

A characterization of market quality for small capitalization US equities

Charles Collver¹

September 2014

This paper characterizes some aspects of market quality for small and mid capitalization stocks during 2013. First, it tabulates some widely-used summary market quality measures such as quoted and effective spreads and trading volume. Then it describes the aggregate displayed depth of the limit order book for these stocks.

Introduction

During 2013, US-listed, US-domiciled small cap stocks with capitalizations below \$1 Billion were much less liquid than stocks with capitalizations between \$1 Billion and \$5 Billion. Small cap stocks had larger quoted and effective spreads and traded much lower volumes than mid cap stocks. They also showed lower depth at the inside quotes and beyond. Liquidity improved with market capitalization: the smallest stocks with capitalizations below \$100 Million exhibited the least liquidity and mid cap stocks with capitalizations between \$2 Billion and \$5 Billion exhibited the greatest liquidity.

The Jumpstart Our Business Startups Act (“JOBS Act”) of 2012 directed the SEC to study how decimalization affected the liquidity and trading of small capitalization companies.² Among other contributions, the resulting July 2012 Decimalization Report summarized academic literature on the impact of decimalization on small and mid cap stock liquidity.³ The Decimalization Report suggested a public roundtable to collect recommendations on a pilot program to generate more data on the impact of decimalization on liquidity. Many participants in the Decimalization Roundtable expressed support for a pilot program to study the impact of wider tick sizes on small cap stock liquidity.⁴ On June 24, 2014 the SEC issued an order (the “Tick Size Pilot Order”) directing US equity exchanges and the Financial Industry Regulatory Authority to act jointly to develop and file a tick size pilot plan.⁵

An increased minimum quoted price increment will have a direct mechanical impact on two aspects of liquidity: quoted spread and the distribution of order book depth. In 2013, more than 41% of small capitalization stocks (with market capitalization less than \$1 Billion and price at least \$2) had mean daily quoted spreads of 4.5 cents or less. Nearly one-third of these (or 14% of the total sample of small cap

¹ This memorandum was prepared for the Division of Trading and Markets (TM). It was reviewed by Gregg Berman (TM), Mark Donohue (TM), Dan Gray (TM) and Amy Edwards, Austin Gerig, Hans Heidle, and Abby Kim, Division of Economic and Risk Analysis. The U.S. Securities and Exchange Commission, as a matter of policy, disclaims responsibility for any private publication or statement of any of its employees. The views expressed herein are those of the author and do not necessarily reflect the views of the Commission or of the author’s colleagues upon the staff of the Commission.

² See SEC [Release No. 34-42360 \(January 28, 2000\), File No. 4-430](#) for some history of the switch to decimal pricing in US equities.

³ See [Report to Congress on Decimalization](#) (July 2012).

⁴ See SEC [Decimalization Roundtable, February 5, 2013](#).

⁵ See [Order Directing the Exchanges and the Financial Industry Regulatory Authority To Submit a Tick Size Pilot Plan, Release No. 34-72460](#), (June 24, 2014).

stocks) had mean daily quoted spreads of 1.5 cents or less. On the other side of the spectrum, 25% had mean daily quoted spreads of 15 cents or more. Given the data reveal small capitalization stocks exhibit a very wide range of quoted spreads, it might be expected that changes in minimum tick sizes could affect one set of small capitalization stocks differently than another set.

This study provides some empirical evidence on the state of the limit order book for small and mid capitalization stocks during 2013, a full year of results for the period preceding the proposed pilot study.⁶ This paper begins by presenting quoted and effective spreads and dollar trade volume. Then it characterizes the aggregate depth of the limit order book on US exchanges.

Sample

The sample period includes every trading day in 2013. I source the list of US-listed, US-domiciled corporate stock tickers from the Center for Research in Security Prices (CRSP) daily stock database. Stocks are included in the daily sample if the closing price measured by CRSP is greater than or equal to \$2.00 and the market capitalization is less than \$5 Billion.⁷ On average, there are 2814 stocks in the sample during a typical trading day in 2013.

Methods

The basic unit of analysis is the ticker-day. I compute spreads from the intra-daily MIDAS trade and quote (SIP) files. This data is similar to the commercially available TAQ data with one important difference: timestamps are in microseconds instead of milliseconds. Quoted spread is the difference between the best ask price and best bid price. Relative quoted spread is the quoted spread scaled by the bid-ask midpoint. Effective spread is twice the absolute value of the difference between the trade price and the prevailing bid-ask midpoint. Relative effective spread is the effective spread scaled by the quote midpoint. Quoted spreads are duration-weighted and effective spreads are dollar value weighted. If the quoted spread is less than or equal to zero (i.e., the market is crossed or locked), the data point is excluded from the computation. If a trade occurs while a quoted spread results in a locked or crossed market for that ticker, the effective spread is dropped. I also filter the first five minutes of each day to avoid some of the irregularities associated with the opening auctions. I compute dollar volume for each ticker-day from the MIDAS trade and quote files, but without filtering the first five minutes of the trading day.

I compute depth from twelve of the thirteen MIDAS direct exchange feeds.⁸ For each ticker and day, I cumulate depth at the bid price and 49 one-penny increments below the bid price at the end of each one-minute interval from 9:30 am to 4:00 pm (1:00 pm on shortened trading days: July 3, November 29 and December 24). I cumulate depth at the ask price and 49 one-penny increments above the ask price

⁶ The purpose of this study is to characterize market quality for small capitalization stocks during 2013 and compare this market quality to that of mid capitalization stocks. The study does not evaluate any proposed market structure reforms. Nor does it advocate a position on any proposed reforms.

⁷ All of the intervals in this study are closed on (include) the left endpoint and open on (exclude) the right endpoint.

⁸ The CBSX feed is restricted to top-of-book data.

for the same one-minute intervals. There are a total of 390 equally spaced intra-daily depth snapshots in a typical trading day (210 on shortened trading days). Using the intraday snapshots, I compute the daily average depth in shares and dollars (price*size) at each 0.5 cent increment and each 1 basis point increment from the bid-ask midpoint for each ticker. The four resultant average daily limit order books – shares/penny, shares/basis point, dollars/penny and dollars/basis point – form the basis for all of the order book summary statistics. I also compute daily average shares per penny away from the best bid and ask in a similar manner.⁹

This paper characterizes the market quality of small capitalization stocks. It also provides empirical analysis on mid cap stocks as a comparison to small cap stocks. However, liquidity tends to vary by price as well as capitalization. To ease exposition and facilitate comparisons stocks are split into six capitalization groups: less than \$100 Million, \$100 Million to \$250 Million, \$250 Million to \$500 Million, \$500 Million to \$1 Billion, \$1 Billion to \$2 Billion, and \$2 Billion to \$5 Billion. Each of these capitalization groups are then split into five price ranges: \$2.00 - \$5.99, \$6.00 - \$9.99, \$10.00 - \$19.99, \$20.00 - \$39.99 and \$40 or more.¹⁰ Table 1 provides the daily average number of ticker symbols in each capitalization-price bin. The Tick Size Pilot Order mandates including stocks with market capitalizations of \$5 Billion or less and prices of \$2 or more. On average, 15.2% of US-listed, US-domiciled corporate stocks had market capitalizations greater than \$5 Billion. Another 7.9% of stocks had prices below \$2. In contrast, 31.4% of stocks with capitalization below \$100 Million were also priced below \$2. The Tick Size Pilot Order also mandates excluding stocks with average daily volume of shares traded (ADV) in excess of one million. Table 1 also shows the daily average number of ticker symbols in the sample with ADV less than 1 million shares (i.e., symbols that could potentially be included in the pilot). As expected, higher-priced and larger stocks tend to be more likely to trade more than one million shares per day.¹¹

⁹ In contrast to the SIP-based sample utilized to compute spreads, this sample excludes off-exchange activity but includes on-exchange odd lot orders and trades.

¹⁰ The choice of price and capitalization bins results from balancing multiple tradeoffs between meaningful comparisons, adequate sample size and sensible demarcations.

¹¹ The bins with a low percentage of tickers with ADV less than one million (i.e., subsets of stocks that would not be included in the proposed pilot) tend to have few ticker symbols. The purpose of this study is to describe the liquidity and trading environment for typical small capitalization stocks and compare this liquidity to that of typical mid cap stocks. The relatively few ticker-days with ADV greater than one million shares are included in the current sample.

Table 1: Sample Description

Daily Average Number of Ticker Symbols		Cap \$ Million					
		<100	100 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 5000
	2 - 5.99	284	145	61	30	10	7
	6 - 9.99	115	109	79	51	24	12
Price \$	10 - 19.99	122	148	175	143	92	60
	20 - 39.99	27	50	99	166	176	159
	≥ 40	2	14	28	64	134	227
Percentage of Daily Average Ticker Symbols with ADV < 1 Million Shares		Cap \$ Million					
		<100	100 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 5000
	2 - 5.99	98.9	93.8	74.1	37.6	20.9	0.1
	6 - 9.99	99.8	98.8	94.3	74.2	30.8	5.3
Price \$	10 - 19.99	99.8	99.4	98.1	90.9	67.0	29.0
	20 - 39.99	100.0	99.9	99.5	97.9	90.7	64.3
	≥ 40	100.0	100.0	99.9	99.4	97.4	90.3

Results and Analysis

The purpose of this study is to characterize market quality for small and mid cap stocks in 2013. To provide a thorough view of liquidity across stocks with various prices and market capitalizations this study includes a large number of stocks. The main body of this study highlights a few characteristics of the tabulated data while also providing methods for the reader to formulate additional interpretations. Many of the results presented in this study are subsets of larger output datasets. For the curious and the thorough, these datasets are provided in an Appendix and are available in electronic format at http://www.sec.gov/marketstructure/research/small_cap_liquidity_appendix.xlsx. The ensuing analysis begins with some examples of average daily limit order books followed by a presentation of quoted and effective spreads along with trade volume. The analysis concludes with an examination of displayed order book depth.

Cumulative Order Book Depth Examples

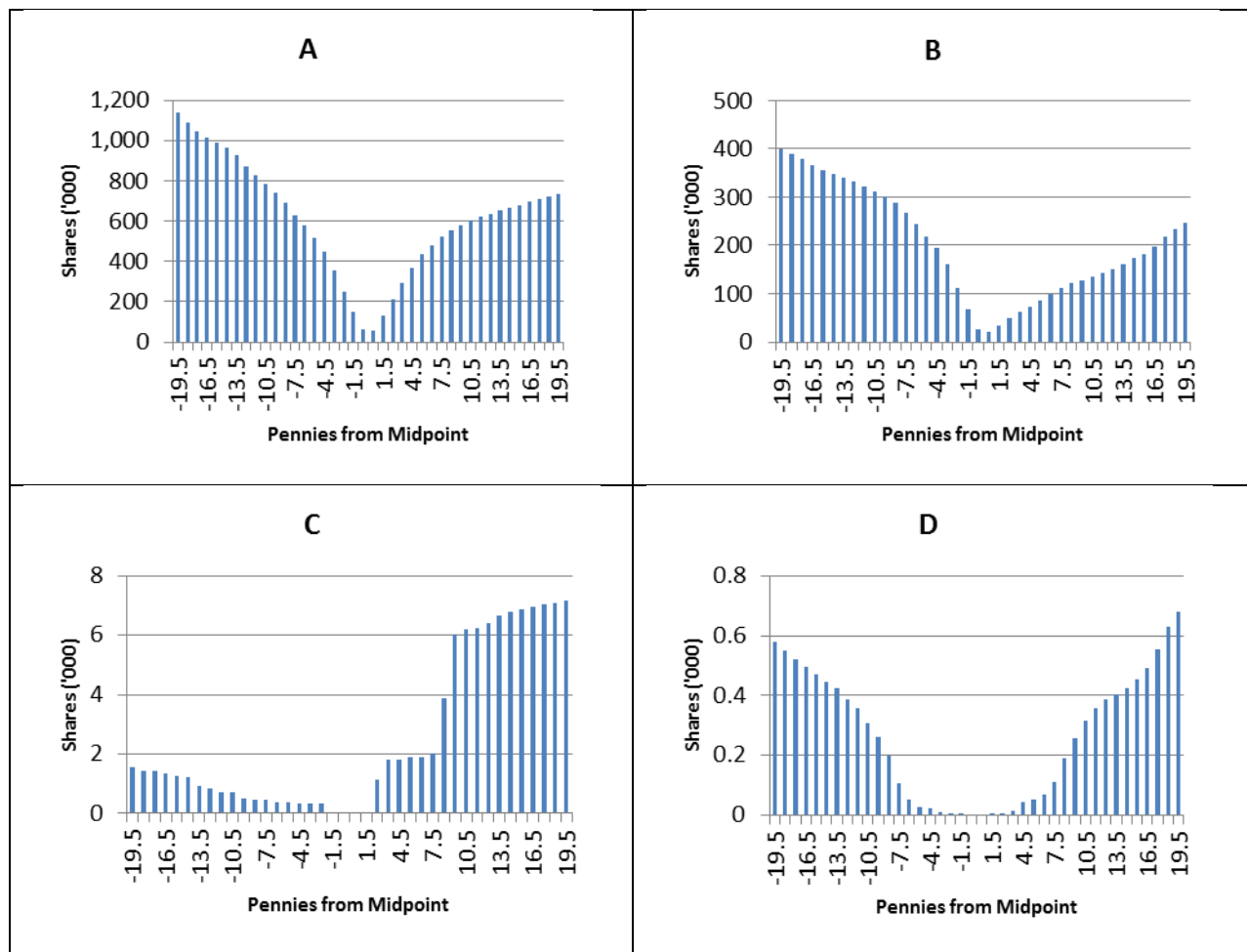
Figure 1 provides some anonymized examples of average cumulative depth in shares per penny away from the quote midpoint for four corporate stocks on August 13, 2013:

- Stock A is a liquid large capitalization stock with a market capitalization of approximately \$246 Billion and a closing price of \$24.20. It traded over 28 million shares and had an average quoted spread of one cent on August 13. The chart shows substantial depth available outside of the best bid and offer.
- Stock B is a small capitalization stock with a market cap of \$350.7 Million and a closing price of \$3.04. It traded over 2 million shares and had an average quoted spread of one cent on August 13. This chart, too, shows substantial depth available outside of the best bid and offer.

- Stock C had a market cap of \$115.4 Million and closed at \$8.90. It traded 20,568 shares and had an average quoted spread of \$0.042 on August 13. This stock has little incremental depth available on the bid side. Cumulative depth improves by about 400 shares at the average ask plus one cent. Average cumulative depth does not improve again until 8 cents above the midpoint.
- Stock D had a market capitalization of \$536.2 Million and a closing price of \$32.52. It traded 15,779 shares and had an average quoted spread of \$0.193. While the average depth inside the average quoted spread is low (as expected), cumulative depth increases somewhat at prices away from the best bid and offer. However, cumulative depth at increments twice the quoted half spread is only 2 to 3 times the depth available at the best bid and offer.

Stock A is a very liquid large capitalization stock. Stock B, though a small capitalization stock, displays many of the features of a liquid large cap stock: substantial trading activity, a one cent spread and considerable depth away from the best bid and offer. It is one of the few small cap stocks that would not meet the 1 million share ADV requirement for potential inclusion in the pilot. Stock C is a small capitalization stock with an average quoted spread less than five cents. While the average quoted spread would necessarily widen if included in one of the pilot test groups, it is not clear if cumulative depth on the coarser grid would change. Occasionally, quoted spreads in Stock D are smaller than average. But Stock D tends to have 200 or fewer shares available at spreads less than 15 cents.

Figure 1: Examples of Mean Cumulative Depth of the Order Book on August 13, 2013



Spreads and Volume

Standard measures of liquidity include quoted and effective spreads and dollar trading volume. During 2013, the sample of stocks with market capitalizations less than \$1 Billion had much larger spreads than mid cap stocks with market capitalizations ranging from \$1 to \$5 Billion, and, the smallest stocks have exceptionally large spreads. Table 2 provides mean and median quoted spread in cents and relative quoted spread in percent for the thirty capitalization-price bins. Average and median quoted spreads decline monotonically with capitalization for each price range and rise monotonically with price within each capitalization bin. Relative spreads exhibit a similar pattern. Exceptions occur when the spreads appear to be constrained by the minimum price increment. Capitalization-price bins where the median duration-weighted quoted spread is close to the minimum price increment are marked with a bold outline.¹² Median quoted spreads range from 6.22 to 113.52 cents for the smallest stocks and from 1.00 to 5.77 cents for stocks with capitalizations between \$2 Billion and \$5 Billion. Median relative quoted

¹² These are also the bins of stocks most likely to have traded more than 1 million shares per day. See Table 1.

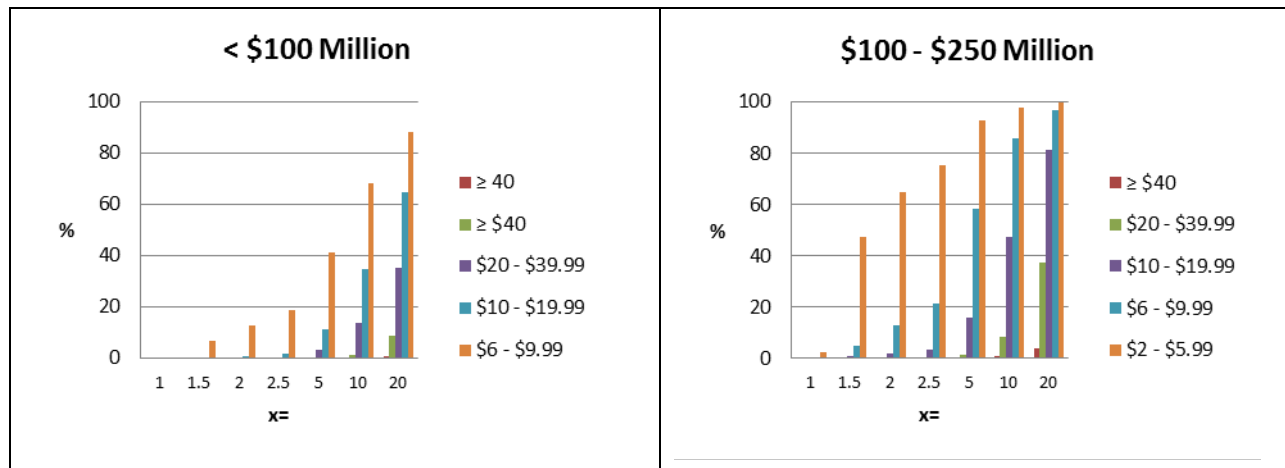
spreads range from 1.749% to 2.641% for the smallest stocks and from 0.066% to 0.237% for stocks with capitalizations between \$2 Billion and \$5 Billion.

Table 2: Quoted Spread

Mean Quoted Spread (cents)		Cap \$ Million					
		<100	100 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 5000
	2 - 5.99	9.81	2.43	1.50	1.10	1.04	1.00
	6 - 9.99	21.26	6.31	2.89	1.47	1.10	1.02
Price \$	10 - 19.99	40.54	15.15	6.60	3.40	1.79	1.25
	20 - 39.99	85.22	36.34	16.14	8.50	4.61	2.38
	≥ 40	134.63	113.23	72.87	32.19	17.49	17.40
Median Quoted Spread (cents)		Cap \$ Million					
		<100	100 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 5000
	2 - 5.99	6.22	1.56	1.10	1.00	1.00	1.00
	6 - 9.99	14.36	4.33	2.02	1.19	1.01	1.00
Price \$	10 - 19.99	28.61	10.51	4.78	2.49	1.40	1.03
	20 - 39.99	64.26	24.85	12.72	6.45	3.84	1.99
	≥ 40	113.52	66.72	37.61	20.50	9.65	5.77
Mean Relative Quoted Spread (%)		Cap \$ Million					
		<100	100 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 5000
	2 - 5.99	2.593	0.616	0.361	0.271	0.258	0.247
	6 - 9.99	2.718	0.798	0.359	0.181	0.141	0.130
Price \$	10 - 19.99	2.828	1.033	0.441	0.221	0.117	0.081
	20 - 39.99	3.435	1.353	0.591	0.303	0.154	0.079
	≥ 40	2.099	1.704	0.966	0.440	0.232	0.124
Median Relative Quoted Spread (%)		Cap \$ Million					
		<100	100 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 5000
	2 - 5.99	1.749	0.460	0.292	0.234	0.208	0.237
	6 - 9.99	1.867	0.558	0.254	0.155	0.135	0.128
Price \$	10 - 19.99	2.079	0.727	0.332	0.166	0.099	0.070
	20 - 39.99	2.641	0.984	0.492	0.231	0.132	0.066
	≥ 40	1.823	1.226	0.706	0.374	0.178	0.097

Figure 2 provides some insight into the distribution of quoted spread for stocks within a capitalization-price bin by showing the percentage of ticker-days with mean quoted spreads less than or equal to some particular prices.¹³ As expected, high-priced stocks tend to show the least liquidity by this measure: within a particular capitalization bin and fixed quoted spread, the percentage of ticker-days increases as price declines.¹⁴ Smallest stocks show the least liquidity. For example, 94.2% of all ticker-days in the \$2 Billion to \$5 Billion capitalization - \$10 to \$19.99 price bin have quoted spreads less than or equal to 2 cents. This percentage is only 72.9% for the same price levels in the \$1 Billion to \$2 Billion bin, 34.9% in the \$500 Million to \$1 Billion bin, 7.2% in the \$250 Million to \$500 Million bin, 1.9% in the \$100 Million to \$250 Million bin, and 0.3% in the < \$100 Million bin. A similar pattern is apparent for other price range bins and quoted spread levels: the percentage of ticker-days with quoted spreads less than some fixed amount declines as capitalization declines while holding stock price range constant. This pattern breaks down somewhat as the percentage of ticker-days reaches the maximum of 100%.

