.4528 ***			-434.6400 250.1508 *					
	exctn_5m_30m-coefs				385.9887 181.6896 **			21.1702 3.7836 ***		-1,093.0215 322.9356 ***					
	exctn_30m-coefs			89.7570 35.2732 **		199.2384 92.3984 **	5.2058 1.7902 ***	7.4384 1.8335 ***						182.8352 99.5798 *	
	exctn_30s_60s-coefs				366.3458 104.9008 ***		-7.0288 2.4356 ***	11.3216 2.3504 ***		-179.3289 96.1122 *					1,193.2675 448.6932 ***
	exctn_60s_5m-coefs		-137.8307 69.9051 **		558.8053 220.3275 **			30.6869 4.6556 ***		-798.9987 241.0187 ***					
	exctn_100micros_1ms-co..		1,127.6199 452.9097 **		675.8943 158.4571 ***	450.9883 103.9218 ***				30.3823 16.5331 *					2,831.4731 483.4503 ***
	exctn_100ms_1s-coefs						-11.3198 2.4007 ***						-13.0574 7.6531 *		
	final_hidden_pt-coefs	0.4061 0.1166 ***										-0.6269 0.3205 *			
	opp_sd_qt_sz-coefs				0.1309 0.0741 *										-0.0059 0.0030 *
	order_count-coefs				242.1776 107.2575 **	430.8376 152.8783 ***			87.4629 40.7310 **				-60.1929 20.9462 ***		2,479.2459 819.2399 ***
	order_shares_ct-coefs	-43,623.5632 23,254.0418 *				-54,871.3474 31,252.2167 *	693.3606 389.4389 *			-1,815,956.5150 461,858.9269 ***		9,514.5820 3,394.4690 ***	-43,195.8528 21,425.2287 **	-182,343.5637 85,574.7148 **	
	orders_ex_away-coefs									-2,421.5360 926.2388 ***					
	orders_ex_tc-coefs				3,023.5907 741.3885 ***	939.1081 371.4304 **	-79.7310 30.0775 ***	89.1403 29.7180 ***		-2,391.2695 927.1121 ***			-99.8195 45.2721 **		
	orders_un_ex-coefs											6,354.7805 2,288.3641 ***	-38,176.8023 20,264.9795 *		
	orgnl_hidden_pt-coefs			-0.0124 0.0062 **								0.0221 0.0097 **		0.0004 0.0002 **	
	orgnl_order_sz-coefs							-0.0436 0.0214 **		-1.0639 0.2332 ***					8.7968 1.4944 ***
	out_qt_ex_ct-coefs		441.2993 170.6008 ***												
	out_qt_ex_wa_tm_pd-coe..														86.9329 23.0447 ***
	price_imp_ct-coefs		-2,154.5982 431.2719 ***												-1,898.8234 1,135.3548 *
	qt_ex_wa_tm_pd-coefs	-97.0485 8.5995 ***													-10.2285 2.1093 ***
	quote_ex_ct-coefs	1,011.4815 128.6828 ***	3,083.1508 597.2529 ***												4,065.5747 689.6091 ***
	same_sd_qt_sz-coefs														-0.0059 0.0032 *
	wa_bbo_spd-coefs		-0.0010 0.0004 ***												
	wa_nbbo_spd-coefs							-0.0004 0.0001 ***		0.0005 0.0002 **					0.0015 0.0008 *
	wa_price_imp-coefs	0.0009 0.0004 **	0.0006 0.0002 **												
	wars_ex_tc-coefs		-0.0008 0.0005 *					-0.0003 0.0002 **							

Table 11: "Best Model" Tests for Pilot B.I (Market Quality) Data, cont'd

Best Model - B.I

		Order Type													
Term	Yvar	10	11	12	13	14	15	16	17	18	19	20	21	22	all
Post G3 - G2 DIFF Pre G3 - G2	cncl_0_100micros-coefs			4,703.6599 2,817.5343 *	-12,167.7958 1,839.6425 ***	-7,079.3612 1,585.4694 ***				-178,602.8959 62,164.3226 ***			-6,559.1890 2,862.9250 **	-5,525.8496 1,808.0229 ***	-339,739.1183 58,529.4491 ***
	cncl_1ms_100ms-coefs				-34,602.0671 12,208.7386 ***		363.9081 127.0825 ***	-12,364.9347 5,017.7500 **	8,154.5424 2,946.1605 ***	-150,662.3791 56,092.1445 ***			4,812.6318 1,603.4089 ***	19,820.8490 5,033.9340 ***	
	cncl_1s_30s-coefs				-100,367.2889 13,269.0960 ***			-37,095.4211 8,292.5263 ***		576,558.1396 268,239.6419 **		-652.8032 334.8613 *		71,813.3431 24,542.4144 ***	1,046,314.4570 300,314.2555 ***
	cncl_5m_30m-coefs		2,934.5738 998.1951 ***	-943.8774 447.1106 **	-28,669.3454 1,446.4630 ***	-3,805.9651 1,219.1644 ***	-59.3301 14.2517 ***	-2,822.3071 273.0525 ***		-110,118.8100 13,087.8091 ***			-348.1538 200.6708 *		-112,842.6327 16,653.8041 ***
	cncl_30m-coefs			-220,125.0353 110,341.7160 **	218,220.5805 63,320.0659 ***		3,221.0627 222.2649 ***	-1,035.3786 94.7120 ***		-256,631.8161 153,506.0468 *					-1,248,214.6250 489,955.1093 **
	cncl_30s_60s-coefs				-36,697.3371 5,644.8552 ***			-4,612.7892 601.7183 ***	8,400.4927 4,655.4026 *	1,588,183.8890 396,204.1392 ***			-665.2147 369.8541 *	11,555.5973 3,612.7653 ***	1,850,183.6380 304,659.2708 ***
	cncl_60s_5m-coefs				-73,051.3751 4,150.8847 ***	-9,781.6897 3,690.4869 ***		-7,526.7237 674.8876 ***	-15,995.3582 3,515.7084 ***	-247,603.0652 51,659.2222 ***	-556.4620 262.7473 **		238.1315 135.3101 *	16,589.5490 5,164.1651 ***	-255,534.6733 52,786.7429 ***
	cncl_100micros_1ms-coefs		-2,893.3877 448.8591 ***	12,696.0970 2,665.2165 ***	14,743.5099 4,837.8664 ***	10,501.7577 2,448.3398 ***	512.4901 102.6121 ***						-277.9021 157.5510 *	3,682.7528 1,032.8927 ***	70,486.6773 11,738.2062 ***
	cncl_100ms_1s-coefs			9,059.9334 4,242.7249 **	-29,675.1507 5,791.3950 ***			-16,343.3938 3,168.4985 ***				-1,789.4642 410.5905 ***	1,139.0013 267.4907 ***		
	cncl_shrs_ct-coefs			-195,921.3360 115,129.2671 *		-57,680.5601 32,789.6704 *	3,906.6149 417.5184 ***	-82,202.4032 19,164.3620 ***		1,186,979.3730 590,933.5249 **					
	exctn_0_100micros-coefs	-344.5185 69.1015 ***	8,959.3235 952.3544 ***	-612.2851 149.4119 ***	-868.6774 63.3268 ***	-68.5514 25.5160 ***	12.5037 1.9654 ***		374.9904 165.5593 **	-4,232.3635 460.4416 ***		198.5622 110.4637 *	49.5436 27.8379 *		
	exctn_1ms_100ms-coefs	-1,642.9177 971.9447 *	-4,820.2807 928.7056 ***	208.5057 88.7508 **	500.8367 65.8954 ***		42.1744 6.8613 ***			-2,125.3958 297.2182 ***		-91.9267 26.2209 ***		9.8524 3.3814 ***	
	exctn_1s_30s-coefs	529.5309 165.1234 ***		466.4607 183.1697 **	3,717.5960 370.9626 ***	278.6329 155.9479 *	43.6258 9.1757 ***			-2,364.1351 260.1306 ***				75.8311 30.8226 **	
	exctn_5m_30m-coefs		-131.4253 63.8409 **	-211.3452 44.1400 ***	1,307.4767 190.7860 ***		-21.8219 5.2091 ***	-13.5451 3.8160 ***							-2,353.8768 720.2956 ***
	exctn_30m-coefs			-183.9789 37.3184 ***	904.9446 114.4734 ***		-10.8781 1.9360 ***	-6.6300 1.8492 ***		3,949.7862 734.5448 ***					-1,667.0411 821.2068 **
	exctn_30s_60s-coefs				969.9392 110.0583 ***		6.2017 2.6474 **	-5.2297 2.3682 **	-63.2402 27.7307 **	-739.9965 100.2042 ***		-770.3838 361.8006 **	-11.2874 3.9498 ***		
	exctn_60s_5m-coefs			-181.9663 58.3337 ***	1,702.6459 227.4963 ***			-16.0358 4.6955 ***		-1,464.7205 309.7926 ***		1,225.7653 448.5702 ***		254.5350 125.8112 **	
	exctn_100micros_1ms-co...			666.9069 114.8460 ***		-506.1255 108.9275 ***	141.2993 6.4324 ***			46.5788 21.1319 **					3,096.1962 579.3593 ***
	exctn_100ms_1s-coefs		-645.9438 159.1281 ***	224.0038 65.7464 ***	710.2344 77.3462 ***		14.6365 2.6041 ***			-717.8408 110.9294 ***				6.3647 3.4253 *	
	final_hidden_pt-coefs				-1.2465 0.5720 **	-3.3995 0.8187 ***	-0.0301 0.0164 *	2.0863 1.1600 *		0.0800 0.0428 *					
	opp_sd_qt_sz-coefs	8.9277 4.1175 **	1.2100 0.6628 *	0.6643 0.1451 ***			-6.2889 2.7573 **			0.6050 0.1417 ***				0.0296 0.0117 **	0.0352 0.0031 ***
	order_count-coefs	-37.6072 8.3912 ***		419.8265 208.2375 **	-1,561.4838 112.5134 ***	-434.2510 161.1762 ***	14.7166 3.3288 ***	-338.0921 52.5492 ***		-5,094.7927 561.0216 ***	-1.4043 0.5916 **		53.7514 21.2194 **	652.0965 123.3644 ***	-7,550.0866 978.4102 ***
	order_shares_ct-coefs			-195,867.2341 115,206.0115 *		-57,770.3041 32,901.6771 *	4,128.2503 428.0484 ***	-82,263.1096 19,168.0719 ***		1,172,400.3030 591,160.3190 **					
	orders_ex_away-coefs	975.0529 505.0067 *		517.8968 105.8781 ***	1,869.9330 159.3476 ***					2,633.1353 1,198.2273 **				186.5891 81.1246 **	
	orders_ex_tc-coefs	-2,671.4224 828.9306 ***	3,909.2935 1,676.7014 **		7,293.2370 777.0565 ***		231.5284 32.6925 ***			-9,995.5397 1,195.8927 ***			76.3220 45.8786 *		
	orders_un_ex-coefs			-218,264.9116 110,337.6505 **	231,938.4863 63,275.1557 ***		3,264.0733 222.4141 ***								-1,202,787.3870 486,661.3205 **

Table 11: "Best Model" Tests for Pilot B.I (Market Quality) Data, cont'd

Best Model - B.I

		Order Type												
Term	Yvar	10	11	12	13	14	15	16	17	18	19	20	21	22	all
Post G3 - G2		0.3239	0.0978	0.0276			-1.7389		0.0417	-0.0584				-0.0006	0.0010
DIFF Pre G3 - G2	orgnl_hidden_pt-coefs	0.1230	0.0465	0.0065			0.2003		0.0189	0.0345				0.0002	0.0002
		***	**	***			***		**	*				***	***
	orgnl_order_sz-coefs	-0.4201	-0.8863	-5.3564	4.3713	1.9278	0.3166	-0.2166	0.1218	2.8697	0.2270		-0.1436		-10.2769
		0.0911	0.3440	0.2886	0.3354	0.2122	0.0190	0.0216	0.0567	0.3056	0.1330		0.0614		1.7762
		***	***	***	***	***	***	***	**	***	*		**		***
	out_qt_ex_ct-coefs														652.6584
															342.7768
															*
	out_qt_ex_wa_tm_pd-coe...														-66.9767
															26.9852
															**
	price_imp_ct-coefs		2,442.7225												6,351.5998
			441.4797												1,310.9069
			***												***
	qt_ex_wa_tm_pd-coefs	86.5660													
		8.7204													
		***													
	quote_ex_ct-coefs	-1,612.8062	-6,690.8619												-4,130.3136
		130.7720	620.0740												818.1631
		***	***												***
	same_sd_qt_sz-coefs			0.7844			-10.0049							0.0380	0.0377
				0.1445			1.9312							0.0131	0.0033
				***			***							***	***
	wa_bbo_spd-coefs			0.1982				0.0001			0.0000				
				0.0983				0.0000			0.0000				
				**				*			**				
	wa_nbbo_spd-coefs		0.0013				-0.0033	0.0003			0.0000				-0.0014
			0.0008				0.0009	0.0001			0.0000				0.0008
			*				***	**			**				*

Table 12: "Best Model" Tests for "TAQ" (Rosenblatt Ticker Plant – Trades and Quotes) Data Realized Spreads with Various Look-Ahead Windows

Best Model - TAQ

		Metric				
Term	Length	exec qty	price impact bps	price impact dollars	realized spread bps	realized spread dolla..
Post G1 - C DIFF Pre G1 - C	100 micros-coefs		31,034.1952 18,277.6503 *	106.1175 37.7255 ***	1,302,225.2630 160,577.6311 ***	
	1 ms-coefs		253,513.3235 27,791.2790 ***	554.2739 45.5898 ***	842,081.3083 151,682.8054 ***	
	100 ms-coefs		425,178.1154 41,390.4262 ***	942.8862 53.9137 ***	525,940.7013 133,091.4479 ***	
	1 sec-coefs		504,852.6015 49,342.7035 ***	1,046.8194 58.9182 ***	419,169.8226 124,385.2933 ***	
	30 sec-coefs		529,709.4312 80,825.9269 ***	1,099.9495 71.9478 ***	294,510.5557 119,742.0238 **	-7,382.5172 4,181.6517 *
	1 min-coefs		508,683.4650 84,795.2058 ***	1,061.9910 73.3164 ***	320,693.0200 120,917.7799 ***	-7,130.6824 3,569.6348 **
	5 min-coefs		518,591.4798 123,638.1916 ***	977.8108 81.9115 ***		-6,912.3725 3,524.1801 **
	30 min-coefs	4,493.1119 1,845.4516 **	672,414.7442 176,035.2895 ***	1,045.5962 116.4101 ***		-4,814.4688 2,525.1147 *
Post G2 - G1 DIFF Pre G2 - G1	100 micros-coefs					11,291.1429 5,436.2301 **
	1 ms-coefs					11,343.7665 5,436.3079 **
	100 ms-coefs				-270,208.0441 157,151.9950 *	11,391.1490 5,477.7879 **
	1 sec-coefs				-254,977.1779 146,985.7770 *	11,709.4138 5,498.8709 **
	30 sec-coefs				-273,328.1245 139,096.7142 **	10,649.1118 5,137.1858 **
	1 min-coefs				-251,533.1560 142,294.9517 *	8,590.9558 4,385.2247 *
	5 min-coefs					7,456.0284 4,329.3774 *
Post G3 - G2 DIFF Pre G3 - G2	100 micros-coefs	17,087.1550 2,408.0548 ***			918,801.1151 192,108.0476 ***	
	1 ms-coefs	17,087.1174 2,408.0544 ***	55,366.0004 32,205.8191 *		878,216.2920 181,630.4737 ***	
	100 ms-coefs	17,072.3065 2,407.1911 ***			815,862.7747 159,530.1428 ***	
	1 sec-coefs	17,156.4699 2,407.2979 ***			785,762.6864 149,196.0125 ***	
	30 sec-coefs	16,469.4189 2,393.4727 ***	161,824.7288 93,978.4361 *		618,440.3787 141,279.5482 ***	
	1 min-coefs	15,965.9090 2,385.6250 ***			598,667.6460 144,420.8705 ***	

Table 12: "Best Model" Tests for "TAQ" (Rosenblatt Ticker Plant) Data, cont'd

Realized Spreads with Various Look-Ahead Windows

Best Model - TAQ

		Metric				
Term	Length	exec qty	price impact bps	price impact dollars	realized spread bps	realized spread dolla..
Post G3 - G2		14,092.3557			531,335.2659	
DIFF Pre G3 - G2	5 min-coefs	2,328.2327			216,756.9847	
		***			**	
		11,020.3844				
	30 min-coefs	2,145.1123				
		***				

Table 13: "Best Model" Tests for Pilot B.II (Trading Center), B.IV and C.I (Market-Maker) Data

Best Model - B.II B.IV C.I

			Order Type		
Data Type	Term	Yvar	NA	10	11
B2	Post G1 - C DIFF Pre G1 - C	qt_leader_fl_0_cnt-coefs		0.0353 0.0042 ***	0.4746 0.0099 ***
		qt_leader_fl_1_cnt-coefs		-0.0475 0.0039 ***	-0.6454 0.0116 ***
		qt_leader_fl_unknown_c..		0.0121 0.0028 ***	0.1728 0.0059 ***
	Post G2 - G1 DIFF Pre G2 - G1	qt_leader_fl_0_cnt-coefs			-0.0244 0.0120 **
		qt_leader_fl_unknown_c..			0.0193 0.0071 ***
	Post G3 - G2 DIFF Pre G3 - G2	qt_leader_fl_0_cnt-coefs		0.0123 0.0052 **	-0.0930 0.0122 ***
		qt_leader_fl_1_cnt-coefs		-0.0145 0.0049 ***	0.1432 0.0143 ***
		qt_leader_fl_unknown_c..			-0.0503 0.0072 ***
B4	Post G1 - C DIFF Pre G1 - C	pct_shares_at-coefs	9.5703 0.1588 ***		
		pct_shares_cross-coefs	3.3762 0.1174 ***		
		pct_shares_inside-coefs	-12.5921 0.1853 ***		
		pct_shares_outside-coefs	-0.2458 0.0203 ***		
	Post G2 - G1 DIFF Pre G2 - G1	pct_shares_at-coefs	3.4924 0.1833 ***		
		pct_shares_cross-coefs	0.5142 0.1364 ***		
		pct_shares_inside-coefs	-4.2423 0.2138 ***		
	Post G3 - G2 DIFF Pre G3 - G2	pct_shares_at-coefs	-20.3137 0.1994 ***		
		pct_shares_cross-coefs	-1.4284 0.1479 ***		

Table 13: "Best Model" Tests for Pilot B.II, B.IV and C.I Data, cont'd

Best Model - B.II B.IV C.I

			Order Type		
Data Type	Term	Yvar	NA	10	11
B4	Post G3 - G2 DIFF Pre G3 - G2	pct_shares_inside-coefs	22.1067 0.2332 ***		
		pct_shares_outside-coefs	0.0559 0.0257 **		
C1	Post G1 - C DIFF Pre G1 - C	realized_profit-coefs	269.9458 39.2995 ***		
		shares_executed-coefs	5,758.3925 2,523.6891 **		
		vwap-coefs	8.3262 1.3740 ***		
	Post G3 - G2 DIFF Pre G3 - G2	vwap-coefs	-8.2760 1.5071 ***		

Table 14: "Simple Model" Tests for B.I Weighted-Average NBBO Spread Data

Simple Model - B.I

		Order Type												
Term	Segment	10	11	12	13	14	15	16	17	18	19	21	22	all
Post G1 - C DIFF Pre G1 - C	pre_spd_class-0	0.000022 0.000005 ***	0.000001 0.000000 ***	0.000007 0.000001 ***	0.000001 0.000000 ***	0.000004 0.000000 ***		0.000001 0.000000 ***	0.000002 0.000001 **	0.000000 0.000000 ***				
	pre_spd_class-10							0.000585 0.000185 ***						
	pre_spd_class-<5			0.000021 0.000001 ***	0.000003 0.000001 ***	0.000012 0.000001 ***				0.000000 0.000000 **			0.000001 0.000001 **	
	pre_spd_class->5			0.000027 0.000004 ***	0.000002 0.000001 *	0.000012 0.000003 ***		-0.000121 0.000043 ***					0.000006 0.000001 ***	
	sector-E		0.005518 0.002924 *											
	sector-F				-0.001443 0.000451 ***			0.000835 0.000440 *						
	sector-H			0.000027 0.000008 ***										
	sector-I							-0.000455 0.000099 ***						
	sector-R				0.000618 0.000343 *			0.000278 0.000154 *		-0.001100 0.000399 ***				
	sector-T						-0.001169 0.000661 *	0.000416 0.000147 ***					0.000032 0.000013 **	
	stratum-H-H-H			0.000011 0.000000 ***	0.000002 0.000000 ***	0.000007 0.000001 ***	-0.000737 0.000164 ***	0.000004 0.000001 ***	-0.000002 0.000001 *	0.000000 0.000000 ***			0.000004 0.000001 ***	0.000001 0.000000 ***
	stratum-H-H-L	0.085293 0.043584 *												
	stratum-H-H-M		-0.000009 0.000003 **	0.000019 0.000001 ***	0.000003 0.000000 ***	0.000026 0.000002 ***				0.000001 0.000000 ***			0.000008 0.000002 ***	0.000004 0.000000 ***
	stratum-H-L-H		0.000002 0.000000 ***	0.000005 0.000001 ***	0.000001 0.000000 ***	0.000003 0.000000 ***		0.000002 0.000001 ***	0.000006 0.000002 ***	0.000000 0.000000 ***			0.000004 0.000001 ***	0.000001 0.000000 ***
	stratum-H-M-H		0.000001 0.000000 ***	0.000010 0.000000 ***	0.000001 0.000000 ***	0.000004 0.000000 ***				0.000000 0.000000 ***			0.000001 0.000001 **	0.000001 0.000000 ***
	stratum-H-M-M			0.000018 0.000007 **									0.000007 0.000003 **	

Table 14: "Simple Model" Tests for B.I Weighted-Average NBBO Spread Data, cont'd

Simple Model - B.I

		Order Type												
Term	Segment	10	11	12	13	14	15	16	17	18	19	21	22	all
Post G1 - C DIFF Pre G1 - C	stratum-L-H-L	-0.077772 0.045235 *			-0.011648 0.005669 **					-0.009067 0.004060 **			-0.000209 0.000114 *	
	stratum-L-L-H	0.000305 0.000147 **	-0.000018 0.000004 ***	0.000045 0.000002 ***	0.000003 0.000000 ***	0.000031 0.000003 ***		-0.001847 0.000333 ***		0.000001 0.000000 ***			0.000007 0.000002 ***	0.000004 0.000000 ***
	stratum-L-L-L	-0.003343 0.001185 ***	-0.001348 0.000537 **										0.000013 0.000004 ***	
	stratum-L-L-M	-0.001053 0.000375 ***		0.000031 0.000007 ***		0.000011 0.000004 ***		0.000147 0.000079 *					-0.000008 0.000001 ***	0.000001 0.000000 ***
	stratum-L-M-L			0.001038 0.000595 *				0.002209 0.001073 **					0.000060 0.000022 ***	
	stratum-L-M-M	-0.000975 0.000508 *		0.000032 0.000004 ***	0.000004 0.000002 **	0.000025 0.000006 ***		0.000470 0.000281 *	0.000039 0.000018 **				-0.000010 0.000004 **	0.000004 0.000001 **
	stratum-M-H-H	-0.000213 0.000126 *	-0.000009 0.000002 ***	0.000009 0.000001 ***		0.000006 0.000003 **		0.000001 0.000000 **	0.000011 0.000003 ***				-0.000012 0.000005 **	
	stratum-M-H-L		0.013152 0.007375 *					0.006450 0.002665 **	0.011580 0.003701 ***					
	stratum-M-H-M		-0.000017 0.000005 ***	0.000019 0.000001 ***	0.000006 0.000001 ***	0.000034 0.000005 ***	-0.003771 0.002137 *		0.000011 0.000005 **	0.000001 0.000000 ***			0.000008 0.000003 ***	0.000005 0.000001 ***
	stratum-M-L-H	0.000029 0.000006 ***	0.000002 0.000000 ***	0.000010 0.000001 ***	0.000002 0.000000 ***	0.000007 0.000000 ***	0.000072 0.000042 *			0.000000 0.000000 ***				0.000001 0.000000 ***
	stratum-M-L-M												0.000008 0.000003 ***	
	stratum-M-M-H		0.000008 0.000004 *	0.000016 0.000002 ***	0.000005 0.000002 **	0.000008 0.000002 ***			-0.000004 0.000002 **	0.000000 0.000000 ***			0.000003 0.000001 **	0.000002 0.000000 ***
	stratum-M-M-L									-0.000012 0.000005 **				
	stratum-M-M-M			0.000022 0.000001 ***	0.000003 0.000000 ***	0.000013 0.000001 ***	-0.000665 0.000295 **		0.000171 0.000062 ***	0.000001 0.000000 ***			0.000005 0.000001 ***	0.000003 0.000000 ***
Post G2 - G1 DIFF Pre G2 - G1	pre_spd_class-0		0.000001 0.000000 **	0.000001 0.000001 **		0.000001 0.000000 **	0.000125 0.000065 *		0.000002 0.000001 ***					
	pre_spd_class-10							-0.000857 0.000225 ***		0.000777 0.000398 *				

Table 14: "Simple Model" Tests for B.I Weighted-Average NBBO Spread Data, cont'd

Simple Model - B.I

		Order Type												
Term	Segment	10	11	12	13	14	15	16	17	18	19	21	22	all
Post G2 - G1				-0.000003		-0.000002							-0.000001	
DIFF Pre G2 - G1	pre_spd_class-<5			0.000001		0.000001							0.000001	
				***		**							**	
	pre_spd_class->5		-0.000280			0.000008		0.000138		-0.000001				
			0.000069			0.000004		0.000054		0.000000				
			***			**		**		*				
	sector-F		-0.003423		0.001863			-0.001339						
			0.001730		0.000536			0.000514						
			**		***			***						
	sector-I							0.000535						
								0.000127						
								***						
	sector-R							-0.000650		0.001105				
								0.000184		0.000478				
								***		**				
	sector-T	0.011134									0.000000			
		0.004653									0.000000			
		**									***			
	stratum-H-H-H			-0.000001	0.000000	-0.000001			0.000002					
				0.000000	0.000000	0.000001			0.000001					
				***	***	*			*					
	stratum-H-H-M		-0.000009	-0.000003	-0.000002	-0.000015	-0.003312			-0.000001			-0.000006	-0.000002
			0.000004	0.000001	0.000000	0.000003	0.001370			0.000000			0.000002	0.000000
			**	***	***	***	**			***			***	***
	stratum-H-L-H			0.000002	0.000000					0.000000				0.000000
				0.000001	0.000000					0.000000				0.000000
				*	**					**				*
	stratum-H-M-H		0.000000	-0.000001					-0.000007					
			0.000000	0.000001					0.000002					
			*	*					***					
	stratum-H-M-M			0.000037	-0.000031			-0.001817					0.000009	0.000006
				0.000009	0.000007			0.000490					0.000004	0.000002
				***	***			***					**	***
	stratum-L-H-L	0.107076			0.018044			-0.005580		0.009747			0.000276	0.060447
		0.054608			0.006919			0.002787		0.004867			0.000145	0.028839
		*			***			**		**			*	**
	stratum-L-L-H		0.000021	-0.000027		-0.000020	-0.000359	0.001852		-0.000001			-0.000007	-0.000003
			0.000005	0.000003		0.000003	0.000196	0.000404		0.000000			0.000002	0.000000
			***	***		***	*	***		***			***	***
	stratum-L-L-L	0.002923						-0.002348						
		0.001461						0.000777						
		**						***						
	stratum-L-L-M	0.001621			0.000007	0.000014							0.000008	0.000002
		0.000510			0.000003	0.000005							0.000002	0.000001
		***			***	***							***	***
	stratum-L-M-L							-0.006342						
								0.001224						
								***						

Table 14: "Simple Model" Tests for B.I Weighted-Average NBBO Spread Data, cont'd

Simple Model - B.I

		Order Type												
Term	Segment	10	11	12	13	14	15	16	17	18	19	21	22	all
Post G2 - G1 DIFF Pre G2 - G1	stratum-M-H-H			0.000004 0.000002 **				0.000001 0.000000 ***						
	stratum-M-H-M				-0.000003 0.000001 ***	-0.000010 0.000006 *			-0.000020 0.000006 ***					-0.000001 0.000001 **
	stratum-M-L-H					-0.000001 0.000000 ***	-0.000135 0.000056 **		-0.000166 0.000051 ***					
	stratum-M-L-L				0.000014 0.000008 *								0.000015 0.000007 **	
	stratum-M-M-H								0.000007 0.000002 ***					
	stratum-M-M-L			0.000025 0.000011 **										
	stratum-M-M-M			-0.000004 0.000001 ***		0.000003 0.000001 **	0.000940 0.000361 ***						-0.000002 0.000001 *	
Post G3 - G2 DIFF Pre G3 - G2	pre_spd_class-0	-0.000012 0.000007 *	-0.000001 0.000000 **		0.000000 0.000000 ***	0.000002 0.000000 ***	-0.000149 0.000065 **		-0.000002 0.000001 ***	0.000000 0.000000 ***				
	pre_spd_class-10		0.002190 0.001331 *				-0.004829 0.001683 ***							
	pre_spd_class-<5			-0.000002 0.000001 *			-0.000188 0.000076 **	-0.000099 0.000035 ***		0.000001 0.000000 ***		0.000000 0.000000 **	0.000002 0.000001 **	
	pre_spd_class->5		0.000275 0.000072 ***			-0.000009 0.000004 **	-0.000787 0.000214 ***			0.000004 0.000000 ***				
	sector-E			-0.069630 0.030000 **	0.002531 0.001309 *							0.000000 0.000000 **		
	sector-F		0.003415 0.001652 **							0.000519 0.000173 ***				
	sector-H	0.007662 0.001806 ***		0.000043 0.000010 ***		0.000098 0.000032 ***	-0.005491 0.002030 ***						-0.000013 0.000006 **	
	sector-I			0.659571 0.344515 *			-0.004080 0.002038 **				0.000000 0.000000 *			
	sector-R	0.016132 0.004705 ***						0.000517 0.000196 ***		0.000967 0.000512 *				

Table 14: "Simple Model" Tests for B.I Weighted-Average NBBO Spread Data, cont'd

Simple Model - B.I

		Order Type												
Term	Segment	10	11	12	13	14	15	16	17	18	19	21	22	all
Post G3 - G2 DIFF Pre G3 - G2	sector-T	-0.009387 0.004972 *									0.000000 0.000000 ***			
	stratum-H-H-H	0.000231 0.000070 ***	0.000001 0.000000 ***	0.000002 0.000000 ***	0.000002 0.000000 ***	0.000003 0.000001 ***			0.000003 0.000001 ***	0.000002 0.000000 ***				0.000002 0.000000 ***
	stratum-H-H-L	0.112691 0.048115 **		0.000453 0.000094 ***	0.000132 0.000067 **	0.001317 0.000366 ***							-0.000208 0.000074 ***	0.000213 0.000042 ***
	stratum-H-H-M			0.000004 0.000001 ***	0.000004 0.000000 ***	0.000006 0.000003 **	-0.003189 0.001384 **		-0.000085 0.000034 **	0.000007 0.000000 ***				0.000005 0.000000 ***
	stratum-H-L-H			-0.000003 0.000001 **	0.000001 0.000000 ***	0.000001 0.000001 ***				0.000000 0.000000 ***		0.000000 0.000000 **		0.000001 0.000000 ***
	stratum-H-M-H			-0.000002 0.000001 ***	0.000000 0.000000 ***	0.000001 0.000000 **			0.000009 0.000003 ***	0.000001 0.000000 ***				0.000001 0.000000 ***
	stratum-H-M-M			-0.000033 0.000009 ***	0.000031 0.000007 ***			0.001794 0.000496 ***					-0.000012 0.000004 ***	-0.000005 0.000002 ***
	stratum-L-H-L		0.056590 0.024582 **					0.005823 0.002935 **		0.010268 0.005019 **				-0.069010 0.029851 **
	stratum-L-L-H			-0.000011 0.000004 ***						0.000000 0.000000 *				
	stratum-L-L-L			0.001206 0.000719 *			-0.003106 0.001614 *	0.002310 0.000762 ***						
	stratum-L-L-M	-0.001023 0.000552 *	-0.000200 0.000120 *		-0.000006 0.000003 **		-0.001386 0.000541 **		0.000231 0.000112 **	0.000008 0.000002 ***			-0.000004 0.000002 *	0.000003 0.000001 ***
	stratum-L-M-L							0.004623 0.001180 ***					-0.000051 0.000026 *	
	stratum-L-M-M			0.000008 0.000004 *		0.000021 0.000008 ***				0.000007 0.000001 ***				0.000005 0.000002 ***
	stratum-M-H-H				0.000002 0.000001 ***	0.000008 0.000003 ***			-0.000011 0.000004 **	0.000003 0.000000 ***				0.000002 0.000001 ***
	stratum-M-H-L						-0.020213 0.012250 *							
	stratum-M-H-M			0.000003 0.000001 **	0.000003 0.000001 ***			-0.001851 0.000452 ***	0.000016 0.000006 ***	0.000006 0.000000 ***				0.000005 0.000001 ***

Table 14: "Simple Model" Tests for B.I Weighted-Average NBBO Spread Data, cont'd

Simple Model - B.I

		Order Type												
Term	Segment	10	11	12	13	14	15	16	17	18	19	21	22	all
Post G3 - G2			0.000000	-0.000003				-0.000345	0.000167	0.000001				0.000001
DIFF Pre G3 - G2	stratum-M-L-H		0.000000	0.000001				0.000136	0.000051	0.000000				0.000000
			**	***				**	***	***				***
		0.011894	-0.004671	19.787198	-0.000023					-0.000400				0.016631
	stratum-M-L-L	0.006718	0.000669	7.832745	0.000011					0.000219				0.006954
		*	***	**	**					*				**
					-0.000106	0.000041				0.000019				
	stratum-M-L-M				0.000057	0.000015				0.000008				
					*	***				**				
								0.000009	0.000006	0.000001		0.000001		0.000001
	stratum-M-M-H							0.000004	0.000002	0.000000		0.000000		0.000000
								**	**	***		***		***
				-0.000024									-0.000011	
	stratum-M-M-L			0.000011									0.000006	
				**									**	
				0.000008	0.000002	0.000002	-0.001345			0.000004				0.000003
	stratum-M-M-M			0.000001	0.000000	0.000001	0.000373			0.000000				0.000000
				***	***	*	***			***				***