Figure 2: Percentage of Ticker-Days with Mean Quoted Spread less than or equal to 'x' cents



¹³ Additional supporting tables, including tables of quoted spread, relative quoted spread, effective spread, and relative effective spread are included in Appendix Table 1. This table contains results for several more spreads in addition to those displayed in Figure 2.

¹⁴ Appendix Table 1 Panel C shows this monotonic relation between percentage of ticker days and price does not hold for relative quoted spreads.

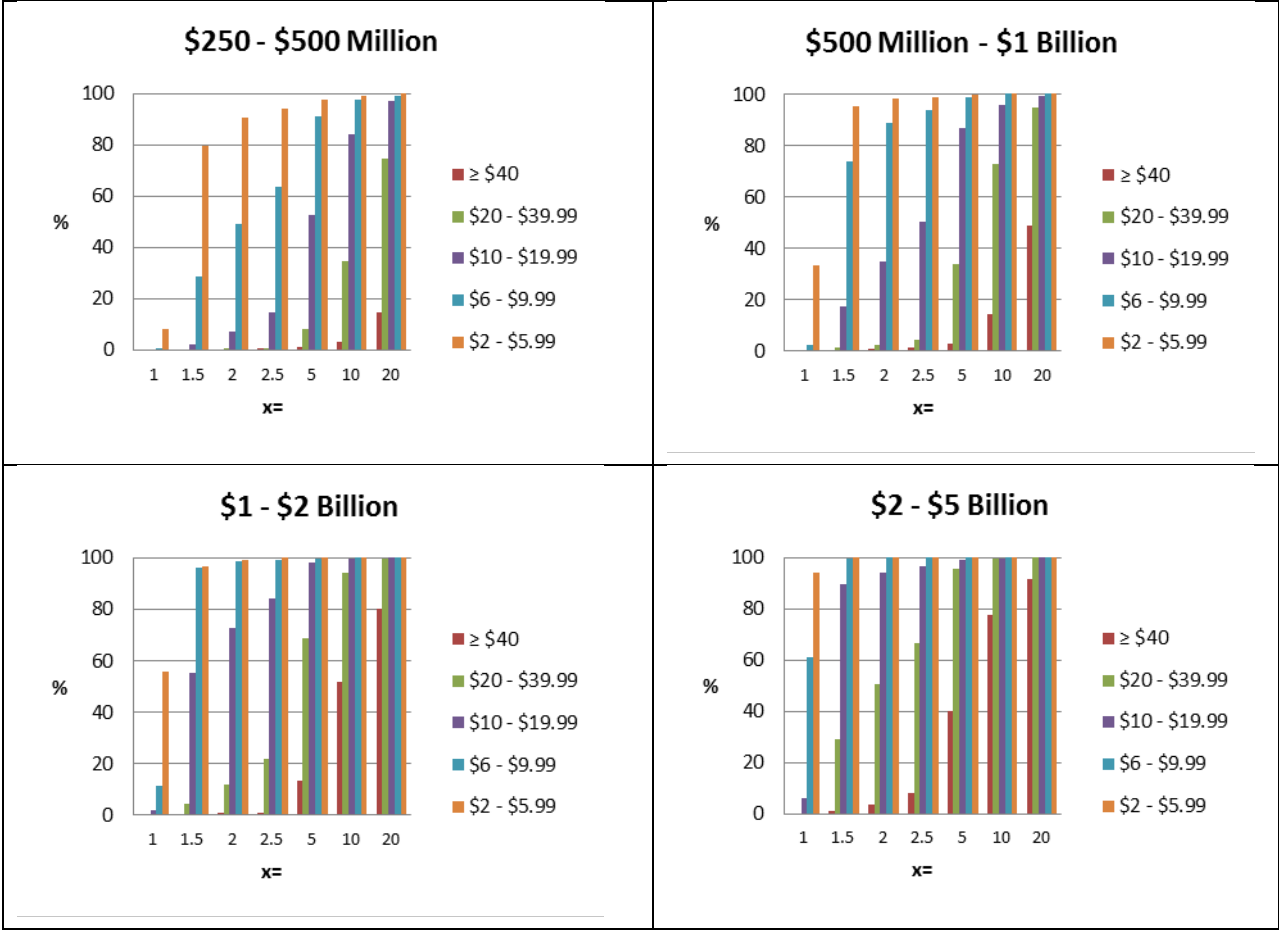


Figure 2 and the accompanying Appendix Table 1 also provide more direct evidence on current minimum tick size constraints. On average, 52 ticker-days (1.9% of the sample) have a mean quoted spread less than or equal to 1 cent. These stocks are constrained the full day. Another 478 ticker-days (15.1% of the sample) have mean quoted spreads less than or equal to 1.5 cents. These stocks are constrained at least part of the day. However, these results reflect the activity of a variety of stocks over a full year. Table 3 shows the number of tickers that were fully and partially constrained for at least one day and the number of tickers that were constrained for more than half of the days in 2013. Twenty-five tickers were fully constrained by the 1 penny minimum price increment for at least half of the days in 2013. A total of 361 unique tickers were fully constrained for at least one day. Exactly 327 tickers were either fully or partially (more than half of a day) constrained for at least half of the days in 2013. A total of 1,534 unique tickers were either fully or partially constrained for at least one day.¹⁵

¹⁵ Stocks can migrate from one capitalization-price bin to another over the course of a full year. The count of unique tickers is less than the count of ticker-days that were constrained for at least one day.

Table 3: Summary of Constrained Ticker-Days

Fully Constrained For At Least 1 (127) Days							
		Cap \$ Million					
		<100	100 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 5000
	2 - 5.99	42	67	67 (1)	55 (5)	35 (3)	13 (7)
	6 - 9.99	8	8	9	22 (1)	39 (1)	27 (6)
Price \$	10 - 19.99	6	7	7	11	21	42 (1)
	20 - 39.99	0	1	3	9	10	8
	≥ 40	0	0	1	0	1	8
Fully or Partially Constrained For At least 1 (127) Days							
		Cap \$ Million					
		<100	100 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 5000
	2 - 5.99	299 (2)	321 (48)	185 (36)	91 (24)	40 (5)	13 (7)
	6 - 9.99	27	116	193 (8)	160 (26)	78 (24)	34 (10)
Price \$	10 - 19.99	16	33	121	225 (9)	191 (41)	129 (51)
	20 - 39.99	1	2	10	35	103 (1)	225 (34)
	≥ 40	0	0	2	4	2 (1)	47

Figure 3 shows the behavior of mean quoted spreads for stocks priced from \$10.00 to \$19.99 over the entire year. While quoted spreads exhibit some variability over time, the averages in Table 2 are a good representation of their overall time series behavior. The chart portrays vast differences in average quoted spread across size ranges with the smallest stocks in the sample exhibiting the least liquidity and the largest stocks exhibiting the most liquidity. The chart also shows that the monotonic relation between average size and average spreads for 2013 is not violated on any day of the sample – the time series plots of daily averages for each size bin never cross.

Figure 3: Quoted Spread for Stocks Priced \$10.00 to \$19.99

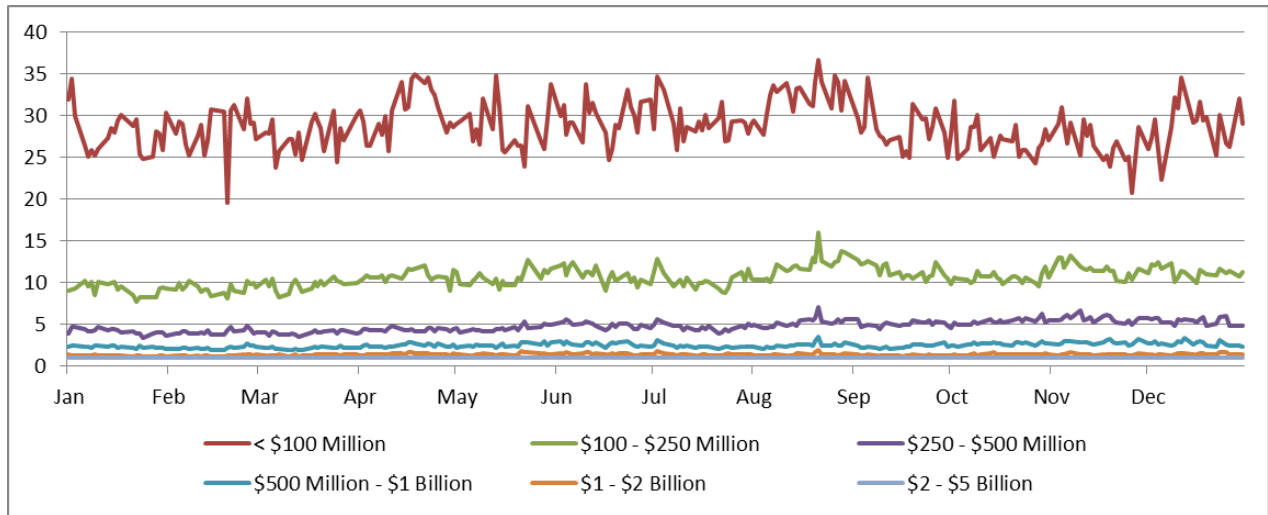


Table 4 provides mean and median effective spread in cents and relative effective spread in percent. Average and median effective spreads also tend to decline monotonically with capitalization for each price range and rise monotonically with price within each capitalization bin. A similar pattern occurs with relative effective spreads with the same exceptions apparent in relative quoted spreads. Median effective spreads range from 3.99 to 56.00 cents for the smallest stocks and from 0.88 to 3.15 cents for stocks in the \$2 to \$5 Billion capitalization range. Median relative effective spreads range from 0.922% to 1.235% for the smallest stocks and from 0.045% to 0.210% for stocks in the \$2 to \$5 Billion capitalization range. The last two panels of Table 4 show the ratio of effective to quoted spread in percent. In general, the effective spread is closer to the quoted spread in lower priced stocks.

Table 4: Effective Spread

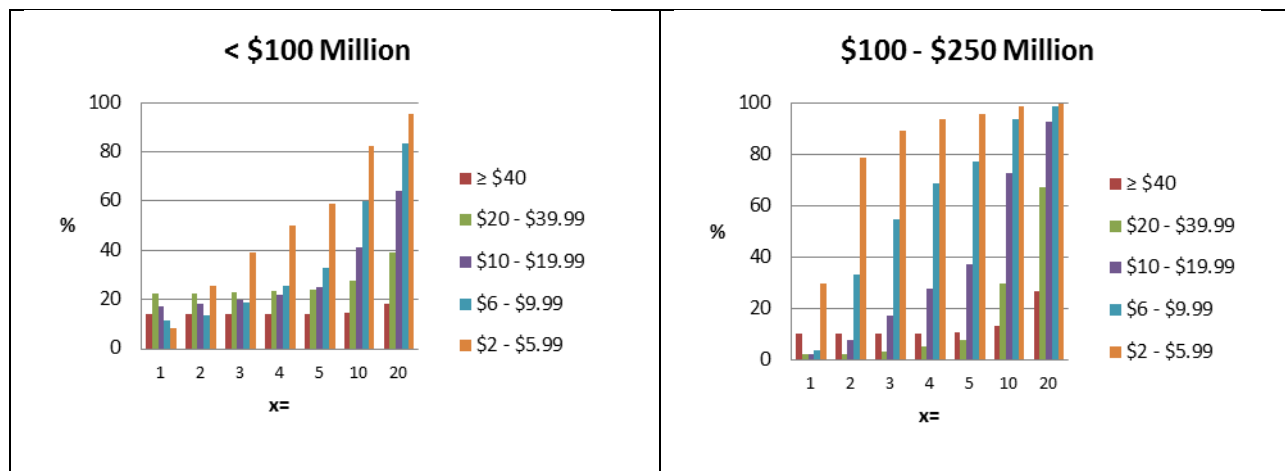
<u>Mean Effective Spread (cents)</u>		Cap \$ Million					
		<100	100 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 5000
Price \$	2 - 5.99	6.32	1.84	1.23	0.99	0.95	0.90
	6 - 9.99	12.03	4.09	1.91	1.16	1.00	0.95
	10 - 19.99	21.07	9.15	3.98	2.12	1.32	1.13
	20 - 39.99	43.28	22.85	9.39	4.78	2.65	1.69
	≥ 40	76.83	57.63	38.30	18.61	9.93	10.78
<u>Median Effective Spread (cents)</u>		Cap \$ Million					
		<100	100 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 5000
Price \$	2 - 5.99	3.99	1.20	0.97	0.91	0.91	0.88
	6 - 9.99	7.91	2.74	1.30	0.98	0.92	0.91
	10 - 19.99	13.29	6.41	2.69	1.46	1.08	0.96
	20 - 39.99	29.76	14.37	7.29	3.47	2.08	1.29
	≥ 40	56.00	33.50	19.89	10.84	5.12	3.15
<u>Mean Relative Effective Spread (%)</u>		Cap \$ Million					
		<100	100 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 5000
Price \$	2 - 5.99	1.708	0.477	0.301	0.244	0.235	0.221
	6 - 9.99	1.553	0.521	0.237	0.144	0.127	0.121
	10 - 19.99	1.499	0.625	0.267	0.139	0.088	0.074
	20 - 39.99	1.762	0.800	0.344	0.170	0.089	0.056
	≥ 40	1.238	0.910	0.514	0.251	0.129	0.072
<u>Median Relative Effective Spread (%)</u>		Cap \$ Million					
		<100	100 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 5000
Price \$	2 - 5.99	1.135	0.370	0.247	0.210	0.192	0.210
	6 - 9.99	1.024	0.359	0.167	0.125	0.120	0.116
	10 - 19.99	0.992	0.448	0.187	0.099	0.076	0.064
	20 - 39.99	1.235	0.566	0.278	0.125	0.072	0.045
	≥ 40	1.033	0.640	0.370	0.202	0.095	0.054

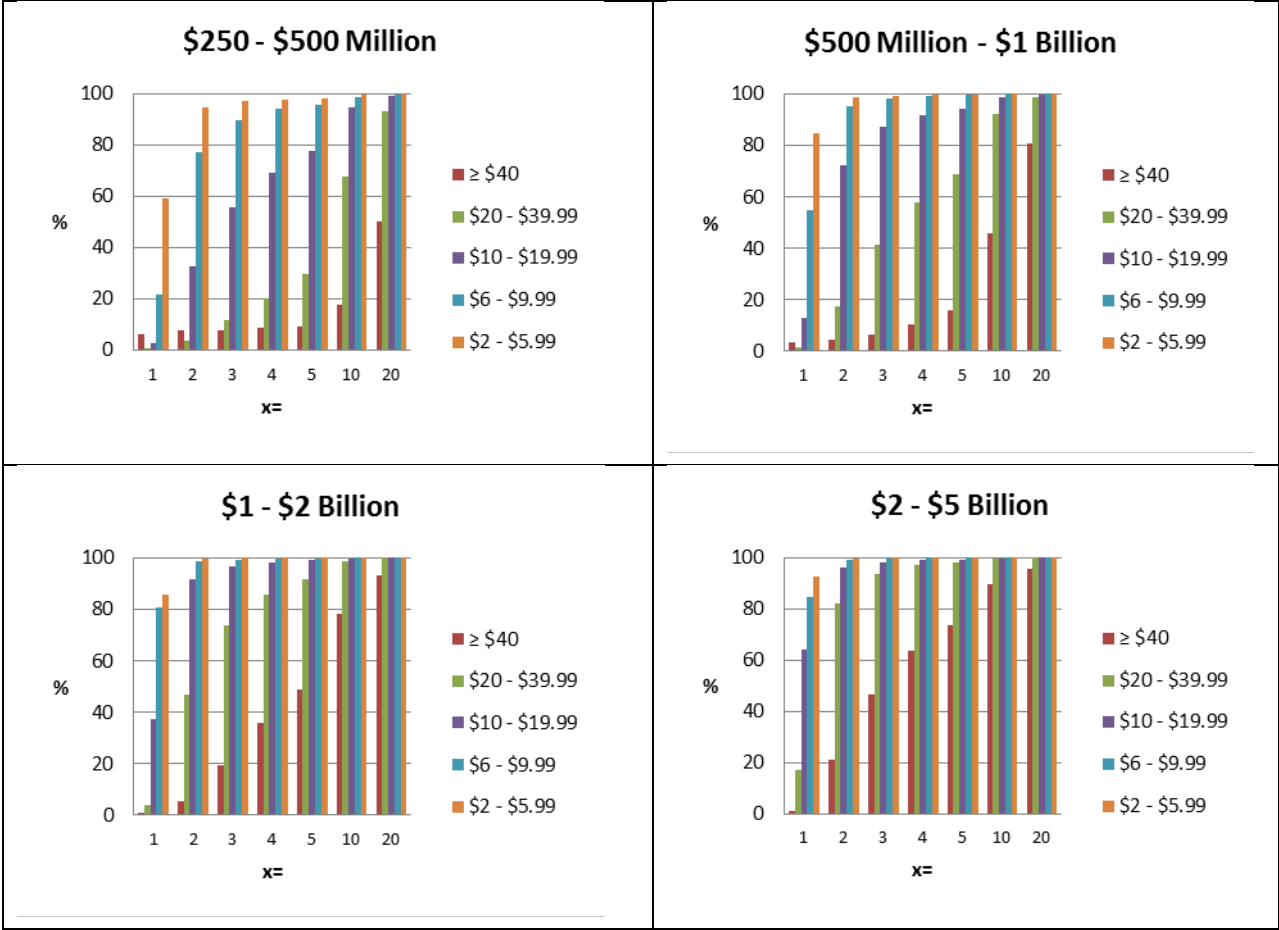
Table 4: Effective Spread (continued)

Mean ES/QS Cents (%)		Cap \$ Million					
		<100	100 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 5000
Price \$	2 - 5.99	76.1	81.4	86.6	91.2	92.1	89.8
	6 - 9.99	67.6	69.7	71.5	83.4	91.9	93.8
	10 - 19.99	62.7	65.4	62.3	67.2	80.6	95.1
	20 - 39.99	59.2	65.4	59.5	57.9	60.7	75.1
	≥ 40	63.9	54.9	56.8	58.1	56.7	59.9
Median ES/QS Cents (%)		Cap \$ Million					
		<100	100 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 5000
Price \$	2 - 5.99	76.8	80.7	86.7	89.4	90.3	88.0
	6 - 9.99	70.3	66.8	68.2	82.1	89.0	89.8
	10 - 19.99	66.9	63.3	58.9	61.8	77.1	89.7
	20 - 39.99	64.5	61.7	57.4	54.7	55.5	66.4
	≥ 40	64.2	54.7	57.0	56.0	53.7	54.5

Figure 4 shows the distribution of effective spreads for each capitalization-price bin. The percentage of ticker-days with mean effective spreads less than or equal to some fixed amount tends to decline with price and increase with capitalization. General exceptions include stocks with market capitalizations below \$500 Million and prices above \$40, and the 1 - 3 cent columns for stocks with capitalizations below \$100 Million.

Figure 4: Percentage of Ticker-Days with Mean Effective Spread less than or equal to 'x' cents





Smaller capitalization stocks tend to trade lower dollar volumes than larger capitalization stocks. Table 5 shows the average and median daily trading volume for each capitalization-price bin. Most stocks in the $< \$100$ Million capitalization bin trade less than $\$25,000$ during a typical trading day in 2013. Median daily dollar volume traded ranges from $\$9,000$ to $\$25,000$ for the smallest stocks and from $\$13,599,000$ to $\$20,577,000$ for stocks in the $\$2$ to $\$5$ Billion capitalization range.¹⁶ Median dollar volume traded increases when moving from the smallest to largest stocks in the sample. The increase is most substantial when moving from stocks with market capitalizations below $\$100$ Million to stocks with market capitalizations ranging from $\$100$ Million to $\$250$ Million.

¹⁶ On average, approximately 30% of the stocks in the $\$2$ Billion to $\$5$ Billion capitalization range trade more than 1 million shares on a typical day.

Table 5: Dollar Volume

Mean Dollar Volume ('000)		Cap \$ Million					
		<100	100 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 5000
	2 - 5.99	128	593	1946	5494	14714	28496
	6 - 9.99	123	487	1503	4233	12896	26004
Price \$	10 - 19.99	98	454	1435	3932	9659	24206
	20 - 39.99	44	345	1283	3392	8217	20708
	≥ 40	64	339	1003	3050	8226	19242
Median Dollar Volume ('000)		Cap \$ Million					
		<100	100 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 5000
	2 - 5.99	25	307	1126	2955	10344	19872
	6 - 9.99	20	209	863	2555	7757	20577
Price \$	10 - 19.99	11	185	761	2413	5828	16754
	20 - 39.99	8	178	650	2166	5258	14201
	≥ 40	25	183	573	1696	5353	13559

Aggregate Order Book Depth Characterization

On average, the smallest capitalization stocks have much less displayed size at all levels of the order book when compared to larger capitalization stocks. Figure 5 depicts average cumulative order book depth for each of the six capitalization ranges. While the overall shapes of the graphs are similar, the change in scale clearly shows the increase in depth with increasing market capitalization. An analogous set of charts for price ranges shows much less variation in average depth across the five price bins. While depth does vary with price, the relationship between depth and price is most evident when conditioned on capitalization.