Table 15: "Simple Model" Tests for B.I Shares Executed Data

Simple Model - B.I

Term	Segment	Order Type 10	11	12	13	14	15	16	17	18	19	20	21	22	all
Post G1 - C DIFF Pre G1 - C	pre_spd_class-0	-22,105.691900 4,201.591946 ***	-50,931.647560 15,729.144870 ***		-53,843.056860 7,170.915627 ***	-35,062.776890 2,250.485224 ***	-1,110.882181 227.872506 ***	-420.383234 73.936022 ***	14,492.986610 2,980.291064 ***	38,867.549370 9,901.430042 ***					
	pre_spd_class-10	-1,903.242497 1,134.576483 *	-5,177.540063 2,151.160338 **	-10,905.820170 690.023629 ***	2,436.837813 775.168032 ***	-4,909.394914 414.161395 ***	109.726965 9.591493 ***			1,567.723807 605.870567 ***					
	pre_spd_class-<S	-9,454.361610 3,772.605231 **	-24,205.627040 8,383.458326 ***	-17,077.882150 1,587.050000 ***		-12,507.907870 1,392.836741 ***	477.551008 77.473176 ***	-277.930561 59.056027 ***	1,957.537014 1,150.732467 *	13,492.332090 2,735.666182 ***		-7,200.491382 3,059.250582 **		-1,849.878558 831.602484 **	
	pre_spd_class->S	-15,644.020910 4,353.362794 ***	-24,786.487680 9,152.428396 ***	-28,704.354010 2,212.655040 ***		-15,128.348690 1,453.390690 ***	290.180113 49.921633 ***	-213.493755 97.996272 **	3,595.826346 1,266.684092 ***	6,810.812105 3,169.738165 **			112.619890 68.224677 *		
	sector-E	-16,668.109010 4,167.962083 ***	-28,817.599640 9,364.423689 ***	-22,458.553340 2,563.353574 ***	-12,653.682890 3,262.903625 ***	-23,170.155350 2,419.497565 ***	173.173627 77.380584 **	-271.403693 56.103673 ***	5,606.354077 1,155.624238 ***	7,855.077276 2,337.778064 ***					
	sector-F		-7,270.696986 3,865.480172 *	-6,097.457081 873.037263 ***		-2,586.527227 789.176181 ***	-116.384687 67.474264 *			2,213.138965 1,142.481547 *			67.589357 36.676796 *		
	sector-H	-16,325.702790 5,974.335255 ***		-22,920.970620 2,685.883519 ***		-15,481.873840 1,956.241919 ***	425.903129 86.955385 ***	-231.444936 89.691498 ***	2,952.661678 1,193.134342 **	9,747.741737 3,212.098084 ***			194.448936 112.721279 *		
	sector-I	-3,760.947499 2,175.080474 *	-24,747.339820 4,977.937685 ***	-12,704.588750 1,233.425355 ***	-7,782.261676 2,328.282950 ***	-8,578.583125 896.186585 ***		-141.786698 50.166140 ***				-4,496.473249 2,122.420898 **		-1,549.273441 789.065446 **	
	sector-R			-11,578.767260 1,267.221022 ***		-8,882.136878 752.680656 ***	97.753526 53.573089 *		4,180.887852 1,373.300451 ***	18,820.739350 4,468.754568 ***					
	sector-T	-13,064.317850 2,465.815797 ***	-24,697.430830 6,515.280240 ***	-16,881.256290 1,367.754047 ***	-12,648.699660 2,935.174717 ***	-13,439.101660 868.815141 ***		-297.867509 56.419108 ***	2,140.296974 1,111.305767 *	6,494.327859 2,496.061138 ***	-16,925.668110 9,254.050856 *	-6,073.236337 2,448.083988 **	90.210506 51.621531 *	-1,747.973223 799.959010 **	
	stratum-H-H-H			-34,328.340700 2,420.146156 ***		-23,678.267290 1,375.123345 ***	781.221719 81.951597 ***		5,368.721669 1,409.673715 ***	17,657.324590 3,628.576464 ***			142.199986 82.491977 *		
	stratum-H-H-L			-3,672.474209 1,492.250821 **		-1,157.393936 391.164328 ***						-2,446.352150 1,483.289181 *			
	stratum-H-H-M	-1,750.315512 614.198510 ***	-5,407.891488 2,480.874806 **	-17,698.875510 1,073.377869 ***	3,375.085769 1,190.657511 ***	-5,921.810512 370.483964 ***	87.554789 14.191639 ***	-21.569842 12.715742 *				-3,933.550385 1,725.113164 **			-30,009.105310 7,215.765458 ***
	stratum-H-L-H	-34,704.946520 11,898.923910 ***		12,056.906250 7,152.742690 *	-72,989.913110 37,167.615370 *	-38,317.851590 5,459.087705 ***	-1,899.927233 792.976530 **	-812.092988 253.377242 ***	45,486.615060 19,897.157160 **	149,794.420600 72,548.310380 **	-12,764.285710 6,742.394831 *			-21,323.738800 9,116.565860 **	
	stratum-H-M-H	-8,907.590371 4,010.075670 **	-41,193.051540 13,953.096340 ***	-14,528.942540 2,456.287034 ***	-38,903.718930 6,738.825269 ***	-28,463.239350 2,073.784945 ***		-270.989264 79.078066 ***	9,505.657431 2,439.202395 ***	24,302.534240 5,651.556729 ***					-101,179.672800 36,739.072170 ***
	stratum-H-M-M	5,324.721247 1,444.330391 ***		-7,939.906482 1,579.472939 ***		-5,181.391258 778.455259 ***			3,752.503780 1,595.235394 **	13,217.450440 3,020.506315 ***				-1,884.151912 1,084.115918 *	
	stratum-L-H-L												85.100491 36.292566 **	89.738852 41.575099 **	
	stratum-L-L-H	-54,386.284950 20,584.592940 ***	-79,862.954750 35,167.915690 **	-28,687.869360 7,436.239489 ***		-25,056.334980 6,444.686136 ***	645.270931 334.808341 *	-518.127620 252.398425 **						-5,357.966861 2,876.634624 *	-194,944.121700 91,059.510170 **
	stratum-L-L-L	-14,897.742490 4,439.661787 ***	-23,567.134770 6,730.602068 ***	-8,863.472402 1,633.170778 ***	-3,372.458367 1,592.235456 **	-5,468.745598 1,589.478882 ***									-58,931.400630 17,300.330780 ***
	stratum-L-L-M	-15,753.689390 7,678.107707 **	-27,432.374680 14,767.717580 *	-16,996.523770 3,258.340751 ***		-9,909.835896 3,267.193034 ***		-343.621436 120.020227 ***				-6,318.599113 3,245.197662 *			-80,510.044310 37,606.818510 **
	stratum-L-M-L			-1,911.942643 276.270315 ***	757.301009 358.098259 **		9.153445 5.265695 *		-276.691651 132.531017 **						
	stratum-L-M-M		11,357.499140 5,041.147096 **		5,639.976857 2,050.125235 ***		21.806882 11.996709 *			4,095.379289 1,724.362393 **				953.827194 414.468598 **	
	stratum-M-H-H	20,344.400560 7,707.246198 ***	102,950.102500 25,720.251210 ***	-18,870.314440 8,420.783995 **	52,959.844690 10,541.442600 ***		731.941002 168.838431 ***	344.292274 107.382857 ***	23,134.934110 4,855.185815 ***	49,977.378630 10,031.715120 ***		15,566.764750 7,334.002840 **		7,527.335281 2,197.324014 ***	250,686.634900 68,151.566210 ***
	stratum-M-H-L			-2,493.416763 394.789035 ***	1,312.234695 285.249372 ***	-600.417715 72.230489 ***									
	stratum-M-H-M	3,646.341759 1,057.659834 ***	8,601.510554 3,584.623634 **	-12,957.964190 1,578.970739 ***	9,197.746969 1,621.248767 ***	-2,738.476022 483.625397 ***	103.314921 21.979789 ***		2,106.987106 604.820629 ***	3,906.533880 1,459.650951 ***				1,795.460009 398.886241 ***	
	stratum-M-L-H	-24,794.326250 7,317.657497 ***	-54,146.404000 18,198.080090 ***	-5,514.484977 2,611.965585 **	-26,843.690460 7,937.444851 ***	-19,439.347080 2,702.183824 ***	-941.801124 228.607209 ***	-401.791290 100.932275 ***						2,722.320604 1,247.045587 **	-121,960.165100 46,543.747380 ***

Table 15: "Simple Model" Tests for B.I Shares Executed Data , cont'd

Simple Model - B.I

		Order Type													
Term	Segment	10	11	12	13	14	15	16	17	18	19	20	21	22	all
Post G1 - C DIFF Pre G1 - C	stratum-M-L-M			-10,760.252850 2,727.557476 ***		-7,189.719504 1,636.696195 ***									
	stratum-M-M-H	-29,621.113700 11,644.219840 **	-54,581.078290 19,910.799980 ***	-29,060.003940 5,801.587605 ***	-13,859.637200 7,993.760226 *	-15,410.197240 2,977.758497 ***	365.080600 147.905870 **	-551.154055 160.440821 ***			14,711.891650 6,213.300320 **	-11,467.784020 5,757.887288 **		-5,547.358793 2,354.181249 **	-150,528.119300 56,191.603920 ***
	stratum-M-M-L			-5,137.097708 784.264910 ***	2,260.375059 1,117.394218 **	-870.194188 224.947307 ***	16.040814 9.669274 *								
	stratum-M-M-M			-11,671.687410 1,944.204267 ***		-4,581.645212 754.111939 ***	173.581778 41.970361 ***	171.008221 91.312778 *							
Post G2 - G1 DIFF Pre G2 - G1	pre_spd_class-0	11,974.172150 5,308.248506 **				11,006.820700 2,843.240130 ***		274.913367 93.353541 ***	-6,348.287377 3,765.269401 *						
	pre_spd_class-10				1,882.158772 942.765026 **				836.774464 329.113035 **						
	pre_spd_class-<S						-419.935510 96.859944 ***								
	pre_spd_class->S		48,993.344110 11,528.056310 ***		24,730.775820 4,563.344626 ***		203.742418 62.985001 ***	274.301314 123.493767 **	7,643.750732 1,600.864423 ***	17,830.005690 3,998.379531 ***		6,685.202382 3,767.198219 *		4,456.292165 1,437.523788 ***	
	sector-E			5,723.073746 3,241.330421 *	-7,994.226892 4,125.138416 *		-320.466750 97.307051 ***	138.289112 69.544578 **	-2,959.544266 1,443.106722 **					-3,711.980689 1,524.728554 **	
	sector-F		8,662.483081 4,593.990986 *			-1,872.260765 937.812788 **	252.885329 80.562792 ***		3,174.723200 724.179099 ***	5,317.137771 1,355.122212 ***				1,939.987612 691.514109 ***	
	sector-H	12,926.419580 7,499.173526 *	33,658.267890 14,343.155690 **		19,029.790950 5,257.026181 ***			260.436086 114.603912 **	3,968.236618 1,498.349963 ***	11,042.924340 4,030.678412 ***					
	sector-I		25,054.163630 6,401.167035 ***	-2,727.317654 1,586.318689 *	11,483.493500 2,994.349971 ***		161.801663 54.287144 ***	236.297098 64.320165 ***	4,132.044526 1,101.000216 ***	8,513.725886 2,379.291784 ***				2,959.613477 1,016.148742 ***	
	sector-R		-14,899.472870 7,715.140103 *	-4,111.104601 1,518.324250 ***		3,967.316104 901.044379 ***			-4,135.484907 1,653.487145 **	-14,961.313590 5,353.649530 ***					
	sector-T			4,528.063680 1,706.920632 ***		3,487.486640 1,085.691698 ***	-635.336323 97.562586 ***								
	stratum-H-H-H				11,156.015320 5,249.592223 **	5,878.873387 1,682.400878 ***		116.299218 48.677876 **			8,295.799818 3,114.701057 ***			2,616.490162 1,124.879945 **	
	stratum-H-H-L	2,337.829025 1,206.220112 *	18,416.294340 5,105.303710 ***		8,700.646749 2,606.196284 ***	810.718881 466.017942 *		257.611823 120.049870 **	2,037.746371 778.732027 ***	5,359.639433 1,907.313062 ***				2,219.382366 713.691598 ***	44,272.967890 14,072.736990 ***
	stratum-H-H-M		5,435.510951 2,993.501667 *		3,093.081918 1,436.684849 **		41.038698 17.073737 **			2,750.626447 1,189.369561 **					
	stratum-H-L-H			-19,697.510360 8,416.609512 **				1,205.699728 296.705275 ***	-46,590.249910 23,412.921380 **	-152,819.973500 85,367.365460 *	10,851.947410 6,208.982642 *				
	stratum-H-M-H			5,116.078623 3,064.981962 *		8,955.949038 2,587.607239 ***	-949.932550 246.870503 ***								
	stratum-H-M-M		-21,082.671860 10,190.835800 **	-3,738.904300 2,013.440834 *					-3,520.026764 2,050.698488 *	-9,829.482432 3,850.405160 **			-670.439684 260.964041 **		-53,893.903410 26,699.743480 **
	stratum-L-L-H				24,860.489910 14,941.064070 *				6,398.934918 3,376.560641 *	27,303.109220 9,606.763205 ***				7,387.305820 3,661.775853 **	
	stratum-L-L-L											1,177.705246 700.317833 *			
	stratum-L-M-L								559.179717 159.814927 ***	782.050263 269.453668 ***		1,773.341498 855.728734 **	136.774782 48.820664 ***	221.386818 99.039763 **	5,043.761492 2,866.704709 *
	stratum-L-M-M		-10,368.386290 6,174.119052 *	-7,877.217453 2,109.619691 ***		-2,213.073155 787.771186 ***	27.684038 14.673658 *							-1,316.405256 507.523316 ***	
	stratum-M-H-H		-125,983.860700 30,741.580090 ***	-21,965.264770 10,064.761940 **	-56,657.248280 12,599.433780 ***	-13,717.261410 3,467.262903 ***	-468.396149 200.731412 **	-334.169629 127.936336 ***	-17,042.425900 5,803.056989 ***	-61,398.436530 11,930.192920 ***		-26,966.047280 8,765.810016 ***		-9,083.376791 2,626.304526 ***	-348,234.929400 81,456.701710 ***
	stratum-M-H-L					213.568378 89.386757 **									

Table 15: "Simple Model" Tests for B.I Shares Executed Data , cont'd

Simple Model - B.I

		Order Type													
Term	Segment	10	11	12	13	14	15	16	17	18	19	20	21	22	all
Post G2 - G1		-2,358.963827		5,953.563291					-1,561.032975					-1,557.215522	
DIFF Pre G2 - G1	stratum-M-H-M	1,277.245594		1,906.788321					730.390300					461.700900	
		x		xxx					xx					xxx	
	stratum-M-L-H							257.527284							
								135.660048							
								x							
	stratum-M-L-L			-9,157.317025		-3,134.542980								-1,360.573664	-50,410.812900
				3,094.561208		1,534.198310								819.796829	28,874.668150
				xxx		xx								x	x
	stratum-M-M-H	24,348.530130	69,943.273750		40,771.217130		341.654685	561.875529	10,320.993300	19,568.319110		20,526.870370		7,926.116738	192,767.978600
		14,046.906780	24,038.752690		9,651.044924		178.401601	191.723640	2,956.660921	8,054.540107		6,951.625682		2,846.627732	67,841.375960
		x	xxx		xxx		x	xxx	xxx	xx		xxx		xxx	xxx
	stratum-M-M-L		5,347.082884						1,996.678777	3,422.869851					14,760.040540
			2,999.130340						594.083950	1,079.799874					8,238.353996
			x						xxx	xxx					x
	stratum-M-M-M				10,724.689750				4,558.466227	9,645.433141	-26,444.855250	7,349.283791			
					5,089.883410				1,865.268261	4,596.140634	13,091.099720	3,765.130106			
					xx				xx	xx	xx	x			
Post G3 - G2	pre_spd_class-0			-5,888.806436	15,414.989720		746.392883			-55,724.889760				-4,734.354600	
DIFF Pre G3 - G2				2,753.416580	8,994.860115		267.226469			12,419.889280				2,333.943025	
				xx	x		xxx			xxx				xx	
	pre_spd_class-10			1,993.164362	-2,473.570840	1,081.442621	72.613458		-548.622637	-8,248.567778					
				847.204776	952.676913	508.374847	12.522370		331.691134	741.808809					
				xx	xxx	xx	xxx		x	xxx					
	pre_spd_class-<5		21,215.529280	-3,760.177912	9,426.468773	-4,660.348320	732.615976		4,666.762066	-32,794.028240					
			10,638.189090	2,013.887031	4,593.416450	1,767.252893	98.886429		1,465.412334	3,467.875241					
			xx	x	xx	xxx	xxx		xxx	xxx					
	pre_spd_class->5				-8,728.543770		225.047188	-290.337267		-37,053.072380					
					4,719.440736		66.331738	127.509900		4,134.942240					
					x		xxx	xx		xxx					
	sector-E		21,339.465620		18,271.280370	6,780.666943	464.483865	125.783534		-15,478.517660					
			11,429.534350		3,981.724588	2,952.862405	96.208298	67.188818		2,850.044159					
			x		xxx	xx	xxx	x		xxx					
	sector-F					1,665.086431			-1,634.760066	-12,477.844090				-1,458.080438	
						894.778479			685.001300	1,293.237711				660.016473	
						x			xx	xxx				xx	
	sector-H			8,438.788446	-14,594.600510			-200.435000		-34,583.229400		-8,706.345598			
				3,333.734957	5,198.286614			114.163024		3,985.641485		4,039.052933			
				xx	xxx			x		xxx		xx			
	sector-I	-6,533.776616	-16,782.274740		-7,541.196233			-226.896553	-1,974.089897	-22,492.924230				-2,391.100145	
		2,825.290626	6,473.123616		3,029.450145			64.516409	1,107.141692	2,397.367869				1,029.492906	
		xx	xxx		xx			xxx	x	xxx				xx	
	sector-R	-8,542.232776			-8,443.668416	-7,747.338142	217.676065	-112.325101		-22,311.218520					
		2,264.926756			3,774.979239	959.957709	70.997617	62.338990		5,732.943154					
		xxx			xx	xxx	xxx	x		xxx					
	sector-T		28,669.524600	-3,720.431357	16,062.232470		1,008.741960		3,818.783257	-20,346.359030					
			8,700.286884	1,826.523333	3,928.484407		106.285319		1,498.232656	3,334.986774					
			xxx	xx	xxx		xxx		xx	xxx					
	stratum-H-H-H	-8,987.304177				-3,339.449119	382.034058	-198.350207	3,648.318559	-41,663.965530	-4,582.194371				
		3,245.226046				1,692.748289	100.910504	49.464697	1,735.279077	4,495.193007	2,746.435276				
		xxx				xx	xxx	xxx	xx	xxx	x				
	stratum-H-H-L	-2,779.606992	-15,696.323430		-7,599.526222	-797.858154	32.686898	-251.030547	-1,771.089214	-6,218.408469			-250.330189	-1,865.904222	-39,113.032720
		1,116.742825	4,726.592790		2,412.868903	431.448777	17.182908	84.685976	717.958886	1,557.314594			113.262706	660.750026	13,028.822760
		xx	xxx		xxx	x	x	xxx	xx	xxx			xx	xxx	xxx
	stratum-H-H-M		-7,252.134047		-4,557.943191	923.574789				-11,730.619130			-207.847691		-23,641.933840
			3,016.039286		1,447.501430	450.402567				1,198.324143			73.109823		8,772.321782
			xx		xxx	xx				xxx			xxx		xxx
	stratum-H-L-H												-1,106.077072		
													345.624153		
													xxx		
	stratum-H-M-H		52,536.775820	-9,635.869424	27,444.300470		1,696.483866		5,482.813638	-50,353.792120					
			18,108.690170	3,187.932992	8,745.822137		256.773977		3,165.660026	7,321.946260					
			xxx	xxx	xxx		xxx		x	xxx					
	stratum-H-M-M	-3,758.163606								-11,688.028890			520.070003		
		1,886.080330								3,944.331284			267.302931		
		xx								xxx			x		
	stratum-L-H-L	361.873342					102.846722		281.318063						
		128.653652					17.134328		148.096722						
		xxx					xxx		x						
	stratum-L-L-H						-2,003.634535			-54,913.359950		-29,394.549710			
							504.367506			11,264.928380		13,971.321630			
							xxx			xxx		xx			
	stratum-L-L-L						58.735147		702.613596						
							10.125265		322.065124						
							xxx		xx						
	stratum-L-L-M						340.488534		3,301.047261	-7,440.567896					
							103.162414		1,328.593147	4,468.682967					
							xxx		xx	x					