Figure 5: Cumulative Average Order Book Depth by Market Capitalization and Price

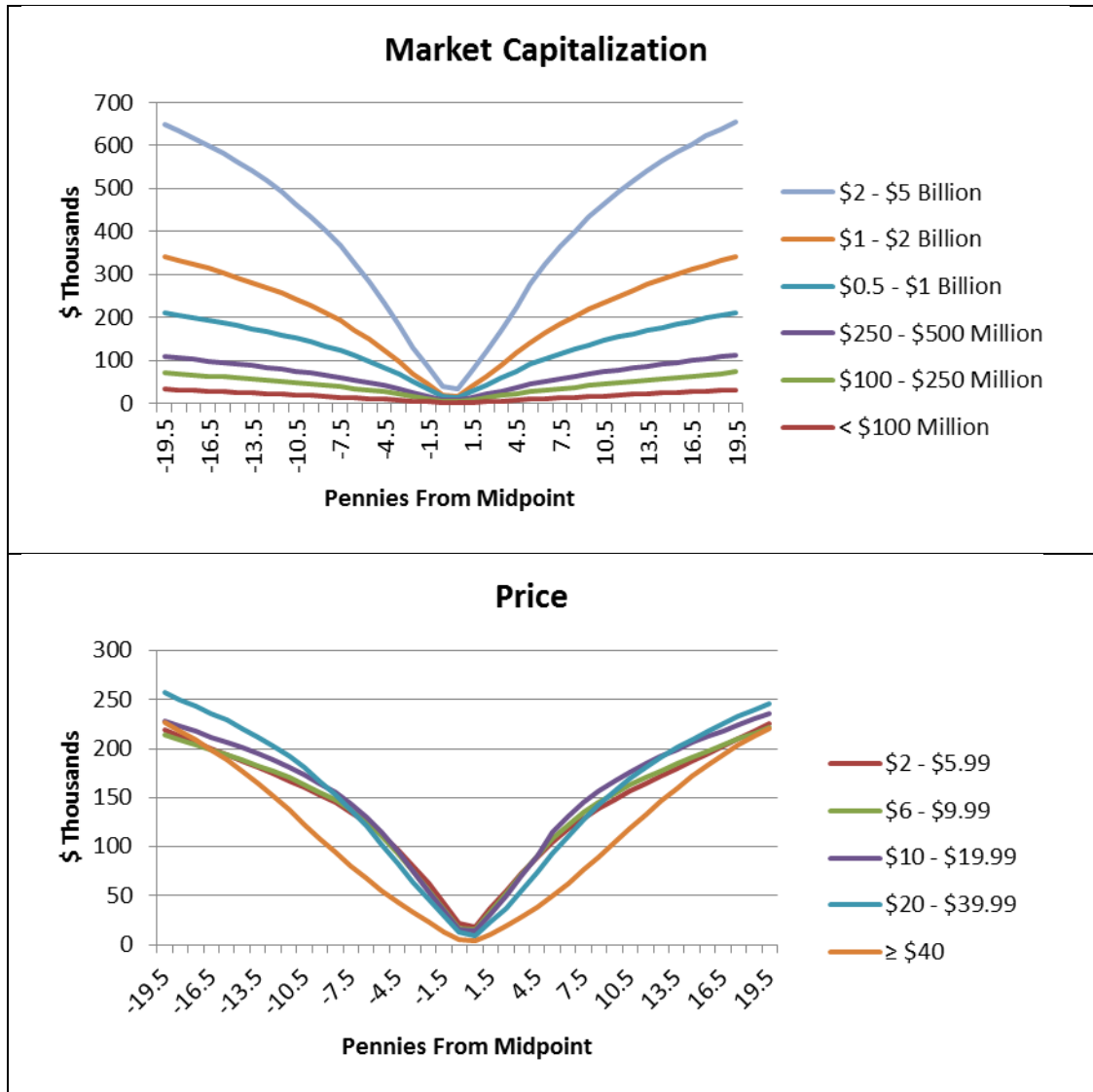


Table 6 provides average cumulative order book depth in thousands of dollars. Small capitalization stocks exhibit much less depth than stocks in the \$2 to \$5 Billion capitalization range. The smallest stocks (< \$100 Million capitalization) exhibit displayed depth on the order of 0.2 to 1.1 per cent of the depth for similarly priced stocks in the \$2 to \$5 Billion capitalization range.¹⁷ Depth relative to stocks in the \$2 to \$5 Billion capitalization bin ranges from 0.4% to 4.1% for stocks in the \$100 to \$250 Million capitalization bin, from 4.7% to 11.1% for stocks in the \$250 Million to \$500 Million capitalization bin, from 13.1% to 20.1% for stocks in the \$500 Million to \$1 Billion capitalization bin, and from 20.6% to

¹⁷ Additional supporting data, including results for combinations of shares/penny, shares/basis point, dollar volume/penny and dollar volume/basis point are included in Appendix Tables 2 and 3. These tables contain several price points in addition to those displayed in Table 6.

44.1% for stocks in the \$1 Billion to \$2 Billion capitalization bin. High-priced stocks (stocks with prices \$40 and above) exhibit especially low relative depth.

Table 6: Cumulative Order Book Depth by Market Capitalization and Price

Cumulative Depth in \$ ('000)			Pennies Away from the Midpoint									
Cap \$ Million	Price \$	Ticker/Day	-10	-5	-2.5	-2	-1	1	2	2.5	5	10
< 100	2 - 5.99	282.0	25.8	14.3	8.2	6.3	3.0	2.0	4.1	5.6	10.9	21.6
< 100	6 - 9.99	113.9	14.5	6.9	3.2	2.3	1.0	1.0	2.2	3.0	6.4	13.6
< 100	10 - 19.99	117.0	9.2	4.5	1.9	1.4	0.6	0.5	1.4	2.2	4.7	10.1
< 100	20 - 39.99	24.7	2.1	0.6	0.2	0.1	0.1	0.1	0.3	0.5	1.2	3.1
< 100	≥ 40	1.5	0.7	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.7
100 - 250	2 - 5.99	144.6	88.9	56.7	36.9	27.0	13.5	10.1	20.0	27.9	46.1	79.5
100 - 250	6 - 9.99	108.7	33.9	19.4	10.8	8.0	3.3	2.8	6.3	8.6	18.0	33.6
100 - 250	10 - 19.99	147.4	27.9	16.1	9.3	6.9	3.6	2.2	4.8	6.7	13.6	27.0
100 - 250	20 - 39.99	49.8	10.1	4.4	1.7	1.2	0.4	0.4	1.1	1.5	4.0	10.7
100 - 250	≥ 40	13.6	2.1	0.6	0.2	0.1	0.1	0.1	0.2	0.2	0.8	2.7
250 - 500	2 - 5.99	60.8	206.9	127.9	79.4	55.5	30.1	24.1	46.8	68.3	115.5	196.4
250 - 500	6 - 9.99	79.4	86.9	51.9	30.3	22.5	11.5	10.2	20.2	27.9	49.7	87.5
250 - 500	10 - 19.99	175.1	51.4	29.4	17.1	13.0	6.6	5.4	10.9	14.4	26.9	50.4
250 - 500	20 - 39.99	98.8	29.9	15.2	7.9	5.8	2.5	1.5	3.4	5.0	11.5	25.9
250 - 500	≥ 40	27.6	16.3	7.7	3.9	3.0	1.1	0.5	1.3	1.9	4.5	11.5
500 - 1000	2 - 5.99	29.5	561.5	363.6	226.5	155.1	78.5	68.8	138.6	207.2	344.6	548.7
500 - 1000	6 - 9.99	51.0	274.9	172.0	103.1	70.6	34.5	28.6	59.3	87.5	154.9	259.2
500 - 1000	10 - 19.99	143.5	146.1	84.9	48.1	35.3	17.4	13.8	29.4	41.7	79.3	144.9
500 - 1000	20 - 39.99	166.1	74.2	39.7	22.4	16.0	7.2	5.0	11.2	15.5	31.1	65.6
500 - 1000	≥ 40	63.2	31.1	12.7	5.1	3.6	1.6	1.3	3.1	4.5	11.5	30.2
1000 - 2000	2 - 5.99	9.9	1212.9	770.4	473.1	313.0	151.8	154.1	310.4	465.5	756.4	1220.1
1000 - 2000	6 - 9.99	24.2	680.4	400.7	221.3	141.3	64.5	65.2	142.8	222.7	403.7	683.6
1000 - 2000	10 - 19.99	91.7	361.1	208.9	112.8	76.0	35.7	31.1	68.4	103.8	200.7	349.0
1000 - 2000	20 - 39.99	175.5	172.8	88.6	48.1	35.0	15.9	12.6	28.1	39.6	78.4	160.9
1000 - 2000	≥ 40	134.1	65.0	26.0	10.9	7.2	2.5	2.4	6.4	9.3	24.0	64.5
2000 - 5000	2 - 5.99	6.5	3187.2	2149.9	1423.4	1011.7	550.8	481.2	931.2	1350.7	2119.8	3329.5
2000 - 5000	6 - 9.99	11.7	1567.9	979.4	582.4	381.2	180.2	180.1	383.6	585.2	986.0	1589.4
2000 - 5000	10 - 19.99	60.5	898.4	537.5	292.7	190.2	87.9	81.8	180.0	282.1	568.2	954.7
2000 - 5000	20 - 39.99	158.9	438.8	223.7	113.8	79.5	37.5	30.1	65.0	96.4	206.2	417.3
2000 - 5000	≥ 40	226.9	187.2	78.8	38.4	27.2	11.9	10.3	23.5	32.7	71.3	179.6

Another feature of Table 6 is the substantial depth available at prices away from the midpoint. For example, there is \$66,700 available within 1 cent of the midpoint for stocks priced between \$10 and \$19.99 in the \$1 Billion to \$2 Billion capitalization bin. Within 2.5 cents, there is \$216,700 available – more than three times the depth available at 1 cent. These averages represent the impact of both the increase in depth at prices away from the midpoint for stocks with low average spreads and the inclusion of additional stocks with wider bid-ask spreads in the averaging process.

Table 7 provides a view of limit order book depth in terms of multiples of the depth available at the best bid and ask prices.¹⁸ The results portrayed in Table 7 further highlight the cumulative depth available at one or two cents away from the best bid and ask irrespective of the spread. For example, it answers the question: How far into the order book would a trader have to go to obtain twice the depth available at the best price? The average depth available at the best ask price in the smallest stocks with prices between \$10 and \$19.99 is 664 shares. On average, 1.8 times more shares are available at the ask and the ask plus one cent and more than twice as many shares are available at the three best (lowest) ask prices than at the best ask alone. Cells outlined in bold represent the fewest cents away from the best (inside) prices at which at least twice the amount of inside shares are available.¹⁹ In most cases, the three best prices are required to double the depth at the best price. The smallest stocks show the least increase in cumulative depth away from the best prices. The cumulative depth available within 2 cents of the best prices ranges from 1.2 to 3.0 times the depth available at the best bid and offer for the smallest stocks, and, from 2.1 to 3.8 times the inside depth for stocks in the \$2 Billion to \$5 Billion capitalization bin.

¹⁸ Appendix Table 4 provides results for several more price points and for median depth in addition to mean depth.

¹⁹ There are five cases in Table 7 where a doubling of the inside depth occurs at the bid minus 9 cents or the ask plus 9 cents and another two cases where a doubling does not occur within 9 cents of the best prices. In these cases, Appendix Table 4A provides a more precise estimate of the average minimum number of cents away from the best prices required to double the inside depth.

Table 7: Cumulative Order Book Depth by Multiple of BBO Depth

Cap \$ Million	Price \$	Multiple of Best Bid Size at Bid - 'x'					Shares		Multiple of Best Ask Size at Ask + 'x'				
		9	4	3	2	1	Bid	Ask	1	2	3	4	9
< 100	2 - 5.99	8.6	4.4	3.6	2.8	2.0	1792	1499	2.2	3.0	3.7	4.4	8.2
< 100	6 - 9.99	5.5	3.2	2.8	2.3	1.7	911	929	2.2	2.6	3.1	3.5	5.8
< 100	10 - 19.99	3.9	2.3	2.1	1.9	1.6	592	664	1.8	2.2	2.5	2.7	4.3
< 100	20 - 39.99	2.7	1.9	1.8	1.6	1.4	301	410	1.5	1.7	1.8	2.0	2.8
< 100	≥ 40	1.5	1.3	1.3	1.2	1.2	217	248	1.2	1.3	1.4	1.5	1.7
100 - 250	2 - 5.99	9.7	5.1	4.1	3.0	2.0	5511	3849	1.9	2.9	3.9	4.9	9.5
100 - 250	6 - 9.99	6.5	3.6	2.9	2.3	1.7	889	1005	1.7	2.3	2.9	3.5	6.6
100 - 250	10 - 19.99	4.5	2.6	2.3	1.9	1.5	704	688	1.6	2.0	2.3	2.7	4.6
100 - 250	20 - 39.99	3.1	2.1	1.9	1.7	1.4	283	327	1.5	1.8	2.0	2.2	3.3
100 - 250	≥ 40	2.3	1.7	1.6	1.5	1.3	176	200	1.3	1.4	1.6	1.6	2.1
250 - 500	2 - 5.99	10.2	5.7	4.5	3.2	2.1	8197	6725	2.0	3.2	4.4	5.6	10.4
250 - 500	6 - 9.99	8.4	4.6	3.6	2.7	1.8	1850	1648	1.8	2.7	3.6	4.6	8.5
250 - 500	10 - 19.99	6.1	3.3	2.7	2.1	1.6	855	767	1.6	2.1	2.7	3.3	6.2
250 - 500	20 - 39.99	4.1	2.4	2.1	1.8	1.5	371	361	1.5	1.8	2.1	2.4	4.0
250 - 500	≥ 40	2.7	1.9	1.7	1.6	1.3	227	213	1.3	1.5	1.7	1.8	2.6
500 - 1000	2 - 5.99	9.8	5.8	4.6	3.3	2.1	18271	18576	2.1	3.3	4.6	5.8	9.8
500 - 1000	6 - 9.99	10.9	6.1	4.8	3.3	2.1	5395	4302	2.1	3.4	4.8	6.2	11.0
500 - 1000	10 - 19.99	9.2	4.8	3.7	2.7	1.8	1482	1227	1.8	2.7	3.8	5.0	9.6
500 - 1000	20 - 39.99	6.2	3.0	2.5	2.0	1.5	588	507	1.5	2.0	2.5	3.0	6.2
500 - 1000	≥ 40	3.6	2.2	1.9	1.7	1.4	250	259	1.4	1.7	1.9	2.1	3.5
1000 - 2000	2 - 5.99	9.6	5.7	4.6	3.3	2.1	40151	40769	2.1	3.3	4.5	5.6	9.5
1000 - 2000	6 - 9.99	11.8	6.8	5.2	3.6	2.3	8433	8523	2.3	3.6	5.2	6.8	11.8
1000 - 2000	10 - 19.99	12.3	6.6	4.9	3.4	2.1	2672	2376	2.1	3.4	5.1	6.8	12.5
1000 - 2000	20 - 39.99	9.6	4.3	3.3	2.4	1.7	849	730	1.7	2.4	3.3	4.4	9.7
1000 - 2000	≥ 40	5.5	2.6	2.2	1.8	1.4	307	316	1.4	1.8	2.2	2.6	5.5
2000 - 5000	2 - 5.99	7.5	4.8	3.9	3.0	2.0	117703	120836	2.0	2.9	3.9	4.7	7.6
2000 - 5000	6 - 9.99	9.6	5.8	4.7	3.4	2.2	22738	22702	2.2	3.4	4.7	5.9	9.8
2000 - 5000	10 - 19.99	12.9	7.3	5.5	3.7	2.3	5689	5555	2.3	3.8	5.6	8.2	14.0
2000 - 5000	20 - 39.99	14.4	6.4	4.6	3.1	2.0	1491	1225	2.0	3.2	4.8	6.7	14.6
2000 - 5000	≥ 40	8.6	3.5	2.7	2.1	1.6	460	444	1.6	2.1	2.7	3.5	8.7

Distribution of Depth

Many small capitalization stocks exhibit very little depth at 1, 2 and 5 cents away from the midpoint. While Table 6 provides average dollar depth for particular combinations of capitalization and price, Figure 6 provides some insight into the distribution of depth for stocks within a capitalization-price bin. Figure 6 shows the percentage of ticker-days in a capitalization-price bin with less than \$5,000 displayed liquidity within various increments away from the midpoint.^{20,21}

²⁰ The median price for stocks in the CRSP database with SHRC equal to 10 or 11 is between \$16 and \$17. Five thousand dollars is approximately 300 shares at the median stock price.

²¹ Appendix Tables 5 and 6 contain several more price points for both dollar volume/penny and dollar volume/basis point and four distinct dollar volumes: \$5,000, \$10,000, \$20,000, and \$50,000.

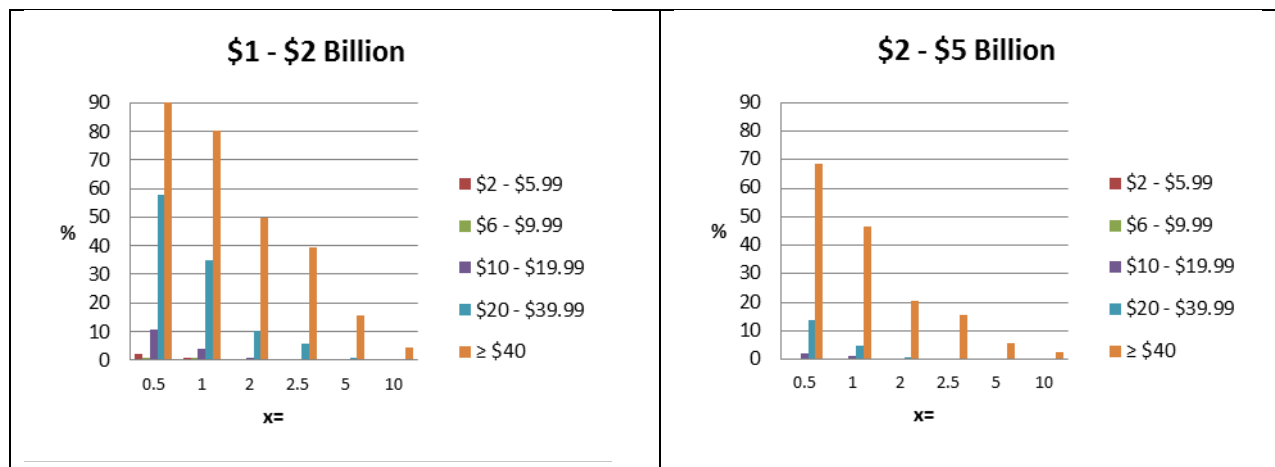
The current minimum price quote increment (MPI) in US stocks priced above \$1 is one cent.²² On the bottom axis, $x=0.5$ cents from the midpoint is consistent with the smallest spread possible with a 1 penny MPI. Similarly, $x=1.0$ cent from the midpoint is consistent with the smallest quoted spread for a 2 penny MPI, and $x=2.5$ cents from the midpoint maps to the smallest spread for a 5 penny MPI. For the smallest stocks priced from \$10 to \$19.99, 99.0% of the ticker-days had less than \$5,000 displayed within 0.5 cents of the midpoint. On the < \$100 Million panel of Figure 6, this is represented by the left-most middle (purple) bar.²³ Liquidity improves dramatically with capitalization. Nearly 95.0% of ticker-days for \$100 Million to \$250 Million capitalization stocks within the same price range (\$10 - \$19.99) have displayed liquidity of less than \$5,000. The percentages are 82.0% for \$250 Million to \$500 Million capitalization stocks, 43.6% for \$500 Million to \$1 Billion capitalization stocks, 10.8% for \$1 Billion to \$2 Billion capitalization stocks, and 2.2% for \$2 Billion to \$5 Billion capitalization stocks. Similar patterns of increasing liquidity with capitalization are apparent in other price ranges and for other price increments.

Figure 6: Percentage of Ticker-Days with less than \$5,000 within 'x' cents of the Midpoint



²² Currently, orders priced at \$1.00 or above must be priced in penny increments and orders for prices below \$1.00 can be priced in \$0.0001 increments.

²³ See Panel A of Appendix Table 5.



Another feature of Figure 6 is the relationship between the percentage of ticker-days with less than \$5,000 displayed liquidity and the distance away from the spread midpoint when compared across capitalization bins. The average improvement in displayed liquidity at prices further away from the midpoint increases with market capitalization. Larger stocks experience proportionately fewer days with less than \$5,000 displayed liquidity at prices away from the midpoint than do smaller stocks. Again, for the smallest stocks priced between \$10 and \$19.99, the percentage of ticker-days with less than \$5,000 displayed liquidity declines from 99.0% to 97.9% (a 1.1% decline) when the increment is doubled from 0.5 to 1 cent, and to 94.4% (a 4.6% decline) when the increment is 2 cents. Moving up in capitalization for the same price range shows the decline is from 82.0% to 65.2% (a 20.5% decline) and then 36.1% (56% decline) for ticker-days in the \$250 Million to \$500 Million capitalization bin. The pattern is from 10.8% to 3.7% (65%) and then 0.9% (over 91%) when moving from 0.5 to 1 and 2 cent increments for ticker-days in the \$1 Billion to \$2 Billion capitalization bin. This pattern of increasingly improving average liquidity away from the midpoint for relatively larger stocks is apparent throughout Figure 6 (and Appendix Tables 5 and 6).