Table 15: "Simple Model" Tests for B.I Shares Executed Data , cont'd

Simple Model - B.I

		Order Type													
Term	Segment	10	11	12	13	14	15	16	17	18	19	20	21	22	all
Post G3 - G2							44.344272			-1,285.841122		-1,470.225791	-151.986672		
DIFF Pre G3 - G2	stratum-L-M-L						7.635808			269.453668		862.222603	48.769906		
							***			***		*	***		
	stratum-L-M-M			7,868.091791		2,992.645638			-2,322.455055	-4,365.374409					
				2,109.619691		787.771186			1,010.368398	2,111.903997					
				***		***			**	**					
	stratum-M-H-H		112,936.737400	38,306.400560	51,239.569640	17,163.551650	609.780304	326.176657				26,867.926020		9,234.122876	292,999.424600
			30,741.580090	10,064.761940	12,599.433780	3,467.262903	200.731412	127.936336				8,765.810016		2,626.304526	81,456.701710
			***	***	***	***	***	**				***		***	***
	stratum-M-H-L			-860.848243	774.896282	-207.145526	29.926191		431.267819	-1,633.896914					
				487.553324	352.824369	89.353367	7.325802		145.219861	326.354047					
				*	**	**	***		***	***					
	stratum-M-H-M	-2,777.971070		-4,733.013896		-1,758.361980	84.075394			-9,174.445262					-24,210.190410
		1,277.245594		1,906.788321		584.033152	27.055247			1,762.695987					13,583.319220
		**		**		***	***			***					*
	stratum-M-L-H		46,466.995330		23,689.298560		1,109.460217		6,509.177941	-36,747.751910					
			24,196.310890		10,553.689310		304.116597		2,653.674735	7,333.220628					
			*		**		***		**	***					
	stratum-M-L-L		31,255.835170	9,097.178839	13,825.794260					22,222.790640					81,612.162460
			16,361.639680	4,337.119679	8,399.505267					8,108.876238					40,468.707200
			*	**	*					***					**
	stratum-M-L-M		26,525.819830	5,914.040239	16,650.698760	3,668.020174	367.106284			-17,679.484950					
			15,584.152800	3,071.248712	6,592.059157	1,842.361658	98.237314			4,268.733125					
			*	*	**	**	***			***					
	stratum-M-M-H	-38,985.159720	-103,777.032600		-53,773.271070	-12,597.235690	-341.638941	-680.216694	-9,778.933178	-70,633.994140			357.749649	-8,914.411602	-312,245.253200
		14,279.102790	24,436.114360		9,810.577136	3,654.541618	181.349530	193.148737	3,005.534660	8,187.682021			143.424949	2,893.503953	68,962.796990
		***	***		***	***	*	***	***	***			**	***	***
	stratum-M-M-L						43.557477			-5,166.047776					
							12.527173			1,079.799874					
							***			***					
	stratum-M-M-M	-8,691.060788	-27,208.101830		-13,322.246880				-5,180.582367	-22,044.023220	33,766.398270	-6,664.068057		-2,858.044397	-85,145.043920
		4,231.600195	11,291.258130		5,182.265206				1,899.496222	4,680.480524	16,290.279880	3,834.220824		1,677.909266	32,350.324940
		**	**		**				***	***	**	*		*	***

Table 16: "Simple Model" Tests for "TAQ" (Rosenblatt Ticker Plant) Data

Simple Model - TAQ

Metric	Term	Segment	Length: 100 micros	1 ms	100 ms	1 sec	30 sec	1 min	5 min	30 min
exec qty	Post G1 - C DIFF Pre G1 - C	stratum-H-H-H	-22,915.8332 12,119.4272 *	-22,915.7396 12,119.3840 *	-23,350.1930 12,111.5696 *	-23,284.2640 12,099.5559 *	-23,283.2896 11,926.2925 *	-22,537.3970 11,810.7323 *	-19,954.9075 11,303.8116 *	
		stratum-H-H-M	-18,588.6284 3,470.0875 ***	-18,589.1285 3,470.0855 ***	-18,687.3957 3,467.3193 ***	-18,665.5730 3,461.3437 ***	-18,605.7480 3,404.5585 ***	-18,308.3817 3,368.4585 ***	-16,598.8677 3,205.1347 ***	-14,470.1039 2,772.7129 ***
		stratum-H-M-H	-89,247.8907 17,867.4920 ***	-89,247.1986 17,867.5516 ***	-89,791.2669 17,861.2972 ***	-89,788.6750 17,827.5658 ***	-90,048.9556 17,537.2687 ***	-88,915.2278 17,338.6048 ***	-84,496.4390 16,623.9109 ***	-68,313.2422 14,763.7759 ***
		stratum-L-L-H	-90,501.7810 42,293.1837 **	-90,501.7487 42,293.2390 **	-90,731.4569 42,278.6322 **	-91,153.5669 42,259.8515 **	-91,589.1641 42,010.7591 **	-91,446.7139 41,835.2914 **	-90,656.9911 40,964.5766 **	-84,259.3953 38,227.3613 **
		stratum-L-L-L	-18,604.6567 8,071.8612 **	-18,604.6227 8,071.8612 **	-18,629.3696 8,071.0696 **	-18,660.7161 8,069.3780 **	-18,575.0052 8,042.4540 **	-18,461.2022 8,021.8697 **	-18,076.0079 7,926.8091 **	-16,715.2752 7,643.7867 **
		stratum-L-L-M	-43,155.4306 21,781.7174 **	-43,155.5043 21,781.7503 **	-43,312.5498 21,778.5273 **	-43,708.7920 21,769.5298 **	-43,909.6856 21,687.2009 **	-43,619.8651 21,621.5495 **	-41,974.7765 21,244.2516 **	-36,679.7322 20,042.7526 *
		stratum-L-M-L	-2,417.6562 1,106.1634 **	-2,417.6220 1,106.1628 **	-2,426.8493 1,105.3730 **	-2,445.8180 1,102.3184 **	-2,362.6812 1,085.0424 **	-2,331.8400 1,078.4017 **	-2,204.0108 1,041.8555 **	-1,933.7340 943.3691 **
		stratum-L-M-M	15,837.8995 7,844.1235 **	15,838.0948 7,844.1200 **	15,758.6126 7,834.0155 **	15,702.4242 7,825.4898 **	14,874.1527 7,737.9801 *	14,698.4156 7,686.4505 *	14,045.0642 7,391.3172 *	13,140.6026 6,649.4371 **
		stratum-M-H-H	91,943.6406 36,840.7591 **	91,943.8106 36,840.7803 **	91,560.5044 36,817.6807 **	91,235.2113 36,760.8419 **	88,209.1616 36,187.5765 **	87,154.1401 35,843.3064 **	84,041.4497 34,130.2439 **	75,696.0656 29,809.3034 **
		stratum-M-H-L	-2,594.4307 1,077.5450 **	-2,594.6360 1,077.5347 **	-2,608.3385 1,075.9596 **	-2,586.0723 1,074.0887 **	-2,479.1988 1,053.5688 **	-2,381.3839 1,041.8975 **	-1,979.3398 990.0097 **	-1,990.2842 861.6695 **
		stratum-M-L-H	-83,740.9015 23,007.8076 ***	-83,744.0906 23,007.8234 ***	-84,369.9527 22,991.0582 ***	-84,946.0446 22,968.5633 ***	-84,599.8898 22,663.2448 ***	-83,989.8280 22,466.3557 ***	-80,479.9421 21,654.5683 ***	-70,555.7631 19,664.1453 ***
		stratum-M-L-M	-37,138.7243 17,254.5528 **	-37,138.6931 17,254.5530 **	-37,320.2863 17,238.7806 **	-37,496.1418 17,214.9841 **	-37,460.9270 17,000.6733 **	-37,205.4839 16,864.4576 **	-34,984.7410 16,356.8072 **	-30,685.4663 15,009.9154 **
		stratum-M-M-H	-85,080.2460 27,850.0603 ***	-85,080.1462 27,850.0926 ***	-85,604.7974 27,838.1442 ***	-85,533.8818 27,813.3157 ***	-85,319.2187 27,520.5442 ***	-84,617.5451 27,288.9788 ***	-80,097.8105 26,374.1797 ***	-69,085.1462 23,908.7771 ***
	Post G2 - G1 DIFF Pre G2 - G1	stratum-H-H-L	22,575.0262 8,437.6350 ***	22,575.0264 8,437.6363 ***	22,568.4389 8,434.0039 ***	22,533.1605 8,427.5988 ***	21,997.4374 8,293.6833 ***	21,718.1827 8,214.2283 ***	20,523.0523 7,830.2605 ***	18,097.5584 6,676.2397 ***
		stratum-H-H-M	10,404.2230 4,176.8173 **	10,404.5620 4,176.8150 **	10,385.1805 4,173.4853 **	10,333.3236 4,166.2926 **	10,249.3915 4,097.9416 **	10,254.7174 4,054.4890 **	9,846.4056 3,857.9011 **	8,640.9303 3,337.4086 ***
		stratum-H-M-M	-22,731.9530 12,976.1199 *	-22,732.2701 12,976.1148 *	-22,806.8994 12,960.4906 *	-22,823.0243 12,937.2696 *	-22,234.6809 12,668.7654 *	-21,810.5595 12,518.1485 *	-20,510.1567 11,943.2521 *	-17,248.4408 10,312.6372 *
		stratum-L-L-H	109,595.8058 53,741.5861 **	109,595.9652 53,741.6563 **	109,390.2670 53,723.0957 **	109,049.0881 53,699.2323 **	107,770.9584 53,382.7295 **	107,117.7719 53,159.7741 **	105,857.2053 52,053.4006 **	99,777.0544 48,575.3251 **
		stratum-L-M-M	-22,677.6929 9,201.5566 **	-22,677.6934 9,201.5525 **	-22,664.2508 9,189.6993 **	-22,630.8359 9,179.6980 **	-22,232.9164 9,077.0540 **	-22,111.1971 9,016.6149 **	-20,770.7502 8,670.4316 **	-18,307.2131 7,800.2254 **
		stratum-M-H-H	-133,773.5133 47,009.9560 ***	-133,773.5146 47,009.9830 ***	-133,742.7590 46,980.4912 ***	-133,373.0482 46,907.9269 ***	-129,673.9043 46,176.2903 ***	-127,567.6927 45,736.9057 ***	-119,724.4517 43,550.7764 ***	-100,436.2540 38,036.7916 ***
		stratum-M-M-H	81,700.7552 33,165.3168 **	81,700.5574 33,165.3552 **	81,677.0340 33,151.1267 **	81,455.7820 33,121.5603 **	80,187.1645 32,772.9173 **	79,699.2022 32,497.1584 **	76,534.7604 31,407.7768 **	70,481.7146 28,471.8638 **
		stratum-M-M-L	9,643.9799 4,375.3024 **	9,643.9998 4,375.3017 **	9,619.2159 4,371.9017 **	9,590.8806 4,367.5703 **	9,376.8916 4,298.3697 **	9,189.9697 4,249.5750 **	8,791.6305 4,068.6145 **	7,963.5097 3,605.4900 **
	Post G3 - G2 DIFF Pre G3 - G2	stratum-H-H-H	34,112.4960 15,141.1080 **	34,111.9419 15,141.0541 **	34,055.9481 15,131.2912 **	34,199.4341 15,116.2820 **	32,866.0934 14,899.8183 **	31,595.1687 14,755.4453 **	26,360.8628 14,122.1337 *	
		stratum-H-H-L	-18,664.5341 7,100.3547 ***	-18,664.5343 7,100.3558 ***	-18,666.3861 7,097.2985 ***	-18,630.9536 7,091.9067 ***	-18,117.1013 6,979.1994 ***	-17,908.1437 6,912.3284 ***	-16,893.1338 6,589.1800 ***	-14,713.8979 5,618.0492 ***
		stratum-H-M-H	102,613.1467 22,272.8260 ***	102,614.2133 22,272.9003 ***	102,471.8197 22,265.1051 ***	102,634.3153 22,223.0585 ***	99,581.5273 21,861.2049 ***	97,387.5965 21,613.5672 ***	91,046.3360 20,722.6984 ***	80,013.7174 18,404.0094 ***
		stratum-L-H-L	2,089.0077 873.8051 **	2,089.0077 873.7899 **	2,087.3171 873.3897 **	2,092.1750 870.5585 **	2,099.9270 850.1394 **	2,078.2230 839.5337 **	2,092.3306 797.7781 ***	1,913.7151 709.5065 ***
		stratum-L-M-L	4,384.9338 1,351.8743 ***	4,385.0372 1,351.8736 ***	4,376.1783 1,350.9082 ***	4,377.5505 1,347.1756 ***	4,296.2713 1,326.0525 ***	4,278.6062 1,317.9331 ***	4,199.4842 1,273.2579 ***	3,913.6262 1,152.8766 ***
		stratum-L-M-M	17,029.4822 8,394.6046 **	17,029.4822 8,394.6009 **	17,022.5203 8,383.7870 **	17,066.4160 8,374.6625 **	17,225.3307 8,281.0380 **	17,359.0201 8,225.9140 **	16,659.3117 7,910.1342 **	15,017.9531 7,116.3516 **
		stratum-M-H-H	177,308.4208 47,009.9560 ***	177,308.4220 47,009.9830 ***	177,340.1309 46,980.4912 ***	176,659.9264 46,907.9269 ***	172,763.6341 46,176.2903 ***	170,018.5724 45,736.9057 ***	158,525.9554 43,550.7764 ***	131,348.9711 38,036.7916 ***
		stratum-M-L-H	119,622.3499 30,781.0890 ***	119,622.0548 30,781.1101 ***	119,444.0224 30,758.6794 ***	119,918.2066 30,728.5814 ***	118,058.1810 30,320.0965 ***	116,454.2269 30,056.6819 ***	110,902.8476 28,970.6151 ***	96,517.9138 26,307.6753 ***

Table 16: "Simple Model" Tests for "TAQ" (Rosenblatt Ticker Plant) Data, cont'd

Simple Model - TAQ

			Length							
Metric	Term	Segment	100 micros	1 ms	100 ms	1 sec	30 sec	1 min	5 min	30 min
exec qty	Post G3 - G2 DIFF Pre G3 - G2	stratum-M-L-L	47,967.1383 26,329.2612 *	47,967.1383 26,329.2587 *	47,973.2595 26,328.3576 *	47,929.5346 26,320.5422 *	46,840.6043 25,756.4304 *	46,549.1436 25,572.3411 *	45,167.3134 24,618.7713 *	48,511.3016 26,144.2991 *
		stratum-M-L-M	61,545.7661 19,622.1626 ***	61,546.1253 19,622.1627 ***	61,315.9942 19,604.2242 ***	61,195.9737 19,577.1613 ***	59,729.6232 19,333.4202 ***	59,283.1510 19,178.5075 ***	56,837.3910 18,601.1634 ***	50,586.9314 17,069.3838 ***
		stratum-M-M-H	-87,549.7409 34,768.7413 **	-87,550.4010 34,768.7815 **	-87,731.9568 34,753.8644 **	-87,624.0664 34,722.8670 **	-88,214.3742 34,357.3559 **	-88,275.2837 34,068.2614 ***	-88,805.8384 32,926.1876 ***	-85,420.5353 29,848.2860 ***
price impact bps	Post G1 - C DIFF Pre G1 - C	stratum-H-H-H		433,398.6291 79,968.0333 ***	670,292.6188 101,712.3722 ***	649,871.1413 107,143.2456 ***	517,822.7473 125,923.1113 ***	504,069.4868 126,661.3797 ***	446,806.0691 132,772.1875 ***	374,580.9130 151,162.1088 **
		stratum-H-H-M		41,317.0153 21,560.7235 *	58,738.3247 23,673.4656 **	46,139.4158 24,974.0967 *		-83,397.4321 34,018.9909 **	-122,418.6258 43,013.6298 ***	-114,895.2177 62,299.5516 *
		stratum-H-L-H		1,862,750.7650 773,016.8375 **	1,834,878.8760 998,239.7272 *					
		stratum-H-M-H		1,595,149.7860 178,198.3145 ***	2,188,034.6860 244,660.1873 ***	2,130,893.7580 279,438.8772 ***	1,779,851.8280 366,546.0780 ***	1,732,303.6130 363,777.6140 ***	1,508,293.5930 397,170.5587 ***	888,162.6989 506,397.1958 *
		stratum-H-M-M	121,881.3080 33,303.6736 ***	473,227.1869 59,854.3793 ***	712,861.6620 79,594.6841 ***	745,034.9261 84,565.1858 ***	733,547.1006 106,231.2951 ***	746,284.1420 109,140.9087 ***	806,599.9520 128,121.9127 ***	757,218.5786 137,828.5822 ***
		stratum-L-H-L							-54,391.2944 29,978.3574 *	
		stratum-L-L-H	-436,011.1325 189,192.6699 **							
		stratum-L-L-L	-193,381.5458 68,999.8325 ***	-183,105.9591 87,284.3795 **	-308,304.5459 184,333.8313 *			-862,145.9909 513,260.8040 *		
		stratum-L-L-M		396,950.5396 150,089.7259 ***	618,196.2118 295,203.9745 **	746,647.5997 400,791.6524 *				
		stratum-L-M-M		242,848.8007 102,746.8801 **	418,453.9603 175,848.8611 **	417,331.5013 192,460.8391 **	622,155.5713 275,056.6949 **	631,841.2934 291,695.0408 **	728,135.0200 312,613.4110 **	793,518.1183 367,878.6446 **
		stratum-M-H-H	242,723.4016 104,489.1159 **	1,257,771.3820 262,208.3552 ***	2,175,233.6190 453,789.1116 ***	2,263,957.9230 512,538.7625 ***	2,741,250.1820 789,923.6471 ***	2,849,565.5050 780,555.8100 ***	3,190,878.7210 829,571.7214 ***	1,746,492.3670 901,140.0642 *
		stratum-M-H-L	-21,379.6170 9,585.2341 **	-20,581.0795 10,761.4817 *						
		stratum-M-H-M	-82,628.9613 20,401.9453 ***						-104,996.6910 62,332.9142 *	
		stratum-M-L-H		1,462,601.8330 244,852.4129 ***	2,273,843.0510 367,577.4945 ***	2,365,767.8070 390,291.4996 ***	2,789,247.6930 519,540.6056 ***	2,779,088.9840 515,306.2137 ***	2,713,846.2910 530,417.7462 ***	2,075,563.5140 589,735.8325 ***
		stratum-M-L-M		391,216.5013 235,314.8323 *						
		stratum-M-M-H		766,616.5949 168,814.1126 ***	967,966.7028 255,476.0798 ***	916,963.5928 296,570.4426 ***				
		stratum-M-M-M	52,903.7048 30,406.9706 *	261,905.1039 74,690.1599 ***	375,344.7074 116,208.3150 ***	374,549.2771 137,719.7261 ***				
	Post G2 - G1 DIFF Pre G2 - G1	stratum-H-H-L			217,866.5842 96,539.6160 **	242,754.7812 110,451.4027 **	330,628.6532 139,120.4082 **	322,436.8138 143,799.4538 **	296,094.4359 149,542.4224 **	256,258.4182 143,903.4565 *
		stratum-H-H-M			51,226.0963 28,494.6452 *	56,545.7761 30,060.1649 *	82,623.6946 38,709.1449 **	95,449.2923 40,947.1240 **	94,432.0062 51,773.3284 *	
		stratum-H-M-H	-367,555.9214 157,965.6173 **	-648,555.2967 218,216.2767 ***	-812,993.4541 299,599.3468 ***	-817,606.0303 342,188.7840 **				
		stratum-H-M-M	-96,971.5843 43,410.2757 **	-184,662.8838 78,017.4688 **	-272,454.4956 103,747.8838 ***	-318,822.3693 110,226.5369 ***	-345,105.3844 138,466.2552 **	-349,498.5501 142,258.8037 **	-372,743.0430 166,995.9169 **	-426,579.4598 179,642.1506 **
		stratum-L-H-L	-26,671.6597 10,746.1751 **	-31,044.8347 11,445.7844 ***	-37,806.2736 15,263.3786 **	-40,995.2115 16,711.6638 **	-49,476.4732 24,749.0076 **	-49,506.4501 28,653.4614 *		
		stratum-L-L-H	806,547.2866 240,404.9985 ***	1,793,274.2280 470,234.1868 ***	2,779,110.3640 809,529.3935 ***	3,368,223.6990 975,169.3738 ***	4,996,219.9770 1,486,213.5050 ***	5,147,375.7410 1,643,672.1320 ***	5,536,506.2390 1,852,847.4250 ***	5,535,565.4500 2,091,624.1770 ***
		stratum-M-H-H		-943,074.4608 334,520.4131 ***	-1,610,756.5140 578,945.2743 ***	-1,688,844.0660 653,884.6003 **	-2,199,217.8160 1,007,653.3650 **	-2,280,120.0210 995,699.0539 **	-2,415,837.5150 1,058,205.6850 **	
		stratum-M-H-M	49,068.7013 24,525.5185 **		79,894.8445 42,798.2447 *	90,715.4852 47,039.1320 *	139,107.7105 67,386.1447 **	154,059.0283 70,524.1182 **	179,803.8228 74,931.4482 **	
		stratum-M-L-M		580,389.4730 279,497.2226 **	1,025,676.4160 521,119.5120 **	1,059,541.9000 610,179.0813 *				

Table 16: "Simple Model" Tests for "TAQ" (Rosenblatt Ticker Plant) Data, cont'd

Simple Model - TAQ

			Length							
Metric	Term	Segment	100 micros	1 ms	100 ms	1 sec	30 sec	1 min	5 min	30 min
price impact bps	Post G2 - G1 DIFF Pre G2 - G1	stratum-M-M-H		637,033.3702 201,032.2893 ***	975,890.5656 304,233.8832 ***	1,014,929.4500 353,171.9230 ***	1,157,170.3120 491,929.5232 **	1,137,568.3220 535,481.7297 **		
		stratum-M-M-L		52,303.9071 27,771.3835 *	106,547.8255 39,992.1696 ***	115,297.0364 42,821.1611 ***	201,320.9746 63,391.3130 ***	227,010.7907 71,138.4705 ***	248,099.7633 78,537.6117 ***	284,744.7170 87,961.2821 ***
		stratum-M-M-M		267,071.2541 91,608.6946 ***	452,176.9543 142,530.4354 ***	533,502.4925 168,913.6212 ***	756,832.0460 245,235.9252 ***	804,752.0529 245,901.7724 ***	850,134.6294 261,768.6287 ***	706,805.0798 333,720.2929 **
	Post G3 - G2 DIFF Pre G3 - G2	stratum-H-H-H							-286,736.1217 165,874.1900 *	-339,384.6228 188,847.6296 *
		stratum-H-H-L		-115,204.1708 43,518.0208 ***	-267,950.3778 81,230.5538 ***	-299,892.9955 92,935.1015 ***	-395,040.1077 117,060.0058 ***	-398,757.5641 120,997.2817 ***	-387,137.9095 125,828.7267 ***	-340,038.2279 121,079.6744 ***
		stratum-H-M-H	366,666.2325 160,828.7320 **	1,233,037.1360 222,151.3350 ***	1,897,924.8730 304,997.5312 ***	2,077,758.4060 348,355.5178 ***	2,477,277.8350 456,951.4635 ***	2,506,768.5400 453,499.5434 ***	2,236,560.8330 495,136.8298 ***	2,450,432.1970 631,350.2962 ***
		stratum-H-M-M				207,272.6749 112,816.9093 *				
		stratum-L-H-L	35,795.6980 11,071.0834 ***	45,571.3500 11,791.6421 ***	71,525.3959 15,724.4091 ***	71,115.2219 17,216.4905 ***	116,249.3830 25,496.0497 ***	128,670.1246 29,518.3752 ***	154,269.6984 36,655.0668 ***	179,706.8596 43,426.8338 ***
		stratum-L-L-L		201,034.4882 107,365.7994 *						
		stratum-L-L-M	216,796.2814 123,431.1002 *	762,832.1137 220,321.4653 ***	991,800.0590 433,339.5086 **	975,861.5164 588,335.8122 *				
		stratum-L-M-L	40,002.6559 13,226.5684 ***							
		stratum-M-H-M		73,738.9512 31,621.0916 **	106,917.8106 42,082.1425 **	99,258.8446 46,252.2472 **				
		stratum-M-L-L								925,159.6105 487,691.8978 *
		stratum-M-L-M	395,242.6905 107,144.4928 ***	863,496.5104 267,603.7764 ***	1,479,058.5260 498,937.6839 ***	1,750,676.3010 584,202.2780 ***	3,118,278.8280 989,324.6855 ***	3,324,756.2390 1,046,887.6240 ***	3,495,477.8390 1,149,312.5160 ***	3,687,660.1580 1,232,845.3260 ***
		stratum-M-M-H	266,632.3707 109,115.1654 **							
		stratum-M-M-L				-74,592.2748 42,821.1611 *	-140,143.2955 63,391.3130 **	-164,341.2134 71,138.4705 **	-170,589.1845 78,537.6117 **	-195,748.8138 87,961.2821 **
		stratum-M-M-M	-85,697.3907 37,969.6878 **	-299,090.0810 93,265.9252 ***	-487,122.5949 145,108.9139 ***	-571,781.6187 171,969.4346 ***	-787,451.3191 249,672.6117 ***	-817,789.6485 250,350.4812 ***	-875,305.2227 266,504.4466 ***	-834,294.0875 339,758.2616 **
price impact dollars	Post G1 - C DIFF Pre G1 - C	stratum-H-H-H		1,399.3118 258.7430 ***	2,189.0463 302.6719 ***	2,081.6945 328.2249 ***	1,512.5986 420.4196 ***	1,449.6883 433.3502 ***	1,200.2656 496.6807 **	
		stratum-H-H-M	-336.8267 86.6082 ***			-266.7224 141.1157 *	-912.4831 199.4457 ***	-1,085.7433 204.4530 ***	-1,318.1549 223.1279 ***	-1,179.1129 269.8675 ***
		stratum-H-L-H		3,167.0312 765.3902 ***	3,798.6447 994.8224 ***	3,698.9931 1,025.7070 ***	4,147.8656 1,289.8116 ***	4,205.1413 1,307.3837 ***	4,228.2493 1,299.0245 ***	3,110.3368 1,256.4242 **
		stratum-H-M-H		2,523.8297 244.2336 ***	3,451.7679 281.0560 ***	3,346.4961 305.3576 ***	2,760.2748 333.7333 ***	2,658.3163 332.7436 ***	2,327.3471 318.5356 ***	1,411.9363 429.4837 ***
		stratum-H-M-M	252.8895 64.6167 ***	934.5585 105.4693 ***	1,382.6757 140.8230 ***	1,440.9453 150.5836 ***	1,452.7229 197.6831 ***	1,462.2816 201.0597 ***	1,500.8296 237.1684 ***	1,276.4251 258.3961 ***
		stratum-L-M-L					-112.9301 57.1074 **	-134.6816 54.0842 **	-166.7125 63.0989 ***	-138.3746 72.1508 *
		stratum-L-M-M		314.2113 79.5413 ***	519.8459 129.0124 ***	540.3749 144.9204 ***	922.1565 223.8619 ***	974.5960 245.4846 ***	1,155.8354 305.4801 ***	1,243.1877 352.4868 ***
		stratum-M-H-H		1,475.8870 470.7559 ***	2,232.3670 749.9310 ***	2,114.7327 937.7083 **			2,167.6489 1,178.0636 *	
		stratum-M-H-M	-403.4328 99.2234 ***	-246.7764 128.3536 *				-484.7268 290.9899 *	-575.7151 303.5847 *	
		stratum-M-L-H	398.7031 114.3200 ***	1,527.0028 214.8750 ***	2,204.9550 295.1376 ***	2,284.8727 315.1987 ***	2,636.7305 393.8179 ***	2,683.3833 380.1668 ***	2,732.0794 396.9558 ***	2,509.8093 424.3128 ***
		stratum-M-L-M		408.4540 132.5269 ***	656.9655 203.6634 ***	680.0390 222.5982 ***	821.2554 308.4135 ***	819.1392 318.7107 **	768.6902 310.3696 **	1,109.6017 398.0798 ***
		stratum-M-M-H		1,336.1107 310.1110 ***	1,700.2491 453.0516 ***	1,591.8969 528.9326 ***				

Table 16: "Simple Model" Tests for "TAQ" (Rosenblatt Ticker Plant) Data, cont'd

Simple Model - TAQ

			Length							
Metric	Term	Segment	100 micros	1 ms	100 ms	1 sec	30 sec	1 min	5 min	30 min
price impact dollars	Post G1 - C DIFF Pre G1 - C	stratum-M-M-M	141.4892 73.4829 *	546.0523 118.0796 ***	807.3148 171.9254 ***	818.9532 188.5825 ***	759.9539 262.7057 ***	666.2759 235.7354 ***	555.8497 229.6505 **	
	Post G2 - G1 DIFF Pre G2 - G1	stratum-H-H-H				704.7290 399.8959 *				
		stratum-H-H-L	-576.9639 313.3853 *							
		stratum-H-H-M		268.0103 126.7232 **	469.1727 153.4546 ***	506.7258 169.8554 ***	670.4238 240.0653 ***	745.9562 246.0924 ***	756.2312 268.5706 ***	
		stratum-H-L-H	-741.0769 392.1091 *							
		stratum-H-M-H	-681.9669 260.3649 ***	-924.3618 299.0997 ***	-1,032.0649 344.1857 ***	-1,049.5637 373.9486 ***	-786.9883 408.6969 *	-745.0471 407.4850 *		
		stratum-H-M-M	-201.8536 84.2278 **	-300.2792 137.4795 **	-416.4873 183.5628 **	-510.4146 196.2856 ***	-629.2696 257.6784 **	-631.5791 262.0799 **	-610.7108 309.1426 **	-617.7915 336.8051 *
		stratum-L-H-L	-70.1860 42.4070 *	-80.8679 45.8908 *	-104.7052 63.0347 *	-113.9203 67.2151 *				
		stratum-L-L-H	445.2377 170.6373 ***	1,139.3894 325.2711 ***	1,742.2495 562.4965 ***	2,020.4088 706.7782 ***	2,714.7161 924.7199 ***	2,733.1876 892.9420 ***	2,672.8947 846.7036 ***	
		stratum-L-L-L	-95.9465 48.9027 **	-106.5876 54.5003 *	-147.9332 82.8209 *					
		stratum-L-M-M	-143.2669 65.5300 **	-260.2874 93.3032 ***	-394.3798 151.3355 ***	-424.5991 169.9964 **	-754.1007 262.5996 ***	-849.4436 287.9645 ***	-1,114.1358 358.3466 ***	-1,001.9960 413.5040 **
		stratum-M-H-H		-1,278.6012 600.6951 **	-1,601.8308 956.8964 *					
		stratum-M-M-H		616.6449 369.2970 *	1,051.9508 539.5188 *	1,083.3589 629.8834 *				
		stratum-M-M-L			142.1243 83.3976 *	151.4029 88.7206 *	272.3994 129.3401 **	313.9866 143.6018 **	332.4177 153.3439 **	387.2221 173.9615 **
		stratum-M-M-M	-149.0869 90.1275 *							
	Post G3 - G2 DIFF Pre G3 - G2	stratum-H-H-L			-793.9012 396.8363 **	-806.5304 444.6899 *	-1,289.6551 692.6261 *	-1,705.0168 683.3369 **	-1,646.9887 737.9851 **	-1,430.7390 744.5605 *
		stratum-H-M-H	512.5191 265.0875 *	1,057.9560 304.5133 ***	1,387.0965 350.4063 ***	1,462.3281 380.7101 ***	1,553.9328 416.0854 ***	1,612.1912 414.8515 ***	1,032.1905 397.1316 ***	1,341.9568 535.5439 **
		stratum-L-H-L	125.5461 43.6882 ***	162.6377 47.2768 ***	279.6881 64.9386 ***	268.7752 69.2453 ***	413.0804 100.3508 ***	464.1693 116.4686 ***	559.1517 150.7078 ***	663.8496 174.5522 ***
		stratum-L-L-H		-663.7055 381.3192 *						
		stratum-L-L-L	104.1556 48.7052 **	142.1580 54.2801 ***	180.4239 82.4858 **					
		stratum-L-L-M		398.5226 166.2633 **	530.5604 268.2661 **					
		stratum-L-M-L		-84.4738 47.7211 *						
		stratum-M-H-M			338.7888 192.8027 *					
		stratum-M-L-H		612.0759 287.4696 **	898.7698 394.8471 **	917.3311 421.6847 **	930.7220 526.8588 *	883.3937 508.5970 *	970.6156 531.0546 *	
		stratum-M-L-L								790.9897 461.2031 *
		stratum-M-L-M					712.8932 350.7244 **	800.3403 362.4332 **	809.9219 352.9483 **	807.8053 452.6745 *
realized spread bps	Post G1 - C DIFF Pre G1 - C	stratum-H-H-H	1,783,458.8350 409,407.8983 ***	850,830.5881 386,164.3690 **					607,496.4018 338,334.7378 *	
		stratum-H-H-M		-130,812.1451 46,430.2291 ***	-142,878.9332 38,079.9695 ***		140,522.7075 54,453.9524 ***	233,017.5999 66,516.8088 ***	327,213.5065 91,933.8107 ***	316,514.7776 138,219.7260 **
		stratum-H-L-H	9,242,628.3080 2,391,497.7680 ***	5,918,479.3020 1,543,523.5910 ***	5,931,850.0790 1,130,436.8640 ***	6,227,970.6510 1,080,273.2330 ***	4,965,281.3930 929,531.7027 ***	4,530,831.9710 1,029,796.7130 ***	3,755,064.8280 1,118,664.3350 ***	4,179,846.0370 1,256,687.1130 ***