Conclusion

This study characterizes the extent of displayed liquidity for small capitalization stocks during 2013. The smallest stocks with market capitalization less than \$100 Million are exceptionally illiquid relative to larger stocks with capitalizations between \$1 Billion and \$5 Billion. They have wider quoted and effective spreads and trade lower dollar volumes. These measures tend to improve monotonically with market cap. The smallest stocks exhibit much less depth on average than stocks in larger capitalization ranges. Depth increases at prices just a few cents away from the midpoint, suggesting that there is more to liquidity than the size posted at the inside spread. But this increase in depth is more apparent in larger stocks. The distributions of many of these market quality measures confirm the anecdotal evidence portrayed in the example order books shown in Figure 1: there is substantial variation in liquidity measures among individual stocks within a specific capitalization-price category. These measures can be monitored for changes in the levels of the metrics or for differential impacts on various capitalization and price categories.

Appendix

List of Tables

Appendix Table 1: Spread Distributions

- Panel A: Mean quoted spread
- Panel B: Mean effective spread
- Panel C: Mean relative quoted spread
- Panel D: Mean relative effective spread

Appendix Table 2: Aggregate Limit Order Book Depth by Pennies

- Panel A: Cumulative bid depth in shares by cents away from the midpoint
- Panel B: Cumulative ask depth in shares by cents away from the midpoint
- Panel C: Cumulative bid depth in \$ ('000) by cents away from the midpoint
- Panel D: Cumulative ask depth in \$ ('000) by cents away from the midpoint

Appendix Table 3: Aggregate Limit Order Book Depth by Percent

- Panel A: Cumulative bid depth in shares by basis points away from the midpoint
- Panel B: Cumulative ask depth in shares by basis points away from the midpoint
- Panel C: Cumulative bid depth in \$ ('000) by basis points away from the midpoint
- Panel D: Cumulative ask depth in \$ ('000) by basis points away from the midpoint

Appendix Table 4: Aggregate Limit Order Book Depth by Pennies from the BBO

- Panel A: Mean
- Panel B: Median

Appendix Table 5: Distribution of Cumulative Depth by Pennies

- Panel A: Less than \$5,000
- Panel B: Less than \$10,000
- Panel C: Less than \$20,000
- Panel D: Less than \$50,000

Appendix Table 6: Distribution of Cumulative Depth by Percent

- Panel A: Less than \$5,000
- Panel B: Less than \$10,000
- Panel C: Less than \$20,000
- Panel D: Less than \$50,000

Note: Tables available in Excel format at

http://www.sec.gov/marketstructure/research/small_cap_liquidity_appendix.xlsx.

Appendix Table 1: Spread Distributions

Panel A: Mean quoted spread

Cap \$ Million	Price \$	Ticker/Day	% of Ticker Days with Mean Quoted Spread less than or equal to 'x' cents											
			1	1.5	2	2.5	3	3.5	4	4.5	5	10	15	20
< 100	2 - 5.99	284.0	0.52	6.63	12.84	18.63	23.77	28.54	33.32	37.44	41.43	68.28	81.27	88.35
< 100	6 - 9.99	115.4	0.17	0.40	0.88	1.65	2.79	4.28	6.18	8.57	11.11	34.77	51.99	64.62
< 100	10 - 19.99	122.0	0.06	0.19	0.32	0.48	0.74	1.12	1.56	2.18	3.08	13.76	24.90	35.18
< 100	20 - 39.99	27.6	0.00	0.03	0.04	0.04	0.06	0.06	0.07	0.10	0.12	1.15	3.90	8.90
< 100	≥ 40	1.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.67
100 - 250	2 - 5.99	145.0	2.14	47.25	64.62	74.96	81.51	86.04	89.06	91.00	92.44	97.79	99.00	99.39
100 - 250	6 - 9.99	108.9	0.14	4.82	12.67	21.32	30.25	38.33	45.55	52.37	58.36	85.59	93.61	96.45
100 - 250	10 - 19.99	147.7	0.26	1.03	1.85	3.11	4.89	7.07	9.65	12.46	15.86	47.29	69.21	81.32
100 - 250	20 - 39.99	50.3	0.01	0.04	0.11	0.20	0.35	0.51	0.76	1.01	1.31	8.40	22.01	37.10
100 - 250	≥ 40	14.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.71	1.67	3.64
250 - 500	2 - 5.99	60.8	8.33	79.81	90.61	94.16	95.96	96.83	97.27	97.54	97.79	99.12	99.64	99.85
250 - 500	6 - 9.99	79.4	0.60	28.68	49.38	63.71	73.91	81.27	85.84	88.84	90.95	97.42	98.70	99.32
250 - 500	10 - 19.99	175.2	0.23	2.32	7.16	14.75	23.21	31.82	39.51	46.48	52.71	83.96	93.72	96.88
250 - 500	20 - 39.99	98.8	0.04	0.41	0.70	1.06	1.77	2.92	4.36	6.23	8.31	34.93	59.71	74.79
250 - 500	≥ 40	28.1	0.03	0.23	0.48	0.79	1.00	1.13	1.24	1.31	1.43	3.39	7.06	14.58
500 - 1000	2 - 5.99	29.6	33.47	95.08	97.88	98.71	99.10	99.36	99.54	99.73	99.80	99.97	99.99	100.00
500 - 1000	6 - 9.99	51.1	2.40	73.83	88.53	93.62	95.83	97.07	97.72	98.15	98.61	99.91	99.99	100.00
500 - 1000	10 - 19.99	143.5	0.45	17.50	34.94	50.21	62.57	71.76	78.47	83.27	86.83	95.85	98.44	99.30
500 - 1000	20 - 39.99	166.1	0.21	1.28	2.30	4.45	8.10	13.43	19.99	26.96	33.96	72.50	88.56	94.64
500 - 1000	≥ 40	63.6	0.00	0.51	0.89	1.21	1.44	1.71	2.06	2.33	2.74	14.15	32.32	48.53
1000 - 2000	2 - 5.99	9.9	55.89	96.54	99.32	99.92	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1000 - 2000	6 - 9.99	24.2	11.43	96.10	98.64	99.30	99.46	99.48	99.48	99.48	99.57	100.00	100.00	100.00
1000 - 2000	10 - 19.99	91.8	1.86	55.42	72.87	84.36	91.20	94.80	96.42	97.36	97.95	99.81	99.98	100.00
1000 - 2000	20 - 39.99	175.5	0.36	4.46	11.84	21.63	32.45	43.24	53.10	61.65	68.65	94.32	98.51	99.59
1000 - 2000	≥ 40	134.3	0.01	0.52	0.59	0.87	1.70	3.15	5.59	8.82	13.06	51.89	70.44	80.17
2000 - 5000	2 - 5.99	6.6	93.89	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
2000 - 5000	6 - 9.99	11.7	61.21	99.63	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
2000 - 5000	10 - 19.99	60.5	6.42	89.41	94.22	96.39	97.62	98.32	98.73	99.04	99.23	99.79	99.90	99.97
2000 - 5000	20 - 39.99	159.3	0.31	29.50	50.48	66.49	77.77	85.49	90.41	93.63	95.59	99.44	99.84	99.98
2000 - 5000	≥ 40	227.3	0.12	1.16	3.61	8.07	13.66	19.80	26.45	33.35	40.24	77.58	87.17	91.50

Panel B: Mean effective spread

Cap \$ Million	Price \$	Ticker/Day	% of Ticker Days with Mean Effective Spread less than or equal to 'x' cents												
			0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	10	15	20
< 100	2 - 5.99	284.0	5.44	8.40	17.34	25.58	32.62	39.12	44.85	50.22	54.78	59.08	82.49	91.13	95.16
< 100	6 - 9.99	115.4	10.96	11.48	12.25	13.84	15.82	18.74	21.88	25.75	29.29	33.12	59.76	74.57	83.25
< 100	10 - 19.99	122.0	17.06	17.38	17.65	18.20	18.80	19.68	20.71	22.02	23.24	25.08	41.29	54.40	64.33
< 100	20 - 39.99	27.6	22.15	22.30	22.38	22.51	22.58	22.76	22.93	23.26	23.45	23.85	27.68	33.18	39.02
< 100	≥ 40	1.8	14.32	14.32	14.32	14.32	14.32	14.32	14.32	14.32	14.32	14.32	14.54	15.88	18.34
100 - 250	2 - 5.99	145.0	0.25	29.92	65.80	78.77	85.46	89.33	91.91	93.51	94.64	95.63	98.81	99.46	99.71
100 - 250	6 - 9.99	108.9	0.78	4.03	19.55	33.22	45.03	54.67	62.34	68.46	73.14	77.17	93.56	97.35	98.72
100 - 250	10 - 19.99	147.7	1.29	2.23	4.67	7.96	12.08	17.13	22.25	27.60	32.34	37.16	72.76	86.81	92.55
100 - 250	20 - 39.99	50.3	2.01	2.08	2.22	2.54	2.90	3.49	4.29	5.31	6.62	7.81	29.58	52.58	67.41
100 - 250	≥ 40	14.0	9.94	10.06	10.06	10.08	10.08	10.17	10.31	10.54	10.62	10.82	13.33	18.95	26.81
250 - 500	2 - 5.99	60.8	0.18	59.27	90.10	94.71	96.08	96.88	97.32	97.69	98.00	98.28	99.52	99.84	99.93
250 - 500	6 - 9.99	79.4	0.31	21.57	61.25	77.00	85.35	89.73	92.29	93.87	94.96	95.73	98.77	99.45	99.72
250 - 500	10 - 19.99	175.2	0.32	2.72	16.80	32.72	45.85	55.78	63.35	69.23	73.93	77.68	94.39	97.88	98.91
250 - 500	20 - 39.99	98.8	0.46	0.75	1.65	3.77	7.51	11.57	15.85	20.38	25.31	29.87	67.82	85.45	92.98
250 - 500	≥ 40	28.1	6.25	6.53	7.08	7.58	7.79	8.03	8.27	8.57	8.83	9.20	17.89	33.53	50.28
500 - 1000	2 - 5.99	29.6	0.04	84.64	96.73	98.46	98.93	99.20	99.46	99.52	99.60	99.68	99.92	99.96	99.96
500 - 1000	6 - 9.99	51.1	0.15	54.75	90.13	95.31	96.96	97.98	98.67	99.06	99.27	99.39	99.86	99.93	99.95
500 - 1000	10 - 19.99	143.5	0.08	12.77	52.20	72.18	81.79	87.03	89.85	91.70	93.06	94.11	98.48	99.39	99.70
500 - 1000	20 - 39.99	166.1	0.38	1.53	6.68	17.31	30.20	41.27	50.47	57.82	63.75	68.86	92.04	97.12	98.81
500 - 1000	≥ 40	63.6	2.95	3.24	3.93	4.54	5.23	6.21	7.96	10.33	13.01	15.91	45.68	67.82	80.70
1000 - 2000	2 - 5.99	9.9	0.04	85.74	97.59	99.40	99.68	99.92	99.92	99.92	99.92	99.96	100.00	100.00	100.00
1000 - 2000	6 - 9.99	24.2	0.07	80.65	97.18	98.58	98.98	99.18	99.51	99.57	99.66	99.69	99.92	99.97	99.98
1000 - 2000	10 - 19.99	91.8	0.11	37.10	81.80	91.85	95.10	96.68	97.61	98.34	98.82	99.13	99.83	99.89	99.94
1000 - 2000	20 - 39.99	175.5	0.01	3.60	25.41	46.95	63.01	73.83	81.14	85.88	89.30	91.73	98.84	99.69	99.86
1000 - 2000	≥ 40	134.3	0.64	1.03	1.86	5.09	11.34	19.50	27.92	35.77	42.78	48.64	77.99	88.37	92.92
2000 - 5000	2 - 5.99	6.6	0.12	92.62	98.97	99.46	99.76	99.88	99.94	99.94	99.94	99.94	100.00	100.00	100.00
2000 - 5000	6 - 9.99	11.7	0.03	84.61	97.29	99.22	99.63	99.73	99.90	99.90	99.90	99.93	100.00	100.00	100.00
2000 - 5000	10 - 19.99	60.5	0.03	64.03	91.97	95.95	97.46	98.27	98.63	98.91	99.06	99.25	99.83	99.94	99.96
2000 - 5000	20 - 39.99	159.3	0.04	17.18	64.20	81.93	89.93	93.77	95.68	96.87	97.63	98.10	99.63	99.86	99.94
2000 - 5000	≥ 40	227.3	0.01	1.12	9.23	21.45	34.51	46.76	56.29	63.78	69.24	73.46	89.76	93.89	95.50

Panel C: Mean relative quoted spread

Cap \$ Million	Price \$	Ticker/Day	% of Ticker Days with Mean Relative Quoted Spread less than or equal to 'x' basis points												
			2	3	5	7	9	11	13	15	20	25	30	50	100
< 100	2 - 5.99	284.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.59	5.97	27.46
< 100	6 - 9.99	115.4	0.00	0.00	0.00	0.00	0.00	0.01	0.10	0.24	0.43	0.75	1.20	5.28	24.57
< 100	10 - 19.99	122.0	0.00	0.00	0.00	0.07	0.13	0.17	0.25	0.31	0.48	0.80	1.41	5.29	20.47
< 100	20 - 39.99	27.6	0.00	0.00	0.00	0.03	0.04	0.04	0.06	0.06	0.09	0.16	0.35	2.00	11.95
< 100	≥ 40	1.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.89	11.19
100 - 250	2 - 5.99	145.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	4.31	11.11	59.67	90.08
100 - 250	6 - 9.99	108.9	0.00	0.00	0.00	0.00	0.00	0.03	0.19	0.67	4.20	9.99	16.72	43.34	78.29
100 - 250	10 - 19.99	147.7	0.00	0.00	0.01	0.12	0.56	0.86	1.15	1.51	2.95	5.34	9.05	28.62	68.01
100 - 250	20 - 39.99	50.3	0.00	0.00	0.02	0.05	0.13	0.24	0.36	0.53	1.18	2.04	3.37	13.23	51.20
100 - 250	≥ 40	14.0	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.06	0.31	0.82	1.21	6.07	35.62
250 - 500	2 - 5.99	60.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.47	29.86	53.27	91.46	97.33
250 - 500	6 - 9.99	79.4	0.00	0.00	0.00	0.00	0.00	0.12	1.16	5.49	29.74	48.91	61.77	86.53	96.61
250 - 500	10 - 19.99	175.2	0.00	0.00	0.00	0.22	0.89	1.72	3.43	6.44	17.83	30.96	43.26	73.97	94.39
250 - 500	20 - 39.99	98.8	0.00	0.00	0.26	0.54	0.82	1.18	1.85	2.93	7.37	13.26	20.55	51.16	88.64
250 - 500	≥ 40	28.1	0.00	0.14	0.51	0.93	1.17	1.31	1.52	1.69	2.54	4.53	7.42	27.42	73.14
500 - 1000	2 - 5.99	29.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.99	58.36	71.98	97.53	99.68
500 - 1000	6 - 9.99	51.1	0.00	0.00	0.00	0.00	0.00	3.48	20.04	44.36	80.46	89.64	93.74	97.80	99.78
500 - 1000	10 - 19.99	143.5	0.00	0.00	0.00	1.10	6.56	17.38	29.62	41.20	64.96	78.42	85.58	93.88	98.73
500 - 1000	20 - 39.99	166.1	0.00	0.01	0.97	1.42	2.54	5.25	10.13	17.26	38.94	55.44	65.79	88.44	97.65
500 - 1000	≥ 40	63.6	0.04	0.49	1.30	1.82	2.31	2.88	4.08	5.94	12.95	23.13	34.08	70.11	96.11
1000 - 2000	2 - 5.99	9.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.67	65.85	75.13	97.11	100.00
1000 - 2000	6 - 9.99	24.2	0.00	0.00	0.00	0.00	0.00	12.48	44.07	72.40	96.77	98.66	99.35	99.48	100.00
1000 - 2000	10 - 19.99	91.8	0.00	0.00	0.00	9.40	35.41	61.80	75.55	84.04	93.56	96.56	97.87	99.58	99.99
1000 - 2000	20 - 39.99	175.5	0.00	0.21	2.07	8.63	20.01	34.29	48.61	60.86	80.48	89.26	93.52	98.90	99.98
1000 - 2000	≥ 40	134.3	0.00	0.46	0.65	2.02	6.62	15.42	26.45	37.20	58.08	70.26	78.06	94.09	99.32
2000 - 5000	2 - 5.99	6.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.50	57.26	77.78	100.00	100.00
2000 - 5000	6 - 9.99	11.7	0.00	0.00	0.00	0.00	0.00	12.34	55.60	87.35	100.00	100.00	100.00	100.00	100.00
2000 - 5000	10 - 19.99	60.5	0.00	0.00	0.03	49.95	79.56	92.02	95.19	96.79	98.29	98.99	99.35	99.61	99.93
2000 - 5000	20 - 39.99	159.3	0.00	0.54	23.43	54.36	73.19	84.41	91.04	94.55	97.74	98.72	99.27	99.89	100.00
2000 - 5000	≥ 40	227.3	0.46	0.94	7.27	23.39	43.49	59.62	70.63	78.29	88.40	92.58	95.08	98.84	99.86

Panel D: Mean relative effective spread

Cap \$ Million	Price \$	Ticker/Day	% of Ticker Days with Mean Relative Effective Spread less than or equal to 'x' basis points												
			1	3	5	7	9	11	13	15	20	25	30	50	100
< 100	2 - 5.99	284.0	5.33	5.33	5.34	5.35	5.37	5.40	5.42	5.46	5.72	6.36	7.43	18.13	44.82
< 100	6 - 9.99	115.4	10.93	10.94	10.95	10.97	10.99	11.10	11.33	11.55	12.17	13.26	14.69	24.15	49.01
< 100	10 - 19.99	122.0	17.01	17.05	17.10	17.28	17.44	17.66	17.86	18.07	18.86	20.01	21.50	29.23	50.34
< 100	20 - 39.99	27.6	22.14	22.17	22.32	22.40	22.50	22.58	22.76	23.04	23.58	24.34	25.41	29.61	43.35
< 100	≥ 40	1.8	14.32	14.32	14.32	14.32	14.32	14.32	14.32	14.54	14.54	15.66	16.78	22.37	48.99
100 - 250	2 - 5.99	145.0	0.07	0.07	0.08	0.09	0.13	0.22	0.40	0.82	6.01	17.10	30.22	76.94	94.22
100 - 250	6 - 9.99	108.9	0.68	0.69	0.71	0.79	1.00	1.66	3.41	6.93	18.96	30.07	40.33	67.19	89.69
100 - 250	10 - 19.99	147.7	1.25	1.27	1.39	1.60	2.68	3.86	5.44	7.49	13.83	21.35	28.97	56.27	86.61
100 - 250	20 - 39.99	50.3	2.01	2.03	2.12	2.30	2.63	3.02	3.61	4.40	7.01	10.93	16.09	41.93	79.67
100 - 250	≥ 40	14.0	9.94	10.08	10.14	10.17	10.48	10.82	11.19	11.72	12.88	14.92	18.08	37.06	73.33
250 - 500	2 - 5.99	60.8	0.00	0.00	0.00	0.01	0.09	0.28	0.67	2.35	24.73	51.79	70.66	94.69	98.03
250 - 500	6 - 9.99	79.4	0.14	0.15	0.19	0.39	1.16	6.03	18.94	36.82	65.21	77.40	84.92	94.44	98.19
250 - 500	10 - 19.99	175.2	0.27	0.29	0.52	1.90	6.95	15.74	26.08	35.49	53.97	66.10	74.53	90.44	98.05
250 - 500	20 - 39.99	98.8	0.46	0.50	1.04	2.08	4.55	8.53	12.84	17.59	30.56	43.53	54.78	82.77	97.86
250 - 500	≥ 40	28.1	6.25	6.79	7.62	8.02	8.54	9.26	10.41	12.02	17.95	26.35	36.11	68.44	92.58
500 - 1000	2 - 5.99	29.6	0.00	0.00	0.00	0.01	0.03	0.20	0.62	3.89	42.86	67.99	81.02	98.18	99.53
500 - 1000	6 - 9.99	51.1	0.00	0.02	0.08	0.46	3.39	26.62	56.24	77.61	92.15	95.30	96.65	99.01	99.78
500 - 1000	10 - 19.99	143.5	0.02	0.06	0.92	12.53	37.57	60.31	72.43	79.64	88.02	91.54	93.52	97.36	99.50
500 - 1000	20 - 39.99	166.1	0.37	0.52	2.79	11.42	26.39	41.26	52.64	61.15	75.75	84.37	89.63	96.61	99.52
500 - 1000	≥ 40	63.6	2.95	4.09	5.11	7.24	11.84	18.10	25.07	32.52	49.36	63.44	73.82	93.12	98.96
1000 - 2000	2 - 5.99	9.9	0.00	0.00	0.00	0.00	0.00	0.00	0.52	4.86	53.64	69.67	79.15	98.71	99.92
1000 - 2000	6 - 9.99	24.2	0.00	0.00	0.02	0.31	5.44	34.79	64.87	88.64	97.36	98.51	98.84	99.66	99.87
1000 - 2000	10 - 19.99	91.8	0.00	0.08	2.41	35.93	74.33	87.75	92.11	94.25	96.94	98.31	99.03	99.71	99.90
1000 - 2000	20 - 39.99	175.5	0.00	0.67	17.32	47.54	68.31	80.10	86.64	90.52	95.27	97.55	98.65	99.73	99.95
1000 - 2000	≥ 40	134.3	0.64	1.42	9.07	28.07	46.56	59.77	68.83	75.14	85.53	91.70	94.89	98.58	99.70
2000 - 5000	2 - 5.99	6.6	0.00	0.00	0.00	0.00	0.00	0.00	0.85	7.38	45.64	68.77	89.71	99.76	99.94
2000 - 5000	6 - 9.99	11.7	0.00	0.00	0.00	0.10	3.52	36.62	75.21	92.46	98.14	99.22	99.56	99.83	99.97
2000 - 5000	10 - 19.99	60.5	0.00	0.03	11.45	62.63	88.51	94.46	96.37	97.40	98.50	98.85	99.11	99.69	99.96
2000 - 5000	20 - 39.99	159.3	0.00	6.71	62.48	84.78	91.89	95.15	96.86	97.70	98.76	99.27	99.52	99.85	99.97
2000 - 5000	≥ 40	227.3	0.03	9.12	44.48	68.87	81.34	87.30	90.70	92.88	96.27	97.89	98.68	99.61	99.95