Table 16: "Simple Model" Tests for "TAQ" (Rosenblatt Ticker Plant) Data, cont'd

Simple Model - TAQ

Metric	Term	Segment	Length: 100 micros	1 ms	100 ms	1 sec	30 sec	1 min	5 min	30 min
realized spread bps	Post G1 - C DIFF Pre G1 - C	stratum-H-M-H	4,613,389.5880 737,761.4189 ***	1,810,859.0680 608,101.2127 ***		691,212.6089 388,272.0565 *	1,172,254.9200 270,205.8266 ***	1,162,779.7570 267,594.7045 ***	1,228,091.3900 437,688.8511 ***	1,691,505.4480 554,605.8887 ***
		stratum-H-M-M	1,911,739.9330 185,719.1839 ***	1,209,236.5790 136,573.1791 ***	724,347.8872 95,659.0019 ***	651,793.2724 88,044.6805 ***	597,777.7744 101,067.0173 ***	540,242.5375 97,706.4988 ***	304,462.9855 139,783.9302 **	
		stratum-L-H-L							53,331.6268 32,145.8822 *	
		stratum-L-L-H					1,801,375.9510 815,353.7730 **	2,411,741.1130 1,117,621.0320 **	2,995,857.9810 1,583,968.4380 *	
		stratum-L-L-L						738,850.1953 379,176.9966 *		
		stratum-L-L-M	4,130,275.7010 2,233,138.8120 *							
		stratum-L-M-L						60,335.3860 34,961.8748 *		
		stratum-L-M-M	1,111,542.2900 532,018.8505 **							-667,118.5865 392,598.4746 *
		stratum-M-H-H	5,216,972.6900 1,326,498.0450 ***	3,186,871.7050 1,016,745.8770 ***	1,345,042.1650 690,889.9658 *	1,151,208.5450 573,803.8998 **			-1,302,489.2480 526,329.7583 **	
		stratum-M-L-H	10,010,155.9000 2,350,493.6600 ***	7,420,975.5280 2,278,733.0990 ***	5,740,761.0310 2,221,161.2100 ***	5,436,362.9710 2,169,796.5970 **	4,193,897.5600 2,143,821.3510 *	3,996,871.7450 2,051,727.2490 *	3,618,833.9790 2,191,294.3640 *	3,576,878.9560 1,962,006.1430 *
		stratum-M-M-H	1,897,384.8860 705,939.5102 ***				775,225.4002 273,150.5164 ***	703,760.1853 316,123.7554 **		
		stratum-M-M-L		-139,885.6318 75,869.4157 *	-161,620.6122 58,873.7306 ***	-164,185.2767 55,321.1700 ***	-86,576.0135 44,931.2733 *			
		stratum-M-M-M	718,645.9419 388,612.1652 *				164,323.4355 87,729.8991 *	191,203.4936 89,170.0660 **	167,539.7225 96,998.1186 *	
	Post G2 - G1 DIFF Pre G2 - G1	stratum-H-H-H		-901,643.9093 470,525.7567 *	-987,262.8656 462,993.9524 **	-1,020,654.5560 462,894.6494 **	-880,148.7849 448,292.1124 **	-699,464.3116 416,486.5563 *		
		stratum-H-H-L	719,320.1394 211,893.5336 ***	539,115.5944 164,281.0068 ***	256,018.3046 110,182.7548 **	205,021.0813 107,890.0017 *				
		stratum-H-H-M	124,856.1478 63,432.8092 **				-141,404.8932 65,538.1060 **	-205,014.2887 80,056.2452 **	-248,639.2728 110,648.0040 **	
		stratum-H-L-H			-3,333,692.9720 1,321,281.1480 **	-3,376,385.7440 1,262,648.5390 ***	-2,052,865.5450 1,086,488.0900 *	-2,318,937.3200 1,203,717.6910 *		
		stratum-H-M-H							-1,093,293.8100 536,211.8446 **	
		stratum-H-M-M	-882,479.5132 242,070.5335 ***	-706,950.1322 178,012.1516 ***	-535,210.8812 124,682.0445 ***	-442,030.4563 114,757.7493 ***	-356,687.3152 131,718.1382 ***	-333,527.5935 127,340.1506 ***		
		stratum-L-L-H	8,373,978.9320 2,438,716.6460 ***	6,401,378.9320 2,062,012.7390 ***	4,406,017.8620 1,539,011.6530 ***	3,179,699.6160 1,299,474.5110 **				
		stratum-L-M-L						-70,223.4062 42,078.6515 *		
		stratum-L-M-M							610,010.0026 285,592.4867 **	
		stratum-M-H-H	-3,780,459.5850 1,692,121.8990 **	-2,260,850.8110 1,296,738.5960 *						
		stratum-M-M-H	2,376,136.2660 840,676.7492 ***	1,110,921.7840 653,169.5018 *						
		stratum-M-M-L	378,841.7437 106,113.5293 ***	331,487.4542 96,082.4319 ***	222,016.6903 74,557.2822 ***	203,773.2405 70,057.6736 ***				-184,325.9133 98,602.7410 *
		stratum-M-M-M	1,583,152.4230 476,622.8254 ***	1,153,023.0050 386,985.2872 ***	771,631.8553 295,082.5033 ***	604,597.2995 225,744.6138 ***				
	Post G3 - G2 DIFF Pre G3 - G2	stratum-H-H-H		870,171.4902 482,403.6595 *	1,032,390.4330 474,658.6323 **	1,075,544.0090 474,554.5955 **	979,213.7624 459,573.0479 **	943,958.9497 426,963.3165 **	815,286.7515 422,632.6522 *	684,631.7714 358,161.0712 *
		stratum-H-H-L	-703,202.6693 178,306.0189 ***	-532,162.9998 138,241.1497 ***	-226,801.9652 92,716.6036 **	-160,955.9509 90,784.0670 *				
		stratum-H-H-M			119,386.4856 46,132.6315 ***	145,465.0944 61,373.1943 **	158,862.7294 65,958.0588 **	185,640.1006 80,569.0013 **		

Table 16: "Simple Model" Tests for "TAQ" (Rosenblatt Ticker Plant) Data, cont'd

Simple Model - TAQ

			Length							
Metric	Term	Segment	100 micros	1 ms	100 ms	1 sec	30 sec	1 min	5 min	30 min
realized spread bps	Post G3 - G2 DIFF Pre G3 - G2	stratum-H-L-H		3,267,659.1550 1,855,188.2220 *	3,730,339.0980 1,358,625.1750 ***	3,540,571.0430 1,298,336.0660 ***	2,384,463.1610 1,117,085.9190 **	2,750,904.5060 1,237,488.1400 **	3,266,099.6940 1,344,162.7880 **	
		stratum-H-M-H	6,256,445.3170 919,723.1329 ***	4,525,566.4820 758,128.4253 ***	3,180,703.0610 587,888.4935 ***	2,807,445.1330 484,103.7145 ***	1,831,294.0010 336,958.3045 ***	1,664,354.1900 333,712.9800 ***	1,876,810.6900 546,130.0761 ***	
		stratum-H-M-M	899,828.8248 247,759.4920 ***	786,511.2897 182,195.6726 ***	656,702.0362 127,612.3027 ***	569,848.9856 117,454.7602 ***	559,075.1200 134,814.2212 ***	527,728.2355 130,333.2663 ***	502,100.7883 186,436.1627 ***	529,685.7553 228,966.5771 **
		stratum-L-H-L	133,085.2023 62,830.8847 **	113,536.4463 61,294.8414 *					-97,080.8698 39,298.5679 **	-167,363.9651 47,787.8331 ***
		stratum-L-L-H	13,629,579.8900 2,858,937.2980 ***	12,728,544.2200 2,417,323.1820 ***	11,739,815.5800 1,804,202.7240 ***	11,985,039.3000 1,523,390.0540 ***	9,215,137.3250 1,214,605.8510 ***	8,866,430.0610 1,664,904.3840 ***	8,118,093.3890 2,359,651.7340 ***	8,883,259.7540 2,960,742.4790 ***
		stratum-L-L-L	1,301,795.8270 754,793.0980 *		970,563.3493 482,263.7318 **	883,457.2937 357,749.5348 **				
		stratum-L-M-L		339,576.8422 122,689.6353 ***	258,465.9486 99,612.5408 ***	264,973.9987 90,907.8397 ***	182,395.1594 48,295.9776 ***	135,610.2004 42,680.2976 ***		
		stratum-M-L-L	2,075,896.2930 1,128,218.0970 *	2,186,640.7960 1,093,550.4890 **						
		stratum-M-L-M	8,455,310.6540 2,589,649.1480 ***	7,518,034.1840 2,355,287.9830 ***	6,267,071.1610 2,026,665.3340 ***	5,727,804.4180 1,860,935.5670 ***	2,826,491.0480 1,359,815.1610 **	2,391,370.6290 1,320,940.1970 *	1,880,927.9760 1,139,086.6710 *	
		stratum-M-M-H			1,248,686.2350 487,790.4888 **	1,375,699.6240 383,057.9227 ***	1,237,840.3220 340,988.1252 ***	1,353,758.0550 394,630.9939 ***		
		stratum-M-M-L			138,466.0577 74,557.2822 *	171,415.0902 70,057.6736 **	292,238.2352 56,893.7184 ***	339,281.5395 63,634.1993 ***	341,984.0812 78,239.9914 ***	376,428.4975 98,602.7410 ***
		stratum-M-M-M	-1,382,065.4030 485,246.0638 ***	-955,623.6734 393,986.9857 **	-569,938.4889 300,421.5768 *	-394,951.8027 229,829.0515 *			279,844.2722 121,115.2609 **	
realized spread dollars	Post G1 - C DIFF Pre G1 - C	stratum-H-H-M	-2,060.0933 378.5381 ***	-2,505.8687 354.9348 ***	-3,126.7595 522.3409 ***	-4,921.3571 1,139.0134 ***	-3,975.7733 1,229.4308 ***	-4,761.0492 1,580.1611 ***	-5,416.7229 1,927.8228 ***	-7,275.9958 2,411.0571 ***
		stratum-H-L-H	12,588.7017 2,662.5716 ***	7,274.5718 1,644.9809 ***	5,973.7600 1,189.0726 ***	6,097.0737 1,117.9728 ***	4,621.1745 760.9723 ***	4,188.4818 820.9465 ***	3,117.9054 831.9661 ***	3,435.4838 1,084.4242 ***
		stratum-H-M-H	6,993.4938 488.2500 ***	2,566.7924 376.8542 ***	666.0637 292.5169 **	845.5820 258.2233 ***	1,676.3579 285.9688 ***	1,716.4526 307.5788 ***	1,779.5633 611.3655 ***	2,388.1331 661.1527 ***
		stratum-H-M-M	2,978.0621 280.4027 ***	1,615.0067 204.0471 ***	705.5079 147.5627 ***	578.0643 135.8963 ***	437.7218 187.9945 **	366.1525 183.9025 **		
		stratum-L-H-L	2,804.4410 968.2280 ***	2,767.5983 966.5018 ***	2,772.1885 961.9473 ***				270.2047 129.5149 **	
		stratum-L-L-H					696.7762 334.8287 **	788.2398 412.3226 *		
		stratum-L-M-L		-128.2011 73.4629 *	-109.9200 63.8209 *				155.9707 64.4081 **	
		stratum-L-M-M	1,294.5619 294.3121 ***	840.7777 252.7467 ***	429.1785 172.8646 **	379.6775 159.9230 **	-435.1067 198.8787 **	-558.5490 237.8300 **	-986.2462 373.3926 ***	-1,343.4590 492.2184 ***
		stratum-M-H-H	3,567.4447 1,817.3501 *							
		stratum-M-H-L							-206.1640 124.3743 *	
		stratum-M-M-H	2,808.1631 889.2029 ***				726.3361 372.4800 *			
		stratum-M-M-L			-234.6500 106.4618 **	-245.2119 99.3429 **				
		stratum-M-M-M	1,494.1751 317.8586 ***	684.9465 238.2012 ***				288.1111 126.9920 **	384.6319 174.4982 **	
	Post G2 - G1 DIFF Pre G2 - G1	stratum-H-H-H	85,023.4313 39,203.3804 **	84,744.8746 39,203.2388 **	84,976.5744 39,541.1406 **	85,397.8828 39,665.5839 **	75,124.0765 36,383.5013 **	56,635.0966 29,991.3237 *	49,601.0839 29,086.0236 *	
		stratum-H-H-M	1,831.6531 455.6297 ***	1,553.1592 427.2183 ***	1,868.2771 628.6950 ***	3,784.4255 1,370.8090 ***	3,719.9207 1,479.5673 **	4,667.4923 1,901.6480 **	5,656.5670 2,320.0397 **	7,788.3104 2,901.5901 ***
		stratum-H-L-H			-3,880.5591 1,389.8589 ***	-3,942.9323 1,306.7466 ***	-2,104.6159 889.4406 **	-2,202.5168 959.5495 **	-1,795.8592 972.4582 *	
		stratum-H-M-H						-665.9816 376.7311 *	-1,882.2721 748.9966 **	-1,786.9791 809.9654 **

Table 16: "Simple Model" Tests for "TAQ" (Rosenblatt Ticker Plant) Data, cont'd

Simple Model - TAQ

Metric	Term	Segment	Length							
			100 micros	1 ms	100 ms	1 sec	30 sec	1 min	5 min	30 min
realized spread dollars	Post G2 - G1 DIFF Pre G2 - G1	stratum-H-M-M	-903.4278 365.4966 **	-706.7335 265.9644 ***	-479.9548 192.3318 **	-294.6917 177.1233 *				
		stratum-L-H-L	-2,714.2497 1,148.3703 **	-2,690.3341 1,146.3037 **	-2,636.6734 1,140.8527 **					
		stratum-L-L-H	4,142.2951 1,322.3638 ***	2,755.3346 1,043.5196 ***	1,535.5853 606.1845 **	959.1286 389.0956 **				
		stratum-L-M-L						-112.0250 63.6208 *		
		stratum-L-M-M	-842.7005 345.2563 **	-609.0249 296.5016 **	-344.8465 202.7904 *		392.2333 233.3068 *	581.2254 279.0005 **	1,119.6909 438.0475 **	981.3288 577.5254 *
		stratum-M-H-L							364.6462 151.8537 **	
		stratum-M-M-H	2,459.6006 1,058.9157 **							
		stratum-M-M-L	517.7741 197.6684 ***	465.8008 174.5950 ***	297.4272 134.8214 **	274.5159 125.8052 **				
	Post G3 - G2 DIFF Pre G3 - G2	stratum-H-H-L	-2,936.7265 1,216.4351 **	-2,793.9269 1,072.3734 ***	-1,628.0820 932.9917 *	-1,559.7087 796.5754 *				
		stratum-H-H-M	775.7627 458.6262 *	922.9289 430.0256 **						
		stratum-H-L-H		3,834.1786 1,976.8357 *	3,875.6065 1,428.9813 ***	3,773.4772 1,343.5545 ***	2,491.4810 914.5857 ***	2,745.3086 986.6399 ***	3,019.4500 999.8067 ***	2,244.1940 1,302.9886 *
		stratum-H-M-H	4,391.2817 608.7039 ***	3,301.5575 469.8969 ***	2,634.1748 364.7677 ***	2,482.1152 322.0027 ***	2,160.1073 356.6365 ***	1,956.4613 383.6099 ***	2,827.4126 762.8655 ***	1,498.2149 824.9347 *
		stratum-H-M-M		639.0619 272.2147 **	778.3892 196.8520 ***	667.9744 181.2861 ***	810.0265 250.7532 ***	812.6019 245.3078 ***	829.1150 366.4704 **	805.9285 483.0664 *
		stratum-L-H-L							-399.0474 158.3358 **	-684.4619 180.1037 ***
		stratum-L-L-H			2,547.4142 710.6402 ***	2,904.3538 456.1425 ***	3,054.6145 498.7781 ***	2,940.1324 614.2236 ***	2,685.9395 819.1053 ***	3,502.7135 2,065.0781 *
		stratum-L-L-L	511.4028 204.2769 **	435.2783 225.8172 *	359.1078 128.4651 ***	330.2078 100.7572 ***	344.2428 195.6446 *			
		stratum-L-M-L		338.3505 89.7710 ***	284.5489 77.9832 ***	307.3895 76.9599 ***	248.2578 63.7559 ***	162.3654 64.5442 **		
		stratum-L-M-M	696.6547 315.0036 **	695.6877 270.5316 **	496.9176 185.0278 ***	433.9552 171.1796 **				
		stratum-M-L-L	2,120.2464 1,092.4444 *	2,185.7956 1,050.1599 **						
		stratum-M-M-H			1,782.8779 506.1131 ***	2,014.1575 369.6046 ***	2,138.3196 464.9918 ***	2,374.8802 593.0732 ***	1,751.4502 922.1109 *	
		stratum-M-M-L			261.5267 134.8214 *	304.2065 125.8052 **	426.3533 99.8395 ***	489.7777 112.4931 ***	493.1598 135.4116 ***	562.9976 187.6698 ***
		stratum-M-M-M						293.6735 158.5676 *		

Table 17: "Simple Model" Tests for Pilot B.II Data

Simple Model - B.II

			Yvar		
Order Type	Term	Segment	qt_leader_fl_0_cnt	qt_leader_fl_1_cnt	qt_leader_fl_unknown_cnt
order-type-10	Post G1 - C DIFF Pre G1 - C	stratum-H-H-H	-0.2507 0.0494 ***	-0.2065 0.0242 ***	-0.0568 0.0306 *
		stratum-H-H-L	0.1770 0.1020 *		
		stratum-H-H-M	-0.1222 0.0355 ***	-0.1525 0.0188 ***	
		stratum-H-L-H		-0.2428 0.0548 ***	-0.3738 0.0868 ***
		stratum-H-M-H	-0.1344 0.0623 **	-0.1444 0.0238 ***	-0.2397 0.0383 ***
		stratum-H-M-M		-0.0748 0.0290 **	-0.0550 0.0324 *
		stratum-L-H-L	0.0842 0.0463 *		
		stratum-L-L-H		-0.1236 0.0584 **	-0.3088 0.0904 ***
		stratum-L-L-L	-0.1344 0.0393 ***	-0.0537 0.0116 ***	-0.0703 0.0157 ***
		stratum-L-L-M		-0.1280 0.0229 ***	-0.1311 0.0325 ***
		stratum-M-H-H	0.5587 0.2250 **	-0.1762 0.1062 *	
		stratum-M-H-L			0.0319 0.0177 *
		stratum-M-H-M	0.1117 0.0599 *		0.0915 0.0271 ***
		stratum-M-L-H	0.1928 0.0805 **	-0.0551 0.0313 *	-0.1891 0.0473 ***
		stratum-M-L-M	0.3161 0.0911 ***		
		stratum-M-M-H	-0.2611 0.0937 ***	-0.1096 0.0407 ***	-0.2028 0.0577 ***
		stratum-M-M-M	-0.1368 0.0503 ***	-0.0542 0.0205 ***	
	Post G2 - G1 DIFF Pre G2 - G1	stratum-H-H-H	0.2285 0.0604 ***	0.1348 0.0296 ***	0.0911 0.0374 **
		stratum-H-H-L	-0.2407 0.1216 **		

Table 17: "Simple Model" Tests for Pilot B.II Data, cont'd

Simple Model - B.II

			Yvar		
Order Type	Term	Segment	qt_leader_fl_0_cnt	qt_leader_fl_1_cnt	qt_leader_fl_unknown_cnt
order-type-10	Post G2 - G1 DIFF Pre G2 - G1	stratum-H-L-H		0.1804 0.0645 ***	
		stratum-H-M-H	-0.1441 0.0777 *	0.0610 0.0297 **	
		stratum-H-M-M			0.0900 0.0413 **
		stratum-L-H-L		0.0570 0.0306 *	-0.0557 0.0284 *
		stratum-L-L-H	0.4207 0.1870 **		0.2213 0.1155 *
		stratum-L-L-L	0.0843 0.0485 *	0.0322 0.0143 **	
		stratum-L-L-M		0.1079 0.0311 ***	
		stratum-M-H-H	-0.8601 0.2689 ***		-0.4365 0.1437 ***
		stratum-M-H-M			-0.0610 0.0327 *
		stratum-M-L-L	-0.2247 0.1306 *		
		stratum-M-L-M	-0.3137 0.1081 ***		
		stratum-M-M-H	0.1931 0.1130 *		0.1580 0.0695 **
		stratum-M-M-M	0.1765 0.0616 ***		
	Post G3 - G2 DIFF Pre G3 - G2	stratum-H-H-H	0.1429 0.0608 **		
		stratum-H-H-L			-0.0703 0.0350 **
		stratum-H-H-M	0.0829 0.0431 *	0.0514 0.0228 **	
		stratum-H-L-H	0.2962 0.1762 *	-0.1680 0.0645 ***	
		stratum-H-M-H	0.2951 0.0808 ***	-0.1014 0.0309 ***	0.0989 0.0497 **
		stratum-L-L-H	0.4755 0.2193 **	-0.1546 0.0875 *	