Appendix Table 2: Aggregate Limit Order Book Depth by Pennies
 Panel A: Cumulative bid depth in shares by cents away from the midpoint

Cumulative Depth in Shares			Pennies Away from the Midpoint (Bid)															
Cap \$ Million	Price \$	Ticker/Day	-20	-10	-9	-8	-7	-6	-5	-4.5	-4	-3.5	-3	-2.5	-2	-1.5	-1	-0.5
< 100	2 - 5.99	282.0	15082	8557	7861	7096	6306	5509	4689	4398	3858	3567	2934	2646	1993	1727	958	777
< 100	6 - 9.99	113.9	3673	1889	1682	1503	1285	1092	905	790	692	603	517	435	314	250	145	103
< 100	10 - 19.99	117.0	1559	742	656	594	507	440	370	312	272	226	192	149	103	78	44	28
< 100	20 - 39.99	24.7	299	90	68	57	43	34	26	19	16	13	11	9	6	4	3	2
< 100	≥ 40	1.5	59	16	8	8	7	6	5	2	2	2	2	2	1	1	1	1
100 - 250	2 - 5.99	144.6	44081	28650	26892	24960	22845	20505	17829	17504	14948	14594	11712	11371	8187	7861	4065	3763
100 - 250	6 - 9.99	108.7	7688	4535	4180	3806	3412	3013	2591	2419	2130	1948	1618	1438	1062	887	441	305
100 - 250	10 - 19.99	147.4	3623	2170	1986	1821	1644	1461	1263	1182	1041	969	801	733	552	500	286	254
100 - 250	20 - 39.99	49.8	906	425	376	328	281	235	188	164	139	117	94	73	51	35	18	12
100 - 250	≥ 40	13.6	170	48	38	31	24	18	13	10	8	6	5	4	2	2	1	1
250 - 500	2 - 5.99	60.8	83924	58090	54782	50983	46697	41687	35696	35447	29292	29033	22311	22073	15294	15075	8171	7957
250 - 500	6 - 9.99	79.4	17723	11847	11081	10237	9289	8254	7098	6849	5824	5564	4405	4170	3092	2863	1584	1371
250 - 500	10 - 19.99	175.1	5995	3757	3493	3205	2882	2534	2168	2033	1788	1658	1393	1270	970	854	497	414
250 - 500	20 - 39.99	98.8	2120	1211	1100	985	866	746	625	575	495	447	369	328	244	212	107	90
250 - 500	≥ 40	27.6	712	375	331	295	259	222	183	167	140	125	106	95	74	66	27	21
500 - 1000	2 - 5.99	29.5	205172	151020	144252	136299	126800	114820	99447	99309	82678	82538	63820	63690	44534	44408	23001	22889
500 - 1000	6 - 9.99	51.0	48174	35920	34068	31861	29278	26250	22618	22327	18555	18252	13923	13663	9327	9089	4562	4355
500 - 1000	10 - 19.99	143.5	15256	10551	9883	9130	8270	7277	6145	5875	4936	4684	3678	3467	2535	2336	1247	1085
500 - 1000	20 - 39.99	166.1	4793	2932	2686	2432	2155	1873	1592	1497	1298	1210	990	907	648	577	292	250
500 - 1000	≥ 40	63.2	1335	630	550	476	403	331	259	231	188	164	125	106	74	61	33	26
1000 - 2000	2 - 5.99	9.9	439459	316039	299718	281260	259652	233135	200180	200033	163464	163300	123799	123652	82395	82254	40413	40274
1000 - 2000	6 - 9.99	24.2	119165	89515	84743	78858	71684	63078	52640	52439	41302	41096	29275	29096	18544	18388	8445	8324
1000 - 2000	10 - 19.99	91.7	35530	26091	24608	22856	20772	18248	15199	14860	11875	11558	8504	8251	5541	5322	2602	2424
1000 - 2000	20 - 39.99	175.5	9720	6281	5754	5186	4574	3915	3228	3018	2550	2370	1884	1731	1259	1122	577	482
1000 - 2000	≥ 40	134.1	2845	1320	1142	976	818	670	534	475	403	349	276	228	151	114	52	33
2000 - 5000	2 - 5.99	6.5	1138490	829323	791768	749449	699423	636096	555691	555537	466202	466063	365579	365403	257758	257599	138693	138527
2000 - 5000	6 - 9.99	11.7	253006	199152	190047	178526	164056	146268	124125	124013	100094	99980	73798	73694	48189	48096	22786	22699
2000 - 5000	10 - 19.99	60.5	76115	59965	56997	53382	48814	43132	35993	35799	28066	27882	19853	19708	12807	12682	5922	5821
2000 - 5000	20 - 39.99	158.9	22123	15499	14305	13003	11526	9825	7926	7556	5982	5676	4195	3966	2732	2537	1280	1123
2000 - 5000	≥ 40	226.9	6548	3428	3000	2589	2186	1792	1423	1300	1086	981	777	686	487	407	212	160

Panel B: Cumulative ask depth in shares by cents away from the midpoint

Cumulative Depth in Shares			Pennies Away from the Midpoint (Ask)															
Cap \$ Million	Price \$	Ticker/Day	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	6	7	8	9	10	20
< 100	2 - 5.99	282.0	496	668	1127	1353	1841	2088	2551	2801	3243	3505	4207	4898	5583	6215	6843	12899
< 100	6 - 9.99	113.9	69	134	232	294	406	482	562	641	730	846	1029	1209	1416	1586	1791	3578
< 100	10 - 19.99	117.0	21	39	79	108	168	206	238	273	312	374	440	512	619	692	803	1711
< 100	20 - 39.99	24.7	3	5	8	11	21	27	31	36	41	53	64	76	94	106	130	395
< 100	≥ 40	1.5	1	1	1	1	2	2	2	2	2	5	6	6	8	9	14	63
100 - 250	2 - 5.99	144.6	2811	3105	5814	6130	8641	8973	11448	11789	14097	14418	16920	19136	21176	23163	24990	41176
100 - 250	6 - 9.99	108.7	243	379	663	838	1147	1353	1649	1833	2139	2353	2793	3213	3626	4015	4408	7805
100 - 250	10 - 19.99	147.4	138	176	314	378	523	601	737	818	956	1049	1267	1467	1667	1852	2057	3687
100 - 250	20 - 39.99	49.8	9	18	32	45	65	83	102	120	142	167	216	267	327	380	439	1021
100 - 250	≥ 40	13.6	1	2	3	4	5	7	9	11	14	18	25	33	42	50	61	202
250 - 500	2 - 5.99	60.8	6454	6664	12745	12960	19013	19250	25563	25824	31653	31906	37729	42613	46839	50592	53958	81571
250 - 500	6 - 9.99	79.4	1161	1391	2486	2731	3783	4036	5133	5413	6418	6686	7896	9000	9990	10873	11689	18435
250 - 500	10 - 19.99	175.1	317	408	697	824	1077	1211	1456	1598	1836	1984	2371	2740	3084	3397	3685	6225
250 - 500	20 - 39.99	98.8	43	62	110	142	205	247	308	355	415	468	582	696	815	928	1039	1989
250 - 500	≥ 40	27.6	8	13	24	32	45	53	66	75	93	104	128	155	186	219	255	583
500 - 1000	2 - 5.99	29.5	18831	18952	37549	37678	55527	55668	74006	74152	90266	90416	105493	117165	126575	134568	141559	197040
500 - 1000	6 - 9.99	51.0	3492	3695	7423	7663	11317	11580	15636	15941	19625	19922	23500	26493	29030	31196	33078	46507
500 - 1000	10 - 19.99	143.5	830	999	1918	2132	3027	3256	4225	4498	5464	5754	6949	7987	8904	9719	10445	15868
500 - 1000	20 - 39.99	166.1	162	205	381	455	624	709	878	969	1134	1233	1505	1782	2056	2315	2558	4397
500 - 1000	≥ 40	63.2	20	28	51	64	93	112	146	170	210	238	311	387	466	542	622	1316
1000 - 2000	2 - 5.99	9.9	40717	40862	80604	80747	119679	119832	157368	157527	192124	192270	224335	250942	273166	292459	309434	450584
1000 - 2000	6 - 9.99	24.2	8415	8537	18522	18684	29151	29334	41193	41405	52470	52677	62905	71300	78314	84134	88916	121072
1000 - 2000	10 - 19.99	91.7	2086	2263	4748	4973	7568	7829	10903	11230	14185	14531	17480	19903	21900	23572	25041	34746
1000 - 2000	20 - 39.99	175.5	367	464	891	1032	1456	1614	2047	2235	2676	2893	3570	4216	4811	5357	5874	9370
1000 - 2000	≥ 40	134.1	32	51	95	134	194	243	306	362	431	492	632	785	949	1121	1304	2840
2000 - 5000	2 - 5.99	6.5	124959	125132	241541	241697	350269	350412	453957	454111	548162	548310	636483	706982	764525	813271	857960	1240580
2000 - 5000	6 - 9.99	11.7	22658	22750	48291	48390	73795	73904	100121	100241	124074	124190	146161	163818	178358	190180	199846	263009
2000 - 5000	10 - 19.99	60.5	5447	5548	12055	12182	19038	19188	27214	27404	35045	38131	46529	52046	56469	60743	63721	80443
2000 - 5000	20 - 39.99	158.9	896	1053	2097	2297	3451	3690	5146	5467	7029	7413	9296	10956	12389	13650	14806	21277
2000 - 5000	≥ 40	226.9	135	187	346	428	596	690	873	982	1180	1309	1678	2078	2483	2892	3314	6353

Panel C: Cumulative bid depth in \$ ('000) by cents away from the midpoint

Cumulative Depth in \$ ('000)			Pennies Away from the Midpoint (Bid)															
Cap \$ Million	Price \$	Ticker/Day	-20	-10	-9	-8	-7	-6	-5	-4.5	-4	-3.5	-3	-2.5	-2	-1.5	-1	-0.5
< 100	2 - 5.99	282.0	45.0	25.8	23.7	21.5	19.1	16.8	14.3	13.4	11.8	10.9	9.1	8.2	6.3	5.4	3.0	2.5
< 100	6 - 9.99	113.9	27.9	14.5	12.9	11.5	9.8	8.4	6.9	6.0	5.2	4.5	3.8	3.2	2.3	1.8	1.0	0.7
< 100	10 - 19.99	117.0	19.7	9.2	8.1	7.3	6.2	5.4	4.5	3.8	3.4	2.9	2.4	1.9	1.4	1.1	0.6	0.4
< 100	20 - 39.99	24.7	6.9	2.1	1.6	1.3	1.0	0.8	0.6	0.4	0.4	0.3	0.3	0.2	0.1	0.1	0.1	0.0
< 100	≥ 40	1.5	2.8	0.7	0.4	0.4	0.3	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
100 - 250	2 - 5.99	144.6	134.2	88.9	83.7	77.9	71.5	64.6	56.7	55.5	48.0	46.7	38.1	36.9	27.0	25.8	13.5	12.3
100 - 250	6 - 9.99	108.7	57.0	33.9	31.2	28.5	25.6	22.6	19.4	18.1	16.0	14.6	12.2	10.8	8.0	6.7	3.3	2.3
100 - 250	10 - 19.99	147.4	47.0	27.9	25.6	23.4	21.1	18.7	16.1	15.1	13.2	12.3	10.2	9.3	6.9	6.3	3.6	3.2
100 - 250	20 - 39.99	49.8	21.9	10.1	8.9	7.8	6.6	5.5	4.4	3.8	3.3	2.7	2.2	1.7	1.2	0.8	0.4	0.3
100 - 250	≥ 40	13.6	7.9	2.1	1.7	1.4	1.1	0.8	0.6	0.4	0.4	0.3	0.2	0.2	0.1	0.1	0.1	0.0
250 - 500	2 - 5.99	60.8	294.6	206.9	195.4	182.1	167.0	149.2	127.9	126.8	105.2	104.0	80.4	79.4	55.5	54.6	30.1	29.1
250 - 500	6 - 9.99	79.4	130.6	86.9	81.3	75.0	68.0	60.4	51.9	50.0	42.5	40.5	32.2	30.3	22.5	20.7	11.5	9.9
250 - 500	10 - 19.99	175.1	82.3	51.4	47.7	43.7	39.2	34.4	29.4	27.5	24.2	22.4	18.8	17.1	13.0	11.4	6.6	5.5
250 - 500	20 - 39.99	98.8	53.0	29.9	27.0	24.1	21.2	18.2	15.2	13.9	12.0	10.8	8.9	7.9	5.8	5.0	2.5	2.1
250 - 500	≥ 40	27.6	32.8	16.3	14.2	12.6	11.0	9.3	7.7	6.9	5.8	5.2	4.4	3.9	3.0	2.7	1.1	0.9
500 - 1000	2 - 5.99	29.5	759.8	561.5	535.6	505.1	468.6	422.7	363.6	363.0	299.1	298.4	227.1	226.5	155.1	154.5	78.5	78.0
500 - 1000	6 - 9.99	51.0	369.8	274.9	260.4	243.3	223.3	200.0	172.0	169.6	140.6	138.1	105.2	103.1	70.6	68.6	34.5	32.8
500 - 1000	10 - 19.99	143.5	211.7	146.1	136.9	126.3	114.3	100.6	84.9	81.1	68.4	64.8	51.1	48.1	35.3	32.4	17.4	15.0
500 - 1000	20 - 39.99	166.1	123.1	74.2	67.7	61.1	54.0	46.9	39.7	37.3	32.3	30.0	24.6	22.4	16.0	14.2	7.2	6.2
500 - 1000	≥ 40	63.2	67.1	31.1	27.1	23.4	19.8	16.2	12.7	11.3	9.2	8.0	6.1	5.1	3.6	2.9	1.6	1.2
1000 - 2000	2 - 5.99	9.9	1656.1	1212.9	1152.6	1083.0	1000.3	898.6	770.4	769.7	628.1	627.4	473.7	473.1	313.0	312.4	151.8	151.2
1000 - 2000	6 - 9.99	24.2	902.3	680.4	644.2	599.6	545.3	480.0	400.7	399.1	314.3	312.6	222.7	221.3	141.3	140.1	64.5	63.5
1000 - 2000	10 - 19.99	91.7	493.8	361.1	340.2	315.6	286.4	251.2	208.9	203.7	163.0	158.2	116.7	112.8	76.0	72.7	35.7	32.9
1000 - 2000	20 - 39.99	175.5	270.1	172.8	157.8	142.0	125.2	107.2	88.6	82.9	70.4	65.4	52.3	48.1	35.0	31.2	15.9	13.3
1000 - 2000	≥ 40	134.1	143.3	65.0	56.1	47.9	40.0	32.7	26.0	23.0	19.5	16.8	13.3	10.9	7.2	5.4	2.5	1.6
2000 - 5000	2 - 5.99	6.5	4313.3	3187.2	3046.1	2885.8	2695.5	2455.8	2149.9	2149.3	1808.5	1807.9	1424.1	1423.4	1011.7	1011.0	550.8	550.2
2000 - 5000	6 - 9.99	11.7	1985.5	1567.9	1496.5	1406.3	1293.0	1153.5	979.4	978.5	790.3	789.4	583.2	582.4	381.2	380.5	180.2	179.5
2000 - 5000	10 - 19.99	60.5	1141.8	898.4	853.8	799.3	730.5	644.9	537.5	534.3	418.1	415.1	295.1	292.7	190.2	188.1	87.9	86.2
2000 - 5000	20 - 39.99	158.9	631.2	438.8	404.0	366.6	324.7	276.7	223.7	212.8	169.9	160.9	120.5	113.8	79.5	73.7	37.5	32.8
2000 - 5000	≥ 40	226.9	365.2	187.2	164.0	141.6	119.8	98.6	78.8	72.1	60.5	54.8	43.4	38.4	27.2	22.9	11.9	9.3

Panel D: Cumulative ask depth in \$ ('000) by cents away from the midpoint

Cumulative Depth in \$ ('000)			Pennies Away from the Midpoint (Ask)															
Cap \$ Million	Price \$	Ticker/Day	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	6	7	8	9	10	20
< 100	2 - 5.99	282.0	1.5	2.0	3.4	4.1	5.6	6.4	7.8	8.6	10.0	10.9	13.1	15.3	17.5	19.5	21.6	41.3
< 100	6 - 9.99	113.9	0.5	1.0	1.7	2.2	3.0	3.6	4.2	4.8	5.5	6.4	7.8	9.2	10.8	12.1	13.6	27.5
< 100	10 - 19.99	117.0	0.3	0.5	1.1	1.4	2.2	2.6	3.0	3.5	3.9	4.7	5.5	6.4	7.8	8.7	10.1	22.0
< 100	20 - 39.99	24.7	0.1	0.1	0.2	0.3	0.5	0.6	0.7	0.8	1.0	1.2	1.5	1.8	2.2	2.5	3.1	9.2
< 100	≥ 40	1.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.4	0.4	0.7	3.0
100 - 250	2 - 5.99	144.6	9.0	10.1	18.8	20.0	27.9	29.1	36.6	37.9	44.9	46.1	54.0	60.9	67.4	73.7	79.5	132.5
100 - 250	6 - 9.99	108.7	1.8	2.8	4.9	6.3	8.6	10.2	12.5	13.9	16.2	18.0	21.3	24.5	27.6	30.6	33.6	59.9
100 - 250	10 - 19.99	147.4	1.7	2.2	4.0	4.8	6.7	7.8	9.5	10.6	12.4	13.6	16.5	19.1	21.8	24.3	27.0	49.0
100 - 250	20 - 39.99	49.8	0.2	0.4	0.7	1.1	1.5	2.0	2.4	2.9	3.4	4.0	5.2	6.4	7.9	9.2	10.7	25.2
100 - 250	≥ 40	13.6	0.0	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.8	1.1	1.4	1.8	2.2	2.7	9.4
250 - 500	2 - 5.99	60.8	23.2	24.1	45.8	46.8	68.3	69.4	92.1	93.2	114.4	115.5	136.8	154.8	170.3	184.1	196.4	298.1
250 - 500	6 - 9.99	79.4	8.4	10.2	18.3	20.2	27.9	29.9	37.9	40.2	47.6	49.7	58.8	67.1	74.6	81.3	87.5	139.8
250 - 500	10 - 19.99	175.1	4.2	5.4	9.2	10.9	14.4	16.2	19.6	21.5	24.8	26.9	32.2	37.3	42.1	46.4	50.4	86.1
250 - 500	20 - 39.99	98.8	1.0	1.5	2.6	3.4	5.0	6.0	7.5	8.7	10.2	11.5	14.3	17.2	20.2	23.1	25.9	50.5
250 - 500	≥ 40	27.6	0.4	0.5	1.0	1.3	1.9	2.2	2.8	3.2	4.0	4.5	5.6	6.8	8.3	9.8	11.5	27.7
500 - 1000	2 - 5.99	29.5	68.3	68.8	138.0	138.6	207.2	207.8	279.4	280.1	343.9	344.6	404.4	450.8	488.4	520.5	548.7	770.8
500 - 1000	6 - 9.99	51.0	26.9	28.6	57.3	59.3	87.5	89.7	121.2	123.7	152.4	154.9	183.0	206.6	226.7	244.0	259.2	367.9
500 - 1000	10 - 19.99	143.5	11.3	13.8	26.3	29.4	41.7	45.0	58.1	62.0	75.1	79.3	95.9	110.4	123.3	134.7	144.9	221.2
500 - 1000	20 - 39.99	166.1	3.9	5.0	9.3	11.2	15.5	17.7	22.0	24.4	28.5	31.1	38.1	45.2	52.3	59.1	65.6	114.7
500 - 1000	≥ 40	63.2	1.0	1.3	2.4	3.1	4.5	5.4	7.0	8.2	10.1	11.5	15.0	18.7	22.5	26.3	30.2	65.5
1000 - 2000	2 - 5.99	9.9	153.5	154.1	309.8	310.4	465.5	466.2	616.5	617.3	755.8	756.4	884.9	990.3	1078.1	1154.0	1220.1	1763.9
1000 - 2000	6 - 9.99	24.2	64.3	65.2	141.5	142.8	222.7	224.1	315.1	316.8	402.1	403.7	482.6	547.3	601.4	646.4	683.6	932.6
1000 - 2000	10 - 19.99	91.7	28.4	31.1	64.9	68.4	103.8	107.8	149.8	154.8	195.4	200.7	242.0	276.1	304.4	328.1	349.0	488.1
1000 - 2000	20 - 39.99	175.5	9.9	12.6	24.2	28.1	39.6	44.0	55.6	60.7	72.5	78.4	96.7	114.4	130.9	146.2	160.9	260.6
1000 - 2000	≥ 40	134.1	1.5	2.4	4.5	6.4	9.3	11.7	14.8	17.6	21.0	24.0	31.0	38.6	46.8	55.4	64.5	144.0
2000 - 5000	2 - 5.99	6.5	480.5	481.2	930.6	931.2	1350.7	1351.3	1753.3	1754.0	2119.2	2119.8	2463.2	2737.1	2962.3	3154.4	3329.5	4843.2
2000 - 5000	6 - 9.99	11.7	179.3	180.1	382.8	383.6	585.2	586.1	794.5	795.4	985.1	986.0	1161.1	1301.7	1417.6	1511.9	1589.4	2095.6
2000 - 5000	10 - 19.99	60.5	80.1	81.8	178.0	180.0	282.1	284.6	405.0	408.1	523.4	568.2	694.3	778.0	845.1	909.5	954.7	1210.2
2000 - 5000	20 - 39.99	158.9	25.4	30.1	59.1	65.0	96.4	103.5	142.8	152.3	194.8	206.2	259.0	306.0	347.0	383.4	417.3	606.5
2000 - 5000	≥ 40	226.9	7.6	10.3	19.0	23.5	32.7	37.8	47.8	53.7	64.3	71.3	91.0	112.3	134.3	156.6	179.6	354.4

Appendix Table 3: Aggregate Limit Order Book Depth by Percent
 Panel A: Cumulative bid depth in shares by basis points away from the midpoint

Cumulative Depth in Shares			Basis Points Away from the Midpoint (Bid)															
Cap \$ Million	Price \$	Ticker/Day	-100	-80	-60	-40	-20	-15	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1
< 100	2 - 5.99	244.0	3253	2667	1940	1292	620	306	157	8	3	2	2	2	2	2	2	2
< 100	6 - 9.99	94.2	1689	1329	973	619	231	172	133	125	125	78	28	6	1	1	1	1
< 100	10 - 19.99	92.8	1203	945	688	417	166	121	77	65	62	40	38	36	21	17	0	0
< 100	20 - 39.99	19.2	471	347	224	96	26	16	9	8	6	6	4	4	2	2	2	1
< 100	≥ 40	1.6	314	231	131	54	11	7	2	2	2	2	2	1	1	1	1	1
100 - 250	2 - 5.99	144.2	11746	9931	7606	5454	2804	1524	420	66	10	3	3	3	3	3	3	3
100 - 250	6 - 9.99	108.1	3557	2956	2293	1580	629	428	315	307	306	236	106	35	1	1	1	1
100 - 250	10 - 19.99	146.0	2667	2242	1794	1290	652	553	316	304	293	267	261	258	226	21	0	0
100 - 250	20 - 39.99	49.2	1144	903	661	413	175	116	65	51	46	30	26	19	17	12	7	0
100 - 250	≥ 40	13.8	582	455	320	174	40	22	10	8	6	5	4	3	2	1	1	1
250 - 500	2 - 5.99	60.8	26139	21494	16055	11387	7055	5394	742	428	66	3	3	3	3	3	3	3
250 - 500	6 - 9.99	79.4	9587	8063	6322	4364	2003	1585	1390	1372	1370	1093	313	87	1	1	1	1
250 - 500	10 - 19.99	175.1	4615	3980	3242	2315	1250	977	606	570	503	452	434	419	387	109	1	1
250 - 500	20 - 39.99	98.8	2566	2142	1708	1219	610	457	306	257	232	220	181	118	102	91	89	1
250 - 500	≥ 40	27.9	1462	1260	985	708	343	247	150	133	114	108	96	75	67	28	27	21
500 - 1000	2 - 5.99	29.5	78083	65056	46204	32624	15949	10860	3431	1856	307	7	7	7	7	7	7	7
500 - 1000	6 - 9.99	51.0	31038	26662	21298	14693	6617	5101	4389	4356	4353	2441	1732	896	2	2	2	2
500 - 1000	10 - 19.99	143.5	12591	11100	9269	6696	3391	2613	1741	1409	1297	1181	1144	1102	964	499	1	1
500 - 1000	20 - 39.99	166.1	5825	4962	4072	3021	1597	1241	810	720	652	610	479	338	286	258	249	6
500 - 1000	≥ 40	63.2	2732	2320	1847	1365	641	441	253	222	195	157	132	102	77	48	38	26
1000 - 2000	2 - 5.99	9.9	160475	127838	99181	61218	37956	21165	11359	6228	930	13	13	13	13	13	13	13
1000 - 2000	6 - 9.99	24.2	75742	63641	48459	31182	13636	8915	8337	8324	8314	6322	3664	1192	5	5	5	5
1000 - 2000	10 - 19.99	91.7	30582	27490	23330	16685	7921	5958	3504	3229	2762	2555	2510	2454	2029	748	3	2
1000 - 2000	20 - 39.99	175.5	11748	10347	8796	6811	3487	2604	1723	1573	1419	1256	1059	901	644	515	481	55
1000 - 2000	≥ 40	134.3	5534	4842	3908	2925	1331	900	537	471	406	349	277	223	147	110	54	34
2000 - 5000	2 - 5.99	6.5	448110	376183	292031	197013	137695	105483	40850	11666	1429	20	20	20	20	20	20	20
2000 - 5000	6 - 9.99	11.7	176115	152227	119318	77979	41502	23610	22704	22699	22682	20289	13967	2489	9	9	9	9
2000 - 5000	10 - 19.99	60.5	69525	64238	56588	42925	20556	15104	9904	8846	7011	5918	5889	5852	5201	3438	12	3
2000 - 5000	20 - 39.99	158.9	25633	23370	20740	16852	9068	6395	3962	3564	3203	2920	2416	2024	1605	1211	1117	318
2000 - 5000	≥ 40	227.4	10736	9987	8740	6998	3846	2700	1603	1428	1236	1093	911	758	578	453	266	167

Panel B: Cumulative ask depth in shares by basis points away from the midpoint

Cumulative Depth in Shares			Basis Points Away from the Midpoint (Ask)															
Cap \$ Million	Price \$	Ticker/Day	1	2	3	4	5	6	7	8	9	10	15	20	40	60	80	100
< 100	2 - 5.99	244.0	2	2	2	2	2	2	2	3	7	59	177	356	844	1305	1849	2329
< 100	6 - 9.99	94.2	1	1	1	1	6	28	63	83	83	88	154	232	549	863	1201	1550
< 100	10 - 19.99	92.8	0	0	7	12	26	28	32	56	61	74	126	181	433	705	1004	1310
< 100	20 - 39.99	19.2	0	4	4	5	7	9	11	13	15	22	38	58	147	291	449	616
< 100	≥ 40	1.6	1	1	1	1	1	2	2	2	2	3	8	12	52	145	281	402
100 - 250	2 - 5.99	144.2	3	3	3	3	3	3	3	11	66	324	1035	1997	3937	5658	7598	9090
100 - 250	6 - 9.99	108.1	1	1	1	1	24	74	176	244	244	254	367	513	1310	2060	2734	3366
100 - 250	10 - 19.99	146.0	0	1	19	114	141	144	153	175	188	203	370	483	1074	1639	2135	2629
100 - 250	20 - 39.99	49.2	1	7	10	14	20	25	31	40	48	57	103	158	432	733	1024	1301
100 - 250	≥ 40	13.8	1	2	2	3	4	6	7	8	11	13	30	52	192	348	496	643
250 - 500	2 - 5.99	60.8	3	3	3	3	3	3	4	70	428	743	4028	5567	9375	13655	18634	22973
250 - 500	6 - 9.99	79.4	2	2	2	2	87	310	886	1159	1162	1182	1396	1846	4003	5962	7704	9332
250 - 500	10 - 19.99	175.1	1	1	62	289	323	339	359	398	444	481	818	1074	2118	3108	3927	4649
250 - 500	20 - 39.99	98.8	1	42	45	57	70	92	117	131	152	185	318	458	1050	1562	2022	2479
250 - 500	≥ 40	27.9	8	13	14	25	34	48	56	62	75	86	154	236	584	847	1088	1304
500 - 1000	2 - 5.99	29.5	6	6	6	6	6	6	6	312	1844	3443	10960	15619	28294	41525	57915	70598
500 - 1000	6 - 9.99	51.0	3	3	3	3	791	1571	2264	3490	3492	3525	4153	5630	12355	18701	24024	28359
500 - 1000	10 - 19.99	143.5	1	1	337	709	848	893	931	1037	1161	1372	2218	2928	6320	9023	11016	12697
500 - 1000	20 - 39.99	166.1	3	161	171	197	236	327	413	452	507	578	922	1248	2660	3687	4570	5460
500 - 1000	≥ 40	63.2	21	33	43	64	84	113	136	171	197	227	412	620	1345	1841	2350	2789
1000 - 2000	2 - 5.99	9.9	20	20	20	20	20	20	20	966	6286	11427	21488	38452	61171	97888	125136	155930
1000 - 2000	6 - 9.99	24.2	5	5	5	5	1215	3676	6387	8406	8415	8429	9013	13773	31214	48455	63472	75217
1000 - 2000	10 - 19.99	91.7	2	3	671	1703	2116	2173	2217	2425	2856	3123	5407	7249	15949	22348	26409	29533
1000 - 2000	20 - 39.99	175.5	34	366	401	493	678	836	1006	1164	1293	1449	2266	3140	6406	8420	10001	11458
1000 - 2000	≥ 40	134.3	32	53	91	130	188	244	307	366	428	496	872	1318	2925	3920	4869	5583
2000 - 5000	2 - 5.99	6.5	32	32	32	32	32	32	32	1478	11870	24360	91886	124217	180657	275673	361327	435188
2000 - 5000	6 - 9.99	11.7	8	8	8	8	2542	13863	20186	22640	22659	22666	23609	41536	78234	119332	152049	175801
2000 - 5000	10 - 19.99	60.5	3	12	3035	4808	5478	5514	5543	6651	8125	9213	14515	19883	45498	60333	67958	73356
2000 - 5000	20 - 39.99	158.9	207	891	984	1257	1576	1952	2424	2688	3019	3404	5847	8516	16102	19868	22538	24925
2000 - 5000	≥ 40	227.4	141	230	380	494	655	801	969	1115	1298	1476	2581	3731	6797	8550	9841	10624

Panel C: Cumulative bid depth in \$ ('000) by basis points away from the midpoint

Cumulative Depth in \$ ('000)			Basis Points Away from the Midpoint (Bid)															
Cap \$ Million	Price \$	Ticker/Day	-100	-80	-60	-40	-20	-15	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1
< 100	2 - 5.99	244.0	11	9	7	5	2	1	1	0	0	0	0	0	0	0	0	0
< 100	6 - 9.99	94.2	13	10	8	5	2	1	1	1	1	1	0	0	0	0	0	0
< 100	10 - 19.99	92.8	16	12	9	5	2	2	1	1	1	1	1	0	0	0	0	0
< 100	20 - 39.99	19.2	11	8	5	2	1	0	0	0	0	0	0	0	0	0	0	0
< 100	≥ 40	1.6	17	13	7	3	1	0	0	0	0	0	0	0	0	0	0	0
100 - 250	2 - 5.99	144.2	41	35	28	20	10	7	2	0	0	0	0	0	0	0	0	0
100 - 250	6 - 9.99	108.1	27	23	18	12	5	3	2	2	2	2	1	0	0	0	0	0
100 - 250	10 - 19.99	146.0	36	30	24	17	9	7	4	4	4	3	3	3	3	0	0	0
100 - 250	20 - 39.99	49.2	29	23	16	10	4	3	2	1	1	1	1	0	0	0	0	0
100 - 250	≥ 40	13.8	31	24	17	9	2	1	0	0	0	0	0	0	0	0	0	0
250 - 500	2 - 5.99	60.8	102	83	63	44	27	22	4	2	0	0	0	0	0	0	0	0
250 - 500	6 - 9.99	79.4	71	60	47	32	15	12	10	10	10	8	3	1	0	0	0	0
250 - 500	10 - 19.99	175.1	65	56	46	32	17	14	9	8	7	6	6	6	5	2	0	0
250 - 500	20 - 39.99	98.8	66	55	44	31	15	11	8	6	6	5	4	3	2	2	2	0
250 - 500	≥ 40	27.9	74	64	50	35	16	11	7	6	5	5	4	3	3	1	1	1
500 - 1000	2 - 5.99	29.5	306	251	180	123	62	48	18	10	2	0	0	0	0	0	0	0
500 - 1000	6 - 9.99	51.0	241	207	165	114	53	40	33	33	33	21	16	9	0	0	0	0
500 - 1000	10 - 19.99	143.5	178	157	131	96	49	37	25	20	19	17	16	15	14	8	0	0
500 - 1000	20 - 39.99	166.1	154	131	107	79	41	32	21	18	16	15	12	9	7	6	6	0
500 - 1000	≥ 40	63.2	142	123	98	73	34	23	13	12	10	8	7	5	4	2	2	1
1000 - 2000	2 - 5.99	9.9	670	537	409	254	146	100	61	35	6	0	0	0	0	0	0	0
1000 - 2000	6 - 9.99	24.2	584	493	377	242	109	69	64	64	63	51	32	11	0	0	0	0
1000 - 2000	10 - 19.99	91.7	431	388	330	238	113	84	51	46	39	35	34	34	29	12	0	0
1000 - 2000	20 - 39.99	175.5	334	294	250	193	100	75	50	45	41	36	31	26	19	14	13	2
1000 - 2000	≥ 40	134.3	289	255	207	154	70	47	28	24	21	18	14	11	7	5	3	2
2000 - 5000	2 - 5.99	6.5	1813	1529	1187	821	548	455	211	65	8	0	0	0	0	0	0	0
2000 - 5000	6 - 9.99	11.7	1399	1213	953	625	336	188	180	180	179	164	119	24	0	0	0	0
2000 - 5000	10 - 19.99	60.5	1054	975	863	661	318	231	154	138	108	88	87	87	80	57	0	0
2000 - 5000	20 - 39.99	158.9	743	677	601	490	267	190	119	107	96	87	74	62	49	36	33	11
2000 - 5000	≥ 40	227.4	615	579	513	412	230	162	97	86	75	66	55	46	35	27	16	10

Panel D: Cumulative ask depth in \$ ('000) by basis points away from the midpoint

Cumulative Depth in \$ ('000)			Basis Points Away from the Midpoint (Ask)															
Cap \$ Million	Price \$	Ticker/Day	1	2	3	4	5	6	7	8	9	10	15	20	40	60	80	100
< 100	2 - 5.99	244.0	0	0	0	0	0	0	0	0	0	0	1	1	3	4	6	8
< 100	6 - 9.99	94.2	0	0	0	0	0	0	0	1	1	1	1	2	4	7	9	12
< 100	10 - 19.99	92.8	0	0	0	0	0	0	0	1	1	1	2	2	6	9	13	17
< 100	20 - 39.99	19.2	0	0	0	0	0	0	0	0	0	1	1	1	4	7	11	15
< 100	≥ 40	1.6	0	0	0	0	0	0	0	0	0	0	0	1	3	8	15	21
100 - 250	2 - 5.99	144.2	0	0	0	0	0	0	0	0	0	2	5	7	14	20	27	32
100 - 250	6 - 9.99	108.1	0	0	0	0	0	1	1	2	2	2	3	4	10	16	21	26
100 - 250	10 - 19.99	146.0	0	0	0	1	2	2	2	2	3	3	5	7	15	22	29	36
100 - 250	20 - 39.99	49.2	0	0	0	0	0	1	1	1	1	1	3	4	11	19	26	33
100 - 250	≥ 40	13.8	0	0	0	0	0	0	0	0	0	1	1	2	10	18	26	34
250 - 500	2 - 5.99	60.8	0	0	0	0	0	0	0	0	2	4	17	22	37	54	73	90
250 - 500	6 - 9.99	79.4	0	0	0	0	1	3	7	8	8	9	10	14	30	45	58	71
250 - 500	10 - 19.99	175.1	0	0	1	4	4	5	5	5	6	7	11	15	30	44	55	66
250 - 500	20 - 39.99	98.8	0	1	1	1	2	2	3	3	4	5	8	12	27	41	53	65
250 - 500	≥ 40	27.9	0	1	1	1	1	2	2	3	3	4	7	11	30	44	57	69
500 - 1000	2 - 5.99	29.5	0	0	0	0	0	0	0	2	10	18	48	61	112	169	235	290
500 - 1000	6 - 9.99	51.0	0	0	0	0	8	14	19	27	27	27	33	46	98	149	191	225
500 - 1000	10 - 19.99	143.5	0	0	5	10	12	12	13	15	17	20	31	42	90	128	157	180
500 - 1000	20 - 39.99	166.1	0	4	4	5	6	8	10	12	13	15	24	33	70	98	122	147
500 - 1000	≥ 40	63.2	1	2	2	3	4	6	7	9	10	12	21	32	71	98	124	146
1000 - 2000	2 - 5.99	9.9	0	0	0	0	0	0	0	6	35	61	101	148	255	408	533	662
1000 - 2000	6 - 9.99	24.2	0	0	0	0	12	32	51	64	64	64	70	110	244	379	496	586
1000 - 2000	10 - 19.99	91.7	0	0	11	24	29	30	31	34	41	45	76	104	229	319	376	421
1000 - 2000	20 - 39.99	175.5	1	10	11	14	19	24	28	33	37	41	64	89	182	239	285	328
1000 - 2000	≥ 40	134.3	2	3	5	7	10	13	16	19	22	26	46	70	156	209	259	294
2000 - 5000	2 - 5.99	6.5	0	0	0	0	0	0	0	9	66	129	385	479	738	1106	1460	1757
2000 - 5000	6 - 9.99	11.7	0	0	0	0	24	118	164	179	179	179	189	337	629	959	1221	1409
2000 - 5000	10 - 19.99	60.5	0	0	51	73	81	81	82	103	127	143	222	308	698	919	1032	1114
2000 - 5000	20 - 39.99	158.9	7	25	28	38	47	58	71	79	89	101	172	249	467	576	654	725
2000 - 5000	≥ 40	227.4	8	14	23	29	39	48	58	67	78	88	154	222	401	503	573	611