Table 17: "Simple Model" Tests for Pilot B.II Data, cont'd

Simple Model - B.II

			Yvar		
Order Type	Term	Segment	qt_leader_fl_0_cnt	qt_leader_fl_1_cnt	qt_leader_fl_unknown_cnt
order-type-10	Post G3 - G2 DIFF Pre G3 - G2	stratum-L-L-M		-0.1009 0.0337 ***	
		stratum-L-M-M	-0.2676 0.1255 **		
		stratum-M-H-H	1.0136 0.2689 ***	0.3178 0.1270 **	0.6851 0.1437 ***
		stratum-M-L-H	0.3111 0.1070 ***		0.1811 0.0629 ***
		stratum-M-L-L		-0.1184 0.0615 *	
		stratum-M-M-H	-0.2658 0.1149 **		-0.2156 0.0707 ***
		stratum-M-M-L	0.1473 0.0660 **		
		stratum-M-M-M		-0.0590 0.0255 **	
order-type-11	Post G1 - C DIFF Pre G1 - C	stratum-H-H-H		-1.7940 0.0477 ***	
		stratum-H-H-L		-1.0225 0.2207 ***	
		stratum-H-H-M	0.1313 0.0364 ***	-1.2068 0.0527 ***	0.0732 0.0373 **
		stratum-H-L-H		-0.3514 0.1999 *	
		stratum-H-M-H	0.2839 0.0533 ***	-1.1094 0.0748 ***	0.1380 0.0440 ***
		stratum-H-M-M	0.3219 0.1139 ***	-1.3170 0.0955 ***	
		stratum-L-H-L	0.5327 0.1897 ***	-0.3870 0.1611 **	0.2436 0.1079 **
		stratum-L-L-H		-1.2023 0.1814 ***	-0.2618 0.1308 **
		stratum-L-L-L		-0.5976 0.0495 ***	-0.4514 0.0633 ***
		stratum-L-L-M	-0.3970 0.0846 ***	-1.4552 0.0854 ***	-0.8870 0.0845 ***
		stratum-L-M-L		-0.3602 0.0661 ***	-0.2688 0.0638 ***

Table 17: "Simple Model" Tests for Pilot B.II Data, cont'd

Simple Model - B.II

			Yvar		
Order Type	Term	Segment	qt_leader_fl_0_cnt	qt_leader_fl_1_cnt	qt_leader_fl_unknown_cnt
order-type-11	Post G1 - C DIFF Pre G1 - C	stratum-L-M-M		-0.6236 0.1561 ***	
		stratum-M-H-H	0.3065 0.1344 **	-1.4386 0.2373 ***	0.4291 0.1466 ***
		stratum-M-H-L	0.2109 0.0876 **	-0.7259 0.1058 ***	
		stratum-M-H-M	0.2115 0.0545 ***	-0.7011 0.0998 ***	0.2176 0.0623 ***
		stratum-M-L-H		-1.1794 0.1034 ***	-0.3012 0.0767 ***
		stratum-M-L-M		-1.3596 0.1088 ***	-0.7089 0.1007 ***
		stratum-M-M-H		-1.6274 0.0946 ***	0.1669 0.0656 **
		stratum-M-M-L	0.2158 0.0861 **	-0.4948 0.0973 ***	
		stratum-M-M-M	0.0921 0.0421 **	-1.3954 0.0651 ***	
	Post G2 - G1 DIFF Pre G2 - G1	stratum-H-H-H	0.1150 0.0490 **	0.2000 0.0584 ***	
		stratum-H-H-M			0.0831 0.0450 *
		stratum-H-L-H			0.2729 0.1491 *
		stratum-H-M-H	-0.2308 0.0665 ***		
		stratum-H-M-M	-0.3738 0.1451 **		
		stratum-L-H-L	-0.4939 0.2297 **	0.4116 0.1951 **	-0.5366 0.1306 ***
		stratum-L-L-L	0.2430 0.1130 **	0.2111 0.0612 ***	0.2292 0.0782 ***
		stratum-L-L-M	0.2555 0.1149 **	0.3658 0.1161 ***	
		stratum-L-M-L	0.3016 0.1309 **		0.1884 0.0767 **
		stratum-L-M-M		-0.5182 0.1912 ***	-0.2944 0.1551 *

Table 17: "Simple Model" Tests for Pilot B.II Data, cont'd

Simple Model - B.II

			Yvar		
Order Type	Term	Segment	qt_leader_fl_0_cnt	qt_leader_fl_1_cnt	qt_leader_fl_unknown_cnt
order-type-11	Post G2 - G1 DIFF Pre G2 - G1	stratum-M-H-H		-0.4923 0.2836 *	
		stratum-M-H-L	-0.4214 0.1080 ***	0.2535 0.1306 *	
		stratum-M-H-M	-0.1136 0.0659 *	-0.2203 0.1205 *	-0.1711 0.0752 **
		stratum-M-L-L	-1.2845 0.3902 ***	-1.0931 0.2419 ***	-1.0062 0.2553 ***
		stratum-M-L-M	-0.3883 0.1224 ***	-0.3726 0.1294 ***	
	Post G3 - G2 DIFF Pre G3 - G2	stratum-H-H-H	0.1411 0.0493 ***	0.4164 0.0588 ***	
		stratum-H-H-M	0.2223 0.0443 ***	0.2397 0.0640 ***	
		stratum-H-M-H	0.2973 0.0692 ***	0.3270 0.0971 ***	0.1430 0.0572 **
		stratum-H-M-M	0.4254 0.1487 ***		
		stratum-L-H-L			0.3691 0.1352 ***
		stratum-L-L-H			-0.4609 0.1959 **
		stratum-L-L-L	-0.4134 0.1130 ***		0.1817 0.0782 **
		stratum-L-L-M	-0.3820 0.1245 ***		0.2744 0.1244 **
		stratum-L-M-L	-0.5437 0.1309 ***		
		stratum-L-M-M		0.6045 0.1912 ***	
		stratum-M-H-H		1.1848 0.2836 ***	
		stratum-M-H-L		-0.2845 0.1306 **	
		stratum-M-H-M			0.1255 0.0752 *
		stratum-M-L-H	0.2572 0.0858 ***	0.3913 0.1375 ***	0.1849 0.1020 *

Table 17: "Simple Model" Tests for Pilot B.II Data, cont'd

Simple Model - B.II

			Yvar		
Order Type	Term	Segment	qt_leader_fl_0_cnt	qt_leader_fl_1_cnt	qt_leader_fl_unknown_cnt
order-type-11	Post G3 - G2			0.5677	
	DIFF Pre G3 - G2	stratum-M-L-M		0.1225	
				***	
			0.2637		0.3169
		stratum-M-M-L	0.1070		0.0976
			**		***
				0.2226	
		stratum-M-M-M		0.0812	
				***	

Table 18: "Simple Model" Tables for Pilot B.IV Data

Simple Model - B.IV

		Yvar				
Term	Segment	avg_trade_size	pct_shares_at	pct_shares_cross	pct_shares_insi..	pct_shares_outs..
Post G1 - C DIFF Pre G1 - C	stratum-H-H-H		6.7245 0.2815 ***	3.2463 0.1947 ***	-9.0150 0.3624 ***	-0.7532 0.0385 ***
	stratum-H-H-L		11.7009 1.2724 ***	4.8856 0.9658 ***	-16.4034 1.4283 ***	
	stratum-H-H-M		12.4206 0.3023 ***	5.4813 0.2265 ***	-17.1618 0.3895 ***	-0.4491 0.0373 ***
	stratum-H-L-H			2.0698 0.6973 ***	-2.6326 0.9343 ***	-0.9566 0.1218 ***
	stratum-H-M-H		1.7293 0.3447 ***	0.6036 0.2489 **	-1.3387 0.3966 ***	-0.6602 0.0464 ***
	stratum-H-M-M		4.4202 0.6701 ***	2.2140 0.5712 ***	-5.2131 0.8210 ***	-0.8031 0.0864 ***
	stratum-L-H-L		11.3300 1.9210 ***	2.0381 1.1111 *	-13.6307 2.3246 ***	
	stratum-L-L-H	-76.8111 32.4907 **	8.4749 0.9147 ***	-1.2398 0.6723 *	-6.4756 0.9245 ***	-0.7641 0.1070 ***
	stratum-L-L-L		12.9232 0.5121 ***	2.4026 0.4449 ***	-14.6118 0.6161 ***	-0.4931 0.0761 ***
	stratum-L-L-M		9.9437 0.5755 ***	-2.4482 0.4585 ***	-6.9233 0.6383 ***	-0.5110 0.0637 ***
	stratum-L-M-L		9.8328 0.8401 ***	3.2441 0.6690 ***	-12.9258 0.9701 ***	
	stratum-L-M-M		13.2157 1.0367 ***	2.7966 0.7866 ***	-15.7403 1.2002 ***	
	stratum-M-H-H	78.6441 15.4369 ***	10.0993 1.2393 ***	4.7431 0.9484 ***	-14.3310 1.5979 ***	
	stratum-M-H-L		12.5534 0.7482 ***	4.7714 0.5431 ***	-15.1636 0.8607 ***	
	stratum-M-H-M		13.0042 0.5069 ***	5.4058 0.3943 ***	-18.0402 0.6512 ***	-0.3385 0.0655 ***
	stratum-M-L-H		2.4986 0.4871 ***		-1.5916 0.4922 ***	-0.5339 0.0673 ***
	stratum-M-L-M		7.5959 0.9502 ***	-2.2780 0.6667 ***	-4.2254 1.0400 ***	-0.7345 0.0917 ***
	stratum-M-M-H		4.0305 0.5195 ***	2.6052 0.3983 ***	-5.8388 0.5750 ***	-0.6407 0.0681 ***

Table 18: "Simple Model" Tables for Pilot B.IV Data, cont'd

Simple Model - B.IV

		Yvar				
Term	Segment	avg_trade_size	pct_shares_at	pct_shares_cross	pct_shares_insi..	pct_shares_outs..
Post G1 - C DIFF Pre G1 - C	stratum-M-M-L	83.6621 42.0469 **	17.6300 0.6546 ***	8.8854 0.5590 ***	-25.9141 0.7680 ***	-0.2193 0.1023 **
	stratum-M-M-M		8.8343 0.4080 ***	2.8596 0.3245 ***	-11.1279 0.4771 ***	-0.4378 0.0444 ***
Post G2 - G1 DIFF Pre G2 - G1	stratum-H-H-H		2.8517 0.3444 ***	1.7813 0.2382 ***	-4.4343 0.4434 ***	
	stratum-H-H-L		7.0981 1.5172 ***		-5.9583 1.7031 ***	
	stratum-H-H-M		1.6879 0.3648 ***	0.9450 0.2734 ***	-2.6829 0.4699 ***	
	stratum-H-L-H		2.1698 1.1750 *		-1.8743 1.0994 *	
	stratum-H-M-H		4.3006 0.4301 ***	0.6303 0.3106 **	-4.9294 0.4948 ***	
	stratum-H-M-M		6.0929 0.8542 ***		-6.5972 1.0466 ***	0.1813 0.1101 *
	stratum-L-H-L		-4.8584 2.3265 **	-2.2816 1.3457 *		
	stratum-L-L-H		2.2226 1.1684 *	-1.5367 0.8587 *		0.3926 0.1367 ***
	stratum-L-L-L		6.7523 0.6323 ***		-6.1854 0.7607 ***	0.2693 0.0940 ***
	stratum-L-L-M		4.6978 0.7824 ***		-6.1678 0.8676 ***	0.2857 0.0866 ***
	stratum-L-M-L	55.3674 29.0971 *	5.9226 1.0111 ***		-7.1043 1.1676 ***	
	stratum-L-M-M		3.4408 1.2697 ***		-3.2717 1.4700 **	
	stratum-M-H-H	-70.6453 18.4506 ***		2.8383 1.1336 **		-0.5107 0.2087 **
	stratum-M-H-L		3.8146 0.9233 ***		-5.7889 1.0622 ***	
	stratum-M-H-M		2.4753 0.6122 ***	0.9321 0.4761 *	-3.2891 0.7864 ***	
	stratum-M-L-H		2.3885 0.6476 ***		-1.4302 0.6545 **	

Table 18: "Simple Model" Tables for Pilot B.IV Data, cont'd

Simple Model - B.IV

		Yvar				
Term	Segment	avg_trade_size	pct_shares_at	pct_shares_cross	pct_shares_insi..	pct_shares_outs..
Post G2 - G1			15.1600	4.0769	-18.1971	-1.0493
DIFF Pre G2 - G1	stratum-M-L-L		2.4455	2.0283	2.6336	0.3197
			***	**	***	***
	stratum-M-L-M			1.4547	-2.1347	
				0.7928	1.2367	
				*	*	
	stratum-M-M-H		5.0786	2.1384	-7.1482	
			0.6272	0.4809	0.6942	
			***	***	***	
	stratum-M-M-L		2.6578	-4.0559		
			0.8138	0.6949		
			***	***		
	stratum-M-M-M		2.3021	1.2904	-3.2848	-0.1291
			0.4997	0.3974	0.5844	0.0544
			***	***	***	**
Post G3 - G2	stratum-H-H-H		-26.7577	-2.7762	29.3848	0.1315
DIFF Pre G3 - G2			0.3465	0.2397	0.4461	0.0474
			***	***	***	***
	stratum-H-H-L		-23.9397		21.9088	
			1.4047		1.5768	
			***		***	
	stratum-H-H-M		-24.2437		24.4538	
			0.3675		0.4735	
			***		***	
	stratum-H-L-H		-24.6975	-3.0859	27.2549	0.4674
			1.1750	0.8205	1.0994	0.1434
			***	***	***	***
	stratum-H-M-H		-25.6052	-2.8352	28.4651	0.1436
			0.4473	0.3231	0.5147	0.0603
			***	***	***	**
	stratum-H-M-M		-23.9629		25.3180	-0.4200
			0.8750		1.0722	0.1128
			***		***	***
	stratum-L-H-L		-12.1982		14.4831	
			2.4081		2.9140	
			***		***	
	stratum-L-L-H	116.1862	-25.4460	-3.6288	29.2243	
		48.6648	1.3701	1.0069	1.3848	
		**	***	***	***	
	stratum-L-L-L		-16.6548		17.4909	
			0.6323		0.7607	
			***		***	
	stratum-L-L-M		-21.0818		21.1057	-0.1770
			0.8472		0.9396	0.0937
			***		***	*
	stratum-L-M-L		-17.2047		17.5313	
			1.0113		1.1679	
			***		***	
	stratum-L-M-M	18.2140	-21.0580	1.8793	19.2979	
		10.2930	1.2697	0.9634	1.4700	
		*	***	*	***	
	stratum-M-H-H		-22.7932	-3.4459	25.8397	0.5835
			1.4813	1.1336	1.9099	0.2087
			***	***	***	***

Table 18: "Simple Model" Tables for Pilot B.IV Data, cont'd

Simple Model - B.IV

		Yvar				
Term	Segment	avg_trade_size	pct_shares_at	pct_shares_cross	pct_shares_insi..	pct_shares_outs..
Post G3 - G2			-19.1790	2.1365	17.6066	
DIFF Pre G3 - G2	stratum-M-H-L		0.9233	0.6702	1.0622	
			***	***	***	
	stratum-M-H-M	-21.3046	-24.0207		24.0321	
		7.5633	0.6122		0.7864	
		***	***		***	
	stratum-M-L-H		-26.2663		26.8163	
			0.6476		0.6545	
			***		***	
	stratum-M-L-L					1.7642
						0.4481
						***
	stratum-M-L-M		-15.1601	-2.1722	16.9077	
			1.0696	0.7505	1.1707	
			***	***	***	
	stratum-M-M-H		-29.4196	-5.8636	35.1528	
			0.6376	0.4889	0.7056	
			***	***	***	
	stratum-M-M-L		-19.7050	2.4523	17.6083	
			0.8138	0.6949	0.9547	
			***	***	***	
	stratum-M-M-M		-22.9279		23.0474	0.2270
			0.5089		0.5951	0.0554
			***		***	***

Table 19: "Simple Model" Tables for Pilot C.I Data

Simple Model - C.I

		Yvar				
Term	Segment	eod	realized_profit	shares_executed	unrealized_profit	vwap
Post G1 - C DIFF Pre G1 - C	stratum-H-H-H			43,220.0687 9,342.1598 ***		
	stratum-H-L-H	-27,917.4786 10,473.6324 ***				36.5092 12.6980 ***
	stratum-H-M-H		716.2330 165.4709 ***			-23.0843 6.5945 ***
	stratum-H-M-M			19,173.6005 7,657.4106 **		
	stratum-L-L-H		702.9173 301.2408 **	-108,699.8726 50,114.0885 **		
	stratum-L-L-L	-586.9759 307.8214 *		-34,267.8989 10,314.7199 ***		6.2041 1.2465 ***
	stratum-L-L-M					-10.4355 3.6845 ***
	stratum-L-M-L					10.2318 3.1090 ***
	stratum-L-M-M			10,364.5642 5,421.6143 *		18.7164 8.6589 **
	stratum-M-H-H			113,118.6307 28,483.4639 ***		-177.1688 46.9772 ***
	stratum-M-H-L					28.8543 13.8508 **
	stratum-M-H-M			10,865.9472 4,049.1385 ***		60.2141 16.1840 ***
	stratum-M-L-H		600.8935 147.2619 ***	-60,798.2736 23,350.3901 ***		35.1823 6.4689 ***
	stratum-M-L-M				1,054.6216 516.9739 **	
	stratum-M-M-H		659.6888 354.9830 *			35.8644 10.9306 ***
	stratum-M-M-L					15.4283 6.1989 **
Post G2 - G1 DIFF Pre G2 - G1	stratum-H-H-H					54.4020 16.9018 ***
	stratum-H-H-L			14,228.9158 5,447.2883 ***		-131.6323 73.7740 *