Appendix Table 4: Aggregate Limit Order Book Depth by Pennies from the BBO

Panel A: Mean

Cap \$ Million	Price \$	Multiple of Best Bid Size at Bid Price Minus 'x' cents												Size in Shares		Multiple of Best Ask Size at Ask Price Plus 'x' cents											
		24	19	14	9	8	7	6	5	4	3	2	1	Bid	Ask	1	2	3	4	5	6	7	8	9	14	19	24
< 100	2 - 5.99	20.8	16.9	12.8	8.6	7.9	7.1	6.3	5.4	4.4	3.6	2.8	2.0	1792	1499	2.2	3.0	3.7	4.4	5.4	6.2	6.9	7.6	8.2	12.1	16.0	19.9
< 100	6 - 9.99	11.3	9.4	7.5	5.5	5.2	4.8	4.4	4.0	3.2	2.8	2.3	1.7	911	929	2.2	2.6	3.1	3.5	4.3	4.8	5.2	5.5	5.8	7.8	9.7	11.6
< 100	10 - 19.99	8.3	6.9	5.4	3.9	3.7	3.5	3.2	2.9	2.3	2.1	1.9	1.6	592	664	1.8	2.2	2.5	2.7	3.2	3.6	3.8	4.1	4.3	5.7	6.9	8.1
< 100	20 - 39.99	5.1	4.4	3.6	2.7	2.6	2.5	2.3	2.1	1.9	1.8	1.6	1.4	301	410	1.5	1.7	1.8	2.0	2.2	2.4	2.5	2.7	2.8	3.7	4.4	5.2
< 100	≥ 40	2.1	1.9	1.7	1.5	1.5	1.5	1.4	1.4	1.3	1.3	1.2	1.2	217	248	1.2	1.3	1.4	1.5	1.6	1.6	1.7	1.7	1.7	2.1	2.5	2.8
100 - 250	2 - 5.99	21.2	17.5	13.5	9.7	8.9	8.0	7.1	6.1	5.1	4.1	3.0	2.0	5511	3849	1.9	2.9	3.9	4.9	5.9	6.9	7.8	8.6	9.5	13.6	17.8	21.8
100 - 250	6 - 9.99	14.2	11.7	9.1	6.5	5.9	5.3	4.8	4.2	3.6	2.9	2.3	1.7	889	1005	1.7	2.3	2.9	3.5	4.2	4.8	5.4	6.0	6.6	9.6	12.5	15.2
100 - 250	10 - 19.99	9.8	8.0	6.2	4.5	4.1	3.8	3.4	3.0	2.6	2.3	1.9	1.5	704	688	1.6	2.0	2.3	2.7	3.2	3.6	4.0	4.3	4.6	6.5	8.4	10.3
100 - 250	20 - 39.99	6.1	5.1	4.2	3.1	2.9	2.7	2.5	2.3	2.1	1.9	1.7	1.4	283	327	1.5	1.8	2.0	2.2	2.5	2.7	2.9	3.1	3.3	4.5	5.6	6.7
100 - 250	≥ 40	3.5	3.0	2.7	2.3	2.2	2.1	2.0	1.9	1.7	1.6	1.5	1.3	176	200	1.3	1.4	1.6	1.6	1.8	1.9	2.0	2.1	2.1	2.6	3.1	3.6
250 - 500	2 - 5.99	19.1	16.3	13.3	10.2	9.5	8.7	7.8	6.8	5.7	4.5	3.2	2.1	8197	6725	2.0	3.2	4.4	5.6	6.8	7.8	8.8	9.6	10.4	14.0	17.4	20.6
250 - 500	6 - 9.99	16.6	14.0	11.2	8.4	7.7	7.0	6.2	5.4	4.6	3.6	2.7	1.8	1850	1648	1.8	2.7	3.6	4.6	5.5	6.3	7.1	7.8	8.5	11.6	14.9	17.7
250 - 500	10 - 19.99	13.0	10.7	8.3	6.1	5.7	5.2	4.6	4.0	3.3	2.7	2.1	1.6	855	767	1.6	2.1	2.7	3.3	4.1	4.7	5.3	5.8	6.2	8.6	11.1	13.6
250 - 500	20 - 39.99	8.6	7.1	5.6	4.1	3.8	3.4	3.1	2.8	2.4	2.1	1.8	1.5	371	361	1.5	1.8	2.1	2.4	2.8	3.1	3.4	3.7	4.0	5.6	7.0	8.5
250 - 500	≥ 40	4.7	4.0	3.5	2.7	2.6	2.4	2.3	2.1	1.9	1.7	1.6	1.3	227	213	1.3	1.5	1.7	1.8	2.0	2.2	2.3	2.4	2.6	3.3	3.9	4.5
500 - 1000	2 - 5.99	15.7	13.8	11.9	9.8	9.2	8.6	7.9	7.0	5.8	4.6	3.3	2.1	18271	18576	2.1	3.3	4.6	5.8	7.0	7.9	8.6	9.2	9.8	12.1	14.1	16.0
500 - 1000	6 - 9.99	18.2	16.1	13.7	10.9	10.2	9.4	8.4	7.4	6.1	4.8	3.3	2.1	5395	4302	2.1	3.4	4.8	6.2	7.5	8.5	9.5	10.3	11.0	13.9	16.4	18.6
500 - 1000	10 - 19.99	17.1	14.6	12.0	9.2	8.5	7.8	6.9	5.9	4.8	3.7	2.7	1.8	1482	1227	1.8	2.7	3.8	5.0	6.2	7.2	8.1	8.9	9.6	12.7	15.6	18.4
500 - 1000	20 - 39.99	13.1	10.8	8.6	6.2	5.6	5.0	4.3	3.7	3.0	2.5	2.0	1.5	588	507	1.5	2.0	2.5	3.0	3.7	4.4	5.0	5.6	6.2	8.6	10.8	13.2
500 - 1000	≥ 40	7.1	6.0	5.0	3.6	3.3	3.0	2.8	2.5	2.2	1.9	1.7	1.4	250	259	1.4	1.7	1.9	2.1	2.5	2.7	3.0	3.2	3.5	4.8	5.8	6.9
1000 - 2000	2 - 5.99	15.6	13.9	11.9	9.6	9.0	8.4	7.7	6.8	5.7	4.6	3.3	2.1	40151	40769	2.1	3.3	4.5	5.6	6.7	7.6	8.3	9.0	9.5	11.8	14.0	15.9
1000 - 2000	6 - 9.99	17.6	16.0	14.1	11.8	11.1	10.3	9.3	8.2	6.8	5.2	3.6	2.3	8433	8523	2.3	3.6	5.2	6.8	8.2	9.3	10.3	11.1	11.8	14.2	16.4	18.2
1000 - 2000	10 - 19.99	20.2	18.0	15.4	12.3	11.5	10.6	9.4	8.1	6.6	4.9	3.4	2.1	2672	2376	2.1	3.4	5.1	6.8	8.3	9.7	10.8	11.7	12.5	15.8	18.6	21.1
1000 - 2000	20 - 39.99	18.3	15.8	13.0	9.6	8.6	7.6	6.6	5.5	4.3	3.3	2.4	1.7	849	730	1.7	2.4	3.3	4.4	5.6	6.7	7.7	8.7	9.7	13.2	16.0	18.6
1000 - 2000	≥ 40	11.5	9.9	8.3	5.5	4.8	4.2	3.7	3.1	2.6	2.2	1.8	1.4	307	316	1.4	1.8	2.2	2.6	3.1	3.7	4.2	4.8	5.5	8.2	9.8	11.4
2000 - 5000	2 - 5.99	11.6	10.4	8.9	7.5	7.1	6.7	6.2	5.6	4.8	3.9	3.0	2.0	117703	120836	2.0	2.9	3.9	4.7	5.6	6.2	6.7	7.2	7.6	9.4	11.1	12.6
2000 - 5000	6 - 9.99	13.9	12.8	11.4	9.6	9.2	8.6	7.8	6.9	5.8	4.7	3.4	2.2	22738	22702	2.2	3.4	4.7	5.9	7.0	7.9	8.6	9.2	9.8	11.9	13.5	15.0
2000 - 5000	10 - 19.99	18.5	17.1	15.3	12.9	12.2	11.3	10.2	8.9	7.3	5.5	3.7	2.3	5689	5555	2.3	3.8	5.6	8.2	10.0	11.3	12.3	13.3	14.0	16.5	18.4	20.1
2000 - 5000	20 - 39.99	24.3	21.7	18.8	14.4	13.0	11.6	10.0	8.3	6.4	4.6	3.1	2.0	1491	1225	2.0	3.2	4.8	6.7	8.6	10.3	11.8	13.2	14.6	19.0	21.9	24.6
2000 - 5000	≥ 40	18.3	16.1	13.3	8.6	7.5	6.4	5.4	4.4	3.5	2.7	2.1	1.6	460	444	1.6	2.1	2.7	3.5	4.5	5.5	6.5	7.6	8.7	13.3	16.0	18.1

Panel B: Median

Cap \$ Million	Price \$	Multiple of Best Bid Size at Bid Price Minus 'x' cents											Size in Shares		Multiple of Best Ask Size at Ask Price Plus 'x' cents												
		24	19	14	9	8	7	6	5	4	3	2	1	Bid	Ask	1	2	3	4	5	6	7	8	9	14	19	24
< 100	2 - 5.99	13.0	10.4	7.7	5.3	4.9	4.5	4.0	3.6	3.0	2.5	2.0	1.5	770	735	1.5	1.9	2.4	2.8	3.3	3.7	4.1	4.5	4.9	7.0	9.3	11.8
< 100	6 - 9.99	6.4	5.4	4.2	3.1	2.9	2.7	2.6	2.3	1.9	1.7	1.5	1.3	465	490	1.3	1.5	1.7	1.9	2.3	2.5	2.7	2.8	3.0	4.0	5.0	6.0
< 100	10 - 19.99	4.2	3.5	2.9	2.2	2.1	2.0	1.9	1.8	1.4	1.3	1.2	1.1	319	336	1.1	1.2	1.3	1.4	1.7	1.8	1.9	2.0	2.1	2.7	3.2	3.8
< 100	20 - 39.99	2.8	2.4	2.0	1.6	1.5	1.5	1.4	1.4	1.2	1.1	1.1	1.0	178	197	1.1	1.1	1.1	1.2	1.3	1.4	1.4	1.5	1.5	1.9	2.2	2.5
< 100	≥ 40	1.6	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.0	1.0	148	135	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.4	1.5	1.7
100 - 250	2 - 5.99	16.7	13.9	10.7	7.9	7.3	6.6	6.0	5.2	4.4	3.6	2.7	1.8	1377	1359	1.8	2.5	3.4	4.2	4.9	5.6	6.3	6.9	7.5	10.4	13.6	16.5
100 - 250	6 - 9.99	11.0	9.0	7.1	5.1	4.7	4.3	3.9	3.4	2.9	2.5	2.0	1.5	536	558	1.5	2.0	2.4	2.9	3.4	3.8	4.2	4.6	5.0	7.0	8.8	10.7
100 - 250	10 - 19.99	7.2	5.9	4.6	3.4	3.2	3.0	2.7	2.5	2.2	1.9	1.7	1.4	334	360	1.4	1.6	1.9	2.1	2.5	2.7	3.0	3.2	3.4	4.6	5.8	7.1
100 - 250	20 - 39.99	4.6	3.9	3.3	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.5	1.3	223	237	1.3	1.5	1.6	1.8	2.0	2.1	2.2	2.4	2.5	3.3	3.9	4.6
100 - 250	≥ 40	2.9	2.6	2.3	2.0	1.9	1.8	1.8	1.7	1.5	1.4	1.3	1.2	146	158	1.2	1.3	1.4	1.4	1.5	1.6	1.6	1.7	1.7	2.1	2.4	2.7
250 - 500	2 - 5.99	16.3	14.1	11.8	9.3	8.7	8.0	7.2	6.3	5.3	4.2	3.1	2.0	2824	2825	2.0	3.0	4.1	5.2	6.2	7.1	7.9	8.6	9.2	11.8	14.4	16.7
250 - 500	6 - 9.99	14.4	12.3	9.7	7.3	6.8	6.2	5.5	4.9	4.1	3.3	2.5	1.8	811	862	1.7	2.5	3.3	4.1	4.9	5.5	6.2	6.8	7.3	9.9	12.6	14.7
250 - 500	10 - 19.99	10.6	8.9	7.0	5.2	4.9	4.5	4.0	3.5	2.9	2.4	2.0	1.5	411	442	1.5	2.0	2.4	2.9	3.5	4.0	4.4	4.8	5.2	7.0	8.9	10.7
250 - 500	20 - 39.99	6.4	5.4	4.4	3.3	3.1	2.8	2.6	2.4	2.1	1.9	1.7	1.4	255	273	1.4	1.7	1.9	2.1	2.4	2.6	2.8	3.0	3.3	4.3	5.4	6.4
250 - 500	≥ 40	3.5	3.0	2.7	2.2	2.1	2.1	2.0	1.9	1.7	1.6	1.5	1.3	164	177	1.3	1.4	1.5	1.6	1.8	1.9	2.0	2.1	2.2	2.5	2.9	3.3
500 - 1000	2 - 5.99	14.2	12.6	10.9	9.1	8.6	8.1	7.4	6.6	5.5	4.4	3.2	2.1	10847	10852	2.1	3.2	4.4	5.5	6.5	7.3	8.0	8.5	9.0	10.9	12.5	14.1
500 - 1000	6 - 9.99	16.3	14.6	12.5	10.1	9.5	8.7	7.9	6.9	5.8	4.5	3.2	2.1	1965	1958	2.1	3.2	4.6	5.9	7.0	8.0	8.8	9.6	10.2	12.7	14.9	16.7
500 - 1000	10 - 19.99	15.4	13.2	10.7	8.3	7.7	7.1	6.3	5.4	4.4	3.4	2.5	1.8	629	640	1.8	2.5	3.5	4.6	5.6	6.6	7.3	8.0	8.6	11.1	13.8	16.2
500 - 1000	20 - 39.99	10.9	9.3	7.3	5.3	4.8	4.2	3.7	3.2	2.7	2.3	1.9	1.5	331	345	1.5	1.8	2.2	2.6	3.2	3.7	4.2	4.8	5.3	7.3	9.2	10.9
500 - 1000	≥ 40	5.1	4.3	3.7	2.9	2.7	2.6	2.4	2.2	2.0	1.8	1.6	1.4	206	220	1.3	1.6	1.7	1.9	2.2	2.3	2.5	2.6	2.8	3.5	4.1	4.9
1000 - 2000	2 - 5.99	13.7	12.4	10.7	8.8	8.4	7.8	7.2	6.4	5.4	4.4	3.2	2.1	23064	22993	2.1	3.2	4.3	5.3	6.2	7.0	7.6	8.2	8.7	10.7	12.6	14.1
1000 - 2000	6 - 9.99	15.9	14.7	13.2	11.2	10.6	9.8	8.9	7.8	6.4	5.0	3.5	2.2	6883	7012	2.2	3.5	5.0	6.5	7.8	8.9	9.8	10.5	11.1	13.2	14.9	16.2
1000 - 2000	10 - 19.99	18.6	16.6	14.3	11.5	10.8	9.9	8.9	7.7	6.3	4.7	3.3	2.1	1300	1282	2.1	3.3	4.9	6.5	7.9	9.1	10.2	11.0	11.7	14.7	17.0	19.2
1000 - 2000	20 - 39.99	16.9	14.6	12.0	8.9	8.0	7.0	6.0	5.0	3.9	3.0	2.3	1.6	444	453	1.6	2.3	3.0	4.0	5.1	6.2	7.1	8.0	9.0	12.0	14.6	17.0
1000 - 2000	≥ 40	10.3	8.9	7.4	4.6	4.1	3.6	3.2	2.8	2.4	2.1	1.7	1.4	275	285	1.4	1.7	2.0	2.3	2.8	3.2	3.6	4.1	4.6	7.2	8.7	10.1
2000 - 5000	2 - 5.99	11.1	9.9	8.5	7.2	6.8	6.5	6.0	5.4	4.7	3.9	3.0	2.0	101702	103209	2.0	2.9	3.8	4.6	5.4	6.0	6.5	6.9	7.3	8.7	10.3	11.6
2000 - 5000	6 - 9.99	12.2	11.4	10.4	9.0	8.6	8.1	7.5	6.7	5.6	4.5	3.3	2.1	21860	21864	2.1	3.3	4.5	5.7	6.7	7.5	8.1	8.7	9.1	10.8	12.0	13.0
2000 - 5000	10 - 19.99	17.2	15.9	14.4	12.2	11.6	10.8	9.8	8.6	7.0	5.4	3.6	2.3	3815	3820	2.3	3.7	5.5	7.2	8.7	9.9	10.8	11.6	12.3	14.5	16.1	17.4
2000 - 5000	20 - 39.99	23.0	20.5	17.8	13.7	12.4	11.1	9.6	7.9	6.1	4.4	2.9	1.9	741	739	1.9	3.0	4.5	6.4	8.2	9.9	11.4	12.7	14.0	18.0	20.7	23.2
2000 - 5000	≥ 40	17.0	14.9	12.4	7.7	6.7	5.7	4.7	3.9	3.1	2.5	2.0	1.5	338	346	1.5	2.0	2.5	3.1	3.9	4.8	5.8	6.8	7.8	12.4	14.9	16.8

Appendix Table 5: Distribution of Cumulative Depth by Pennies

Panel A: Less than \$5,000

Cap \$ Million	Price \$	Ticker/Day	% of Ticker-Days with less than \$5,000 within 'x' cents of the midpoint											
			0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	7.5	10
< 100	2 - 5.99	282.0	90.10	82.82	73.78	66.42	58.67	53.04	47.99	43.79	39.64	35.61	22.74	14.95
< 100	6 - 9.99	113.9	97.87	95.28	91.30	86.47	79.48	74.82	70.80	66.73	62.83	57.72	42.88	32.19
< 100	10 - 19.99	117.0	99.00	97.95	96.53	94.41	90.08	87.78	85.65	83.36	80.79	76.34	64.78	54.72
< 100	20 - 39.99	24.7	99.55	99.28	99.05	98.66	97.84	97.28	96.59	96.11	95.33	93.64	88.20	80.90
< 100	≥ 40	1.5	99.19	99.19	99.19	99.19	98.39	98.39	98.39	98.39	98.39	97.04	95.70	92.74
100 - 250	2 - 5.99	144.6	44.71	29.41	16.96	11.65	7.97	6.06	4.67	3.73	3.01	2.42	1.13	0.63
100 - 250	6 - 9.99	108.7	83.57	70.26	55.08	43.43	33.00	25.95	21.05	17.27	14.03	11.35	5.08	2.80
100 - 250	10 - 19.99	147.4	94.97	90.27	83.01	75.16	66.28	59.25	52.78	46.78	40.92	35.22	19.01	11.08
100 - 250	20 - 39.99	49.8	98.84	97.75	96.23	94.29	91.16	88.34	85.19	82.03	78.19	73.49	54.00	38.41
100 - 250	≥ 40	13.6	99.65	99.39	99.21	98.89	98.37	98.05	97.61	97.03	96.16	95.14	90.10	82.64
250 - 500	2 - 5.99	60.8	12.58	6.63	3.69	2.47	1.84	1.53	1.27	1.04	0.87	0.74	0.35	0.13
250 - 500	6 - 9.99	79.4	46.35	28.21	15.63	9.67	6.57	4.95	3.86	3.15	2.61	2.17	1.06	0.57
250 - 500	10 - 19.99	175.1	81.97	65.15	47.92	36.12	26.72	20.58	16.00	12.56	9.80	7.59	2.91	1.35
250 - 500	20 - 39.99	98.8	96.29	92.33	85.57	78.32	69.47	61.38	53.23	46.20	39.76	34.38	17.21	8.78
250 - 500	≥ 40	27.6	98.31	97.67	96.81	95.88	94.04	92.32	90.32	88.34	85.32	81.73	64.35	48.69
500 - 1000	2 - 5.99	29.5	2.94	1.18	0.52	0.26	0.15	0.09	0.04	0.03	0.01	0.01	0.00	0.00
500 - 1000	6 - 9.99	51.0	8.96	4.24	2.65	2.02	1.37	0.87	0.41	0.22	0.10	0.05	0.00	0.00
500 - 1000	10 - 19.99	143.5	43.59	24.43	13.08	8.39	6.17	5.01	4.05	3.30	2.64	2.09	0.58	0.27
500 - 1000	20 - 39.99	166.1	87.06	72.18	52.80	39.66	29.78	22.78	17.33	13.16	9.95	7.59	2.74	1.37
500 - 1000	≥ 40	63.2	97.14	95.33	91.77	86.58	79.67	72.87	66.17	59.84	53.65	47.74	27.33	16.75
1000 - 2000	2 - 5.99	9.9	1.97	0.80	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000 - 2000	6 - 9.99	24.2	0.95	0.56	0.49	0.41	0.21	0.11	0.03	0.03	0.02	0.00	0.00	0.00
1000 - 2000	10 - 19.99	91.7	10.82	3.74	1.62	0.90	0.47	0.27	0.13	0.08	0.03	0.02	0.00	0.00
1000 - 2000	20 - 39.99	175.5	57.65	34.77	17.79	10.00	5.90	3.68	2.38	1.51	0.95	0.59	0.09	0.01
1000 - 2000	≥ 40	134.1	92.12	80.07	63.32	49.88	39.56	32.20	26.75	22.35	18.86	15.71	7.80	4.41
2000 - 5000	2 - 5.99	6.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000 - 5000	6 - 9.99	11.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000 - 5000	10 - 19.99	60.5	2.20	1.13	0.60	0.41	0.31	0.23	0.14	0.10	0.07	0.04	0.02	0.01
2000 - 5000	20 - 39.99	158.9	13.93	4.56	1.50	0.68	0.34	0.20	0.14	0.09	0.06	0.03	0.00	0.00
2000 - 5000	≥ 40	226.9	68.61	46.33	29.19	20.51	15.41	11.98	9.59	8.02	6.77	5.86	3.62	2.72

Panel B: Less than \$10,000

Cap \$ Million	Price \$	Ticker/Day	% of Ticker-Days with less than \$10,000 within 'x' cents of the midpoint											
			0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	7.5	10
< 100	2 - 5.99	282.0	95.26	92.00	85.01	79.73	73.13	68.16	63.26	58.99	54.78	50.72	35.40	25.51
< 100	6 - 9.99	113.9	98.99	97.82	95.75	93.12	88.57	85.13	81.55	78.14	74.57	70.29	55.35	43.74
< 100	10 - 19.99	117.0	99.46	98.88	98.10	97.00	94.52	93.00	91.47	89.75	87.75	84.41	74.21	64.74
< 100	20 - 39.99	24.7	99.73	99.55	99.40	99.31	98.79	98.52	98.21	97.86	97.33	96.28	92.73	87.83
< 100	≥ 40	1.5	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	98.92	98.66	96.51
100 - 250	2 - 5.99	144.6	64.15	53.93	33.78	26.57	19.00	15.07	11.60	9.45	7.74	6.43	2.96	1.64
100 - 250	6 - 9.99	108.7	93.05	86.17	73.64	64.26	53.74	45.94	38.92	33.26	28.30	24.25	11.46	6.30
100 - 250	10 - 19.99	147.4	97.54	95.42	91.29	86.62	79.83	74.21	68.64	63.14	57.83	52.32	31.93	19.56
100 - 250	20 - 39.99	49.8	99.44	98.84	98.04	97.09	95.36	93.81	92.10	90.05	87.34	84.23	68.41	52.51
100 - 250	≥ 40	13.6	99.94	99.85	99.74	99.50	99.18	98.89	98.54	98.25	97.93	97.47	94.53	89.57
250 - 500	2 - 5.99	60.8	24.97	16.80	7.95	5.94	4.15	3.21	2.42	1.97	1.67	1.46	0.74	0.41
250 - 500	6 - 9.99	79.4	64.72	49.27	31.04	22.41	15.38	11.52	8.82	7.09	5.70	4.78	2.24	1.27
250 - 500	10 - 19.99	175.1	92.29	82.90	66.41	54.10	42.90	34.77	28.21	23.23	19.05	15.66	6.27	2.95
250 - 500	20 - 39.99	98.8	98.23	96.52	92.91	88.32	82.48	76.28	69.76	63.06	56.35	49.82	28.22	16.25
250 - 500	≥ 40	27.6	98.77	98.39	97.99	97.46	96.68	95.69	94.49	93.19	91.64	89.80	77.69	62.42
500 - 1000	2 - 5.99	29.5	6.22	4.25	1.60	1.10	0.59	0.43	0.32	0.20	0.13	0.08	0.03	0.00
500 - 1000	6 - 9.99	51.0	19.37	9.96	4.51	3.47	2.78	2.37	1.98	1.56	1.18	0.89	0.08	0.01
500 - 1000	10 - 19.99	143.5	62.57	43.38	24.23	15.94	10.53	7.94	6.54	5.63	4.84	4.14	1.75	0.62
500 - 1000	20 - 39.99	166.1	94.42	87.13	71.93	57.54	44.75	36.09	29.05	23.51	18.68	14.93	5.23	2.52
500 - 1000	≥ 40	63.2	98.09	97.27	95.67	93.12	89.53	84.68	79.24	73.43	67.71	62.27	39.84	25.11
1000 - 2000	2 - 5.99	9.9	3.37	2.37	1.33	0.64	0.28	0.08	0.04	0.04	0.04	0.04	0.00	0.00
1000 - 2000	6 - 9.99	24.2	2.24	1.06	0.56	0.51	0.47	0.39	0.31	0.18	0.11	0.07	0.00	0.00
1000 - 2000	10 - 19.99	91.7	22.19	10.08	3.67	2.02	1.16	0.72	0.49	0.29	0.17	0.11	0.00	0.00
1000 - 2000	20 - 39.99	175.5	75.32	55.30	32.94	20.47	12.16	7.93	5.51	3.77	2.62	1.91	0.33	0.10
1000 - 2000	≥ 40	134.1	96.94	91.08	79.06	66.26	54.11	44.69	37.30	31.71	27.39	23.50	12.16	6.87
2000 - 5000	2 - 5.99	6.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000 - 5000	6 - 9.99	11.7	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000 - 5000	10 - 19.99	60.5	3.96	2.20	1.21	0.77	0.50	0.42	0.31	0.25	0.20	0.16	0.05	0.03
2000 - 5000	20 - 39.99	158.9	26.79	11.55	4.02	1.82	0.97	0.55	0.33	0.22	0.17	0.12	0.01	0.00
2000 - 5000	≥ 40	226.9	82.02	63.72	43.66	30.71	22.44	17.54	14.06	11.56	9.62	8.25	4.75	3.43