Table 19: "Simple Model" Tables for Pilot C.I Data, cont'd

Simple Model - C.I

		Yvar				
Term	Segment	eod	realized_profit	shares_executed	unrealized_profit	vwap
Post G2 - G1 DIFF Pre G2 - G1	stratum-H-H-M			6,628.1832 2,897.4296 **		
	stratum-H-L-H					-31.4375 14.9416 **
	stratum-H-M-M				363.9086 211.7455 *	22.5486 11.6349 *
	stratum-L-L-H			111,589.1247 64,012.3664 *		
	stratum-L-L-L					9.4019 1.5390 ***
	stratum-L-L-M					14.4705 5.0085 ***
	stratum-L-M-L					-9.4811 3.7419 **
	stratum-L-M-M					-27.5592 10.6049 ***
	stratum-M-H-H			-95,069.0260 34,044.2509 ***		
	stratum-M-H-M					-68.4821 19.5440 ***
	stratum-M-L-H					-14.6273 8.6011 *
	stratum-M-L-M					-12.4849 6.9319 *
	stratum-M-M-H			102,240.0432 33,868.3829 ***		
Post G3 - G2 DIFF Pre G3 - G2	stratum-H-H-H		720.0905 216.6081 ***	-39,057.6940 11,500.0048 ***		
	stratum-H-H-L		-367.6710 117.1400 ***	-16,306.3849 5,043.2090 ***		
	stratum-H-H-M			-13,303.0966 2,919.2439 ***		
	stratum-H-L-H					-27.7337 14.9416 *
	stratum-H-M-H	4,002.9128 2,148.6329 *				-43.3967 8.5586 ***

Table 19: "Simple Model" Tables for Pilot C.I Data, cont'd

Simple Model - C.I

		Yvar				
Term	Segment	eod	realized_profit	shares_executed	unrealized_profit	vwap
Post G3 - G2				-26,249.9896		-72.2356
DIFF Pre G3 - G2	stratum-H-M-M			9,999.4375		11.9187
				***		***
	stratum-L-H-L		-61.4347	1,038.9849		
			23.7972	549.8156		
			***	*		
	stratum-L-L-H		-986.3241			-25.7356
			451.2001			9.6381
			**			***
	stratum-L-L-L					-6.0154
						1.5390
						***
	stratum-L-M-L		-50.6755			
			21.2367			
			**			
	stratum-M-H-H			61,500.2694		
				34,044.2509		
				*		
	stratum-M-H-L					-49.1789
						17.0933
						***
	stratum-M-H-M	-2,444.7000		-11,470.9216	-935.8817	
		1,250.0370		4,889.7993	446.0891	
		*		**	**	
	stratum-M-L-L		-240.8683	66,622.2732		
			83.1925	26,461.7375		
			***	**		
	stratum-M-M-H			-167,096.5087	1,966.6565	-40.1565
				34,428.2288	921.9444	13.4149
				***	**	***
	stratum-M-M-M			-47,754.4607		
				14,513.2858		
				***		

Table 20: R-Squared Coefficients for Pilot B.I Data

R-Squared - B.I

	Order Type																											
	10		11		12		13		14		15		16		17		18		19		20		21		22		all	
Yvar	Adjrsq	Rsq	Adjrsq	Rsq	Adjrsq	Rsq	Adjrsq	Rsq	Adjrsq	Rsq	Adjrsq	Rsq	Adjrsq	Rsq	Adjrsq	Rsq	Adjrsq	Rsq	Adjrsq	Rsq	Adjrsq	Rsq	Adjrsq	Rsq	Adjrsq	Rsq	Adjrsq	Rsq
cncl_0_100micros	0.0260	0.0280	0.1900	0.1920	0.2200	0.2210	0.4390	0.4400	0.3920	0.3930	0.2190	0.2200	0.2620	0.2630	0.2440	0.2460	0.2500	0.2510			0.0090	0.0100	0.0040	0.0060	0.0500	0.0510	0.2840	0.2860
cncl_1ms_100ms	0.0330	0.0350	0.0790	0.0810	0.4250	0.4270	0.2890	0.2900	0.4710	0.4720	0.4580	0.4590	0.3230	0.3240	0.1120	0.1130	0.1560	0.1580			0.2620	0.2630	0.1970	0.1980	0.1150	0.1170	0.2450	0.2470
cncl_1s_30s	0.2480	0.2500	0.0770	0.0790	0.5350	0.5360	0.5150	0.5160	0.4720	0.4730	0.1260	0.1280	0.4570	0.4580	0.2240	0.2250	0.1760	0.1780			0.1610	0.1620	0.2780	0.2800	0.2040	0.2060	0.2170	0.2190
cncl_5m_30m	0.3770	0.3790	0.1790	0.1810	0.4170	0.4190	0.6440	0.6450	0.5160	0.5170	0.2790	0.2800	0.3400	0.3410	0.2230	0.2250	0.2630	0.2650	0.0660	0.0810	0.0260	0.0270	0.0870	0.0890	0.5270	0.5290	0.4050	0.4070
cncl_30m	0.1300	0.1320	0.1440	0.1460	0.1540	0.1560	0.1620	0.1640	0.2350	0.2370	0.1710	0.1720	0.1750	0.1760	0.1830	0.1840	0.1760	0.1770	0.1870	0.1990	0.2430	0.2440	0.2100	0.2120	0.1830	0.1850	0.1750	0.1770
cncl_30s_60s	0.1300	0.1320	0.1060	0.1080	0.3350	0.3360	0.2700	0.2720	0.3930	0.3950	0.1960	0.1970	0.5250	0.5260	0.1080	0.1090	0.0160	0.0180			0.0700	0.0720	0.2260	0.2280	0.3490	0.3510	0.0240	0.0260
cncl_60s_5m	0.1910	0.1930	0.1930	0.1950	0.3830	0.3850	0.5430	0.5440	0.4530	0.4550	0.2500	0.2510	0.4840	0.4840	0.2570	0.2580	0.2130	0.2150	0.0360	0.0500	0.1640	0.1650	0.1610	0.1620	0.4710	0.4720	0.3670	0.3690
cncl_100micros_1ms	0.0040	0.0050	0.2940	0.2960	0.2110	0.2130	0.2310	0.2330	0.3630	0.3640	0.1540	0.1550	0.2500	0.2520	0.0650	0.0660	0.0150	0.0160			0.0040	0.0050	0.0210	0.0230	0.2580	0.2600	0.2810	0.2840
cncl_100ms_1s	0.1390	0.1410	0.0290	0.0310	0.4960	0.4980	0.3920	0.3930	0.0540	0.0560	0.1410	0.1430	0.3070	0.3090	0.0160	0.0170	0.1490	0.1510			0.1940	0.1950	0.1320	0.1340	0.0030	0.0040	0.0690	0.0710
cncl_shrs_ct	0.2050	0.2070	0.1510	0.1530	0.2790	0.2810	0.3920	0.3940	0.4620	0.4640	0.3380	0.3390	0.4230	0.4240	0.1580	0.1590	0.2160	0.2180	0.2080	0.2200	0.2130	0.2150	0.2170	0.2190	0.0980	0.1000	0.2760	0.2780
exctn_0_100micros	0.6340	0.6350	0.8330	0.8330	0.6950	0.6960	0.6460	0.6470	0.5150	0.5160	0.2340	0.2350	0.0190	0.0200	0.5630	0.5640	0.6250	0.6260	0.2970	0.3090	0.3060	0.3070	0.2380	0.2400	0.1960	0.1980	0.8350	0.8350
exctn_1ms_100ms	0.7260	0.7270	0.7100	0.7110	0.6520	0.6540	0.6900	0.6910	0.5230	0.5250	0.3970	0.3980	0.1540	0.1560	0.5060	0.5060	0.6870	0.6870	0.4200	0.4290	0.0250	0.0260	0.1770	0.1780	0.2890	0.2910	0.7330	0.7340
exctn_1s_30s	0.5000	0.5020	0.5880	0.5890	0.7170	0.7180	0.7040	0.7050	0.5380	0.5390	0.1750	0.1760	0.2300	0.2310	0.6250	0.6260	0.6820	0.6820			0.2990	0.3000	0.1840	0.1850	0.3880	0.3900	0.7060	0.7070
exctn_5m_30m	0.4570	0.4580	0.4490	0.4500	0.4410	0.4420	0.6700	0.6710	0.6350	0.6360	0.1730	0.1750	0.1660	0.1670	0.3460	0.3470	0.6210	0.6230			0.0370	0.0380	0.0810	0.0830	0.3810	0.3830	0.7050	0.7060
exctn_30m	0.3520	0.3540	0.2160	0.2180	0.2690	0.2710	0.5970	0.5980	0.6620	0.6630	0.1310	0.1320	0.0930	0.0940	0.0910	0.0930	0.6320	0.6330			0.2300	0.2310	0.1350	0.1360	0.5390	0.5410	0.6930	0.6940
exctn_30s_60s	0.3030	0.3050	0.6280	0.6290	0.6630	0.6640	0.7190	0.7200	0.5590	0.5610	0.1890	0.1900	0.2390	0.2400	0.5890	0.5900	0.6150	0.6160			0.0130	0.0140	0.1400	0.1420	0.3110	0.3130	0.6280	0.6290
exctn_60s_5m	0.2810	0.2830	0.6320	0.6330	0.6170	0.6180	0.7340	0.7350	0.6210	0.6220	0.1950	0.1960	0.2210	0.2220	0.5540	0.5550	0.6250	0.6260			0.1720	0.1730	0.1850	0.1870	0.4200	0.4220	0.6960	0.6970
exctn_100micros_1ms	0.4650	0.4670	0.5700	0.5710	0.5380	0.5390	0.3780	0.3800	0.3700	0.3710	0.3810	0.3820	0.0670	0.0680	0.2660	0.2670	0.4350	0.4360	0.2030	0.2150	0.0410	0.0430	0.2040	0.2060	0.1340	0.1360	0.5890	0.5900
exctn_100ms_1s	0.6050	0.6070	0.6130	0.6140	0.6250	0.6260	0.6660	0.6670	0.5250	0.5260	0.1600	0.1610	0.1210	0.1220	0.5510	0.5520	0.6190	0.6200	0.0240	0.0380	0.3360	0.3370	0.2100	0.2120	0.2000	0.2020	0.7020	0.7030
final_hidden_pt	0.0630	0.0650	0.0670	0.0690	0.0840	0.0860	0.0660	0.0670	0.0550	0.0570	0.0480	0.0490	0.0390	0.0410	0.0610	0.0630	0.0330	0.0350	0.1350	0.1490	0.0530	0.0540	0.2820	0.2830	0.0470	0.0490	0.0710	0.0730
opp_sd_qt_sz	0.0130	0.0140	0.0320	0.0340	0.0160	0.0170	0.0220	0.0230	0.0040	0.0050	0.0140	0.0150	0.0100	0.0120	0.0130	0.0150	0.0070	0.0090	0.2280	0.2400			0.4920	0.4930	0.0580	0.0600	0.1620	0.1640
order_count	0.5720	0.5740	0.7200	0.7210	0.5550	0.5560	0.5690	0.5700	0.5650	0.5660	0.2290	0.2300	0.3730	0.3740	0.6650	0.6660	0.4510	0.4530	0.3150	0.3260	0.3330	0.3340	0.4320	0.4340	0.3210	0.3230	0.5980	0.6000
order_shares_ct	0.2150	0.2170	0.1600	0.1620	0.2830	0.2840	0.4050	0.4060	0.4680	0.4700	0.3490	0.3500	0.4230	0.4240	0.1610	0.1630	0.2190	0.2210	0.2060	0.2180	0.2640	0.2650	0.2170	0.2190	0.0990	0.1010	0.2840	0.2860
orders_ex_away	0.6240	0.6250	0.6310	0.6320	0.6280	0.6300	0.6770	0.6780	0.5960	0.5970	0.0000	0.0010					0.7060	0.7070	0.9680	0.9690	0.0840	0.0850	0.3090	0.3100	0.6300	0.6310	0.7550	0.7560
orders_ex_tc	0.7460	0.7460	0.8380	0.8390	0.7480	0.7490	0.7920	0.7930	0.6690	0.6700	0.3140	0.3150	0.2670	0.2690	0.6040	0.6050	0.6510	0.6520	0.2010	0.2130	0.3800	0.3810	0.2600	0.2620	0.4400	0.4420	0.8450	0.8460
orders_un_ex	0.1310	0.1330	0.1440	0.1460	0.1540	0.1560	0.1570	0.1590	0.2150	0.2170	0.1710	0.1720			0.1820	0.1830	0.1480	0.1500	0.4010	0.4100	0.2460	0.2470	0.2080	0.2100	0.1300	0.1320	0.1620	0.1640
orgnl_hidden_pt	0.0510	0.0530	0.0490	0.0500	0.0350	0.0360	0.0190	0.0210	0.0380	0.0390	0.1110	0.1130	0.0400	0.0410	0.0300	0.0320	0.0030	0.0040	0.1350	0.1490	0.0100	0.0120	0.0810	0.0830	0.1830	0.1850	0.2460	0.2480
orgnl_order_sz	0.9510	0.9510	0.9410	0.9410	0.9400	0.9400	0.9260	0.9260	0.9370	0.9370	0.8990	0.8990	0.8490	0.8500	0.9740	0.9740	0.9520	0.9520	0.6340	0.6400	0.8900	0.8900	0.9090	0.9090	0.9260	0.9260	0.9410	0.9410
out_qt_ex_ct	0.6400	0.6410	0.4830	0.4840																							0.5140	0.5160
out_qt_ex_wa	0.0380	0.0400	0.0080	0.0100																							0.0210	0.0230
out_qt_ex_wa_tm_pd	0.3060	0.3070	0.0000	0.0020																							0.1760	0.1780
price_imp_ct	0.7320	0.7330	0.7470	0.7480																							0.7150	0.7160
qt_ex_wa_tm_pd	0.0470	0.0490	0.0030	0.0040																							0.0100	0.0110
quote_ex_ct	0.6310	0.6320	0.6590	0.6600																							0.6450	0.6470
same_sd_qt_sz	0.0050	0.0060	0.0170	0.0180	0.0110	0.0130	0.0270	0.0290	0.0060	0.0070	0.0300	0.0320	0.0170	0.0190	0.0050	0.0060	0.0020	0.0030	0.2280	0.2400			0.6870	0.6870	0.0480	0.0500	0.1590	0.1610
wa_bbo_spd	0.0040	0.0060	0.0160	0.0170	0.0090	0.0100	0.0020	0.0030	0.0000	0.0010	0.1350	0.1360	0.0240	0.0260	0.0020	0.0030			0.3030	0.3140			0.2800	0.2810	0.0000	0.0010	0.0040	0.0050
wa_eff_spd	0.0280	0.0290	0.0230	0.0240																							0.0280	0.0300
wa_nbbo_spd	0.0340	0.0360	0.0190	0.0200	0.0030	0.0040	0.0120	0.0130	0.0010	0.0020	0.0570	0.0580	0.0270	0.0290	0.0020	0.0030	0.0030	0.0050	0.3030	0.3140			0.7760	0.7760	0.0110	0.0120	0.0070	0.0090
wa_price_imp	0.0440	0.0450	0.0170	0.0180																							0.0270	0.0280
wa_time_pd	0.0060	0.0070	0.0030	0.0040																							0.0030	0.0040
wars_ex_tc	0.0220	0.0230	0.0250	0.0270	0.0060	0.0070	0.0160	0.0180	0.0050	0.0060	0.0230	0.0240	0.0260	0.0280	0.0180	0.0190	0.0140	0.0160			0.0040	0.0050	0.0240	0.0260	0.0090	0.0100	0.0210	0.0230

Table 21: R-Squared Coefficients for TAQ (Rosenblatt Ticker Plant – Trades and Quotes) Data

R-Squared - TAQ

	exec qty		price impact bps		price impact dollars		realized spread bps		realized spread dollars	
Length	Adjrsq	Rsq	Adjrsq	Rsq	Adjrsq	Rsq	Adjrsq	Rsq	Adjrsq	Rsq
100 micros	0.7650	0.7650	0.2070	0.2080	0.1680	0.1690	0.4010	0.4020	0.0940	0.0960
1 ms	0.7650	0.7650	0.3760	0.3770	0.3050	0.3060	0.3400	0.3410	0.0940	0.0950
100 ms	0.7640	0.7650	0.4630	0.4640	0.4150	0.4160	0.2700	0.2710	0.0910	0.0920
1 sec	0.7640	0.7640	0.4750	0.4760	0.4390	0.4400	0.2390	0.2410	0.0880	0.0890
30 sec	0.7600	0.7610	0.4310	0.4320	0.4890	0.4900	0.1700	0.1710	0.1000	0.1010
1 min	0.7580	0.7580	0.4290	0.4290	0.4900	0.4910	0.1790	0.1800	0.1540	0.1550
5 min	0.7520	0.7520	0.3250	0.3260	0.4450	0.4460	0.1080	0.1090	0.0910	0.0920
30 min	0.7410	0.7420	0.2500	0.2520	0.3370	0.3380	0.0880	0.0900	0.0970	0.0980

Table 22: R-Squared Coefficients for Pilot B.II, B.IV and C.I Data

R-Squared - B.II B.IV C.I

		Order Type					
		NA		10		11	
Data Type	Yvar	Adjrsq	Rsq	Adjrsq	Rsq	Adjrsq	Rsq
B2	qt_leader_fl_0_cnt			0.9460	0.9460	0.8840	0.8840
	qt_leader_fl_1_cnt			0.6570	0.6580	0.7660	0.7660
	qt_leader_fl_unknow..			0.9130	0.9130	0.9500	0.9500
B4	avg_trade_size	0.1030	0.1050				
	pct_shares_at	0.4640	0.4660				
	pct_shares_cross	0.2380	0.2400				
	pct_shares_inside	0.4570	0.4590				
	pct_shares_outside	0.2960	0.2980				
C1	eod	0.1030	0.1050				
	realized_profit	0.1170	0.1190				
	shares_executed	0.6930	0.6940				
	unrealized_profit	0.0160	0.0180				
	vwap	0.8670	0.8670				