Panel C: Less than \$20,000

Cap \$ Million	Price \$	Ticker/Day	% of Ticker-Days with less than \$20,000 within 'x' cents of the midpoint											
			0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	7.5	10
< 100	2 - 5.99	282.0	98.01	97.16	93.42	91.06	86.51	83.32	79.35	76.35	72.82	69.78	54.86	44.01
< 100	6 - 9.99	113.9	99.48	99.07	98.34	97.37	95.29	93.48	91.60	89.48	87.08	84.37	72.14	61.23
< 100	10 - 19.99	117.0	99.69	99.48	99.11	98.57	97.48	96.65	95.80	94.90	93.79	91.85	84.99	77.45
< 100	20 - 39.99	24.7	99.89	99.81	99.71	99.58	99.44	99.36	99.26	99.08	98.92	98.34	96.46	93.63
< 100	≥ 40	1.5	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.46	99.46	98.39
100 - 250	2 - 5.99	144.6	82.05	79.19	58.59	52.90	40.62	35.82	28.31	24.82	20.92	18.61	9.82	5.99
100 - 250	6 - 9.99	108.7	97.64	95.99	89.67	85.14	77.38	72.11	65.43	60.07	54.72	50.37	32.08	20.29
100 - 250	10 - 19.99	147.4	98.63	98.08	96.38	94.59	91.49	88.46	84.76	81.44	77.52	73.68	56.29	41.49
100 - 250	20 - 39.99	49.8	99.76	99.42	99.12	98.68	97.92	97.32	96.45	95.66	94.42	92.93	84.16	72.70
100 - 250	≥ 40	13.6	100.00	99.94	99.85	99.85	99.71	99.56	99.30	99.01	98.63	98.34	97.06	94.64
250 - 500	2 - 5.99	60.8	46.62	42.14	20.34	16.86	10.94	8.93	6.58	5.59	4.66	4.14	1.87	1.10
250 - 500	6 - 9.99	79.4	84.20	77.18	55.44	47.44	37.29	31.41	25.07	21.59	17.75	15.34	7.47	4.25
250 - 500	10 - 19.99	175.1	97.41	95.10	86.05	78.29	67.64	59.58	52.11	46.17	40.30	35.70	19.26	10.66
250 - 500	20 - 39.99	98.8	99.04	98.59	97.16	95.48	92.44	89.28	85.33	81.37	76.58	71.96	49.26	32.84
250 - 500	≥ 40	27.6	99.18	98.87	98.49	98.33	97.89	97.54	97.03	96.28	95.52	94.60	88.35	77.93
500 - 1000	2 - 5.99	29.5	10.70	9.80	5.29	4.34	2.08	1.65	1.17	0.91	0.66	0.51	0.23	0.11
500 - 1000	6 - 9.99	51.0	37.73	29.35	12.43	8.71	5.50	4.56	3.67	3.30	2.95	2.71	1.53	0.47
500 - 1000	10 - 19.99	143.5	80.53	69.97	47.02	35.12	24.45	18.64	14.21	11.55	9.57	8.21	4.89	3.08
500 - 1000	20 - 39.99	166.1	97.73	95.94	89.03	80.39	67.97	57.30	47.93	40.97	34.88	29.97	13.67	6.36
500 - 1000	≥ 40	63.2	98.57	98.06	97.47	96.62	95.08	92.92	89.99	86.39	82.27	77.79	56.65	39.62
1000 - 2000	2 - 5.99	9.9	5.30	4.66	3.01	2.57	1.65	1.25	1.00	0.68	0.36	0.24	0.04	0.04
1000 - 2000	6 - 9.99	24.2	5.73	3.95	1.16	0.75	0.56	0.52	0.51	0.49	0.47	0.44	0.15	0.03
1000 - 2000	10 - 19.99	91.7	38.68	27.47	11.04	6.61	3.57	2.41	1.63	1.16	0.86	0.68	0.12	0.03
1000 - 2000	20 - 39.99	175.5	88.46	77.57	56.15	41.03	27.62	19.29	13.18	9.51	7.13	5.47	1.55	0.42
1000 - 2000	≥ 40	134.1	98.82	97.29	91.75	83.42	72.85	62.90	53.77	46.13	39.83	34.80	19.70	11.67
2000 - 5000	2 - 5.99	6.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000 - 5000	6 - 9.99	11.7	1.22	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000 - 5000	10 - 19.99	60.5	8.00	5.05	2.43	1.71	1.17	0.83	0.64	0.52	0.47	0.42	0.21	0.09
2000 - 5000	20 - 39.99	158.9	45.97	27.58	11.40	5.79	2.92	1.84	1.11	0.76	0.52	0.33	0.09	0.02
2000 - 5000	≥ 40	226.9	91.84	80.93	63.30	47.93	35.37	27.22	21.40	17.65	14.72	12.46	6.78	4.57

Panel D: Less than \$50,000

Cap \$ Million	Price \$	Ticker/Day	% of Ticker-Days with less than \$50,000 within 'x' cents of the midpoint											
			0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	7.5	10
< 100	2 - 5.99	282.0	99.31	99.21	98.25	97.84	96.46	95.69	93.90	92.94	91.07	89.95	81.81	74.61
< 100	6 - 9.99	113.9	99.70	99.50	99.33	99.15	98.73	98.32	97.90	97.44	96.81	96.08	91.43	86.19
< 100	10 - 19.99	117.0	99.84	99.74	99.58	99.46	99.18	98.86	98.58	98.31	97.99	97.48	94.96	92.11
< 100	20 - 39.99	24.7	99.97	99.90	99.89	99.84	99.74	99.73	99.68	99.65	99.63	99.50	99.10	98.33
< 100	≥ 40	1.5	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100 - 250	2 - 5.99	144.6	95.62	95.38	85.09	83.97	74.04	71.99	63.01	60.48	53.53	51.28	35.30	26.04
100 - 250	6 - 9.99	108.7	99.27	98.99	97.90	97.28	95.06	93.73	90.94	89.11	86.14	83.90	71.20	60.18
100 - 250	10 - 19.99	147.4	99.21	99.10	98.72	98.45	97.77	97.11	96.10	95.30	94.07	92.91	85.40	77.13
100 - 250	20 - 39.99	49.8	99.88	99.75	99.63	99.43	99.18	98.99	98.84	98.65	98.43	98.18	96.14	92.97
100 - 250	≥ 40	13.6	100.00	100.00	99.97	99.97	99.91	99.88	99.88	99.85	99.80	99.68	98.84	98.25
250 - 500	2 - 5.99	60.8	76.14	75.59	50.88	49.12	34.33	32.39	24.38	22.42	18.14	16.65	9.34	6.39
250 - 500	6 - 9.99	79.4	96.80	96.39	86.45	83.61	72.07	68.16	59.39	55.49	49.09	46.18	30.90	22.95
250 - 500	10 - 19.99	175.1	99.16	99.00	97.77	96.78	93.90	91.61	86.76	83.06	77.68	73.77	55.13	42.96
250 - 500	20 - 39.99	98.8	99.51	99.33	99.05	98.81	98.30	97.72	96.79	95.83	94.71	93.35	84.15	73.85
250 - 500	≥ 40	27.6	99.63	99.31	99.12	98.99	98.78	98.71	98.52	98.31	98.00	97.82	96.01	93.02
500 - 1000	2 - 5.99	29.5	23.93	23.33	11.34	10.90	8.51	8.17	6.26	5.75	4.19	3.76	1.67	0.90
500 - 1000	6 - 9.99	51.0	74.00	71.67	39.52	35.84	24.23	21.08	13.90	11.92	8.97	7.78	4.48	3.44
500 - 1000	10 - 19.99	143.5	94.84	93.67	80.44	75.51	64.12	57.52	46.65	40.68	33.88	29.52	15.11	10.25
500 - 1000	20 - 39.99	166.1	98.85	98.71	97.95	97.08	94.43	91.82	86.81	81.87	75.44	69.84	45.02	30.75
500 - 1000	≥ 40	63.2	99.29	98.98	98.35	98.12	97.74	97.46	96.90	96.21	95.20	93.88	83.89	70.59
1000 - 2000	2 - 5.99	9.9	15.51	15.39	6.71	6.51	4.34	4.10	3.46	3.25	2.85	2.65	1.41	0.72
1000 - 2000	6 - 9.99	24.2	20.02	18.43	6.52	5.78	2.83	2.01	0.85	0.65	0.56	0.54	0.51	0.46
1000 - 2000	10 - 19.99	91.7	69.22	64.64	37.56	31.55	20.28	15.86	10.56	8.30	5.79	4.48	1.48	0.84
1000 - 2000	20 - 39.99	175.5	96.88	95.50	86.50	79.51	67.78	58.65	47.72	40.09	32.51	27.07	10.66	5.06
1000 - 2000	≥ 40	134.1	99.47	99.32	98.74	97.47	94.58	90.63	85.07	79.05	72.18	65.85	41.17	27.15
2000 - 5000	2 - 5.99	6.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000 - 5000	6 - 9.99	11.7	4.23	3.75	1.35	1.08	0.17	0.03	0.00	0.00	0.00	0.00	0.00	0.00
2000 - 5000	10 - 19.99	60.5	19.74	17.44	8.10	6.74	4.13	3.37	2.24	1.88	1.58	1.38	0.62	0.46
2000 - 5000	20 - 39.99	158.9	74.78	65.91	40.04	28.99	17.50	11.97	7.57	5.35	3.68	2.84	0.82	0.27
2000 - 5000	≥ 40	226.9	98.21	96.28	88.11	79.90	68.40	57.77	47.16	38.91	32.23	27.07	13.64	8.55

Appendix Table 6: Distribution of Cumulative Depth by Percent

Panel A: Less than \$5,000

Cap \$ Million	Price \$	Ticker/Day	% of Ticker-Days with less than \$5,000 within 'x' basis points of the midpoint													
			1	2	3	4	5	6	7	8	9	10	20	35	50	
< 100	2 - 5.99	244.0	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.90	99.68	99.09	91.74	81.17	69.98
< 100	6 - 9.99	94.2	99.98	99.98	99.98	99.98	99.66	98.85	98.14	97.44	97.43	97.22	91.62	76.16	62.89	
< 100	10 - 19.99	92.8	99.96	99.96	99.65	99.15	98.69	98.58	98.29	98.05	97.51	97.01	89.40	75.63	62.45	
< 100	20 - 39.99	19.2	99.90	99.42	99.40	99.34	99.07	99.01	98.72	98.43	98.10	97.73	93.45	82.77	69.39	
< 100	≥ 40	1.6	99.26	99.26	99.01	99.01	98.76	98.51	98.51	98.26	98.01	97.77	92.06	78.41	57.82	
100 - 250	2 - 5.99	144.2	99.98	99.98	99.98	99.98	99.98	99.98	99.98	99.98	99.42	95.70	90.54	51.98	23.53	13.29
100 - 250	6 - 9.99	108.1	100.00	100.00	100.00	100.00	98.29	94.32	88.56	83.50	83.48	82.64	61.15	32.94	19.03	
100 - 250	10 - 19.99	146.0	99.99	99.99	98.86	96.40	94.74	94.13	93.10	91.56	89.65	87.76	64.48	36.09	20.15	
100 - 250	20 - 39.99	49.2	99.94	98.88	98.76	98.09	97.46	96.94	95.70	94.97	93.54	92.34	74.82	45.29	24.59	
100 - 250	≥ 40	13.8	99.66	99.43	99.34	99.17	98.76	98.28	97.93	97.50	96.61	95.81	81.70	46.91	27.09	
250 - 500	2 - 5.99	60.8	99.99	99.99	99.99	99.99	99.99	99.99	99.97	96.44	80.95	69.81	14.85	4.54	2.91	
250 - 500	6 - 9.99	79.4	99.96	99.96	99.96	99.96	91.87	76.36	58.99	46.35	46.29	43.80	17.78	5.71	3.05	
250 - 500	10 - 19.99	175.1	99.99	99.98	93.85	85.92	80.82	77.36	73.18	67.08	61.23	55.96	22.24	6.73	2.74	
250 - 500	20 - 39.99	98.8	99.76	96.40	95.82	93.65	90.96	87.98	82.73	79.34	75.09	70.51	32.34	9.25	2.99	
250 - 500	≥ 40	27.9	98.31	97.67	97.19	96.16	94.32	92.41	89.91	87.32	84.01	80.43	43.69	16.83	7.51	
500 - 1000	2 - 5.99	29.5	99.95	99.95	99.95	99.95	99.95	99.95	99.95	94.07	72.81	58.62	7.96	0.89	0.35	
500 - 1000	6 - 9.99	51.0	99.97	99.97	99.97	99.97	73.29	41.13	21.15	8.97	8.96	7.88	2.87	1.26	0.33	
500 - 1000	10 - 19.99	143.5	99.98	99.89	71.47	50.68	39.75	32.28	28.14	21.87	17.54	14.79	5.09	1.77	0.58	
500 - 1000	20 - 39.99	166.1	99.31	87.20	83.33	73.75	62.66	52.69	42.27	36.27	30.31	25.54	5.66	1.72	0.69	
500 - 1000	≥ 40	63.2	97.08	94.82	91.96	86.73	79.45	71.35	63.28	55.88	48.89	42.60	9.72	1.55	0.70	
1000 - 2000	2 - 5.99	9.9	99.76	99.76	99.76	99.76	99.76	99.76	99.76	89.88	62.23	44.40	9.32	0.84	0.12	
1000 - 2000	6 - 9.99	24.2	99.98	99.98	99.98	99.98	77.44	43.30	15.60	0.95	0.95	0.95	0.49	0.13	0.02	
1000 - 2000	10 - 19.99	91.7	99.97	99.61	49.94	19.13	8.35	5.36	4.23	2.90	2.26	1.73	0.23	0.01	0.00	
1000 - 2000	20 - 39.99	175.5	92.71	57.73	45.23	30.08	20.31	13.73	9.13	6.61	4.73	3.49	0.19	0.00	0.00	
1000 - 2000	≥ 40	134.3	91.64	77.60	61.25	44.99	32.78	24.38	18.56	14.39	11.24	8.90	1.73	0.40	0.20	
2000 - 5000	2 - 5.99	6.5	99.82	99.82	99.82	99.82	99.82	99.82	99.82	94.18	70.85	61.21	0.30	0.00	0.00	
2000 - 5000	6 - 9.99	11.7	99.73	99.73	99.73	99.73	85.15	37.50	7.78	0.00	0.00	0.00	0.00	0.00	0.00	
2000 - 5000	10 - 19.99	60.5	99.92	98.84	33.05	8.93	1.68	1.21	1.13	0.83	0.64	0.52	0.26	0.05	0.02	
2000 - 5000	20 - 39.99	158.9	75.18	13.93	6.87	3.16	1.81	1.17	0.72	0.55	0.36	0.26	0.01	0.00	0.00	
2000 - 5000	≥ 40	227.4	62.11	34.92	19.01	10.67	6.32	4.15	2.84	2.00	1.48	1.12	0.16	0.01	0.01	

Panel B: Less than \$10,000

Cap \$ Million	Price \$	Ticker/Day	% of Ticker-Days with less than \$10,000 within 'x' basis points of the midpoint												
			1	2	3	4	5	6	7	8	9	10	20	35	50
< 100	2 - 5.99	244.0	99.99	99.99	99.99	99.99	99.99	99.99	99.99	99.97	99.89	99.56	96.17	90.93	84.23
< 100	6 - 9.99	94.2	99.99	99.99	99.99	99.99	99.84	99.38	99.11	98.78	98.78	98.65	95.90	86.96	76.08
< 100	10 - 19.99	92.8	100.00	100.00	99.78	99.56	99.29	99.23	99.05	98.92	98.70	98.41	94.04	84.91	73.66
< 100	20 - 39.99	19.2	99.94	99.65	99.63	99.57	99.40	99.38	99.21	99.15	99.03	98.80	96.26	89.30	78.22
< 100	≥ 40	1.6	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	96.03	86.35	69.23
100 - 250	2 - 5.99	144.2	99.99	99.99	99.99	99.99	99.99	99.99	99.99	99.77	98.19	95.52	71.27	46.34	31.13
100 - 250	6 - 9.99	108.1	100.00	100.00	100.00	100.00	99.42	97.82	95.16	93.02	93.01	92.54	79.37	54.38	36.62
100 - 250	10 - 19.99	146.0	100.00	99.99	99.49	98.20	97.46	97.23	96.78	96.08	95.13	94.20	79.19	53.52	34.39
100 - 250	20 - 39.99	49.2	99.98	99.47	99.38	98.92	98.72	98.33	97.77	97.45	96.73	96.11	85.54	60.38	38.14
100 - 250	≥ 40	13.8	99.94	99.86	99.83	99.74	99.48	99.17	98.79	98.74	98.16	97.82	90.46	61.07	37.52
250 - 500	2 - 5.99	60.8	99.99	99.99	99.99	99.99	99.99	99.99	99.98	97.57	85.72	76.70	25.89	10.93	6.06
250 - 500	6 - 9.99	79.4	99.99	99.99	99.99	99.99	95.97	87.00	74.77	64.74	64.69	63.03	34.94	14.37	7.44
250 - 500	10 - 19.99	175.1	100.00	100.00	97.57	94.03	91.79	90.01	87.89	84.41	80.13	75.71	38.55	14.54	6.24
250 - 500	20 - 39.99	98.8	99.88	98.26	98.03	97.08	95.90	94.37	91.75	89.60	86.70	83.48	49.48	17.90	6.76
250 - 500	≥ 40	27.9	98.78	98.39	98.27	97.68	96.99	96.07	94.47	93.18	91.38	89.06	57.84	25.31	11.09
500 - 1000	2 - 5.99	29.5	99.99	99.99	99.99	99.99	99.99	99.99	99.99	95.00	75.00	61.13	10.72	2.61	1.36
500 - 1000	6 - 9.99	51.0	99.98	99.98	99.98	99.98	78.31	49.23	30.85	19.39	19.37	17.19	5.54	2.72	1.82
500 - 1000	10 - 19.99	143.5	99.99	99.98	83.37	68.40	59.74	53.19	48.51	40.31	33.59	28.62	8.25	3.82	1.67
500 - 1000	20 - 39.99	166.1	99.77	94.52	93.10	88.58	81.64	73.97	62.98	55.69	47.42	41.00	11.05	2.98	1.27
500 - 1000	≥ 40	63.2	98.07	96.92	95.65	93.42	89.56	84.40	78.16	71.80	65.41	58.82	17.50	2.72	1.10
1000 - 2000	2 - 5.99	9.9	99.92	99.92	99.92	99.92	99.92	99.92	99.92	90.84	63.00	44.76	10.65	2.37	1.49
1000 - 2000	6 - 9.99	24.2	100.00	100.00	100.00	100.00	78.19	44.60	16.94	2.24	2.24	2.19	0.56	0.43	0.15
1000 - 2000	10 - 19.99	91.7	99.98	99.80	59.81	30.49	18.22	13.02	10.95	7.62	5.62	4.10	0.72	0.08	0.00
1000 - 2000	20 - 39.99	175.5	96.75	75.42	66.31	50.94	38.65	28.18	19.75	14.49	10.59	8.07	0.83	0.04	0.00
1000 - 2000	≥ 40	134.3	96.85	90.15	79.18	64.22	49.84	37.98	29.58	23.63	19.07	15.41	2.69	0.63	0.30
2000 - 5000	2 - 5.99	6.5	99.88	99.88	99.88	99.88	99.88	99.88	99.88	94.36	71.09	61.27	0.30	0.00	0.00
2000 - 5000	6 - 9.99	11.7	100.00	100.00	100.00	100.00	85.63	37.94	7.91	0.10	0.10	0.10	0.00	0.00	0.00
2000 - 5000	10 - 19.99	60.5	99.98	99.14	34.86	10.78	3.11	2.41	2.27	1.68	1.29	1.08	0.40	0.16	0.05
2000 - 5000	20 - 39.99	158.9	80.90	26.78	15.71	8.26	4.76	3.05	1.82	1.31	0.97	0.70	0.06	0.00	0.00
2000 - 5000	≥ 40	227.4	78.40	53.04	32.58	19.64	11.82	7.55	5.18	3.74	2.73	2.11	0.34	0.07	0.01

Panel C: Less than \$20,000

Cap \$ Million	Price \$	Ticker/Day	% of Ticker-Days with less than \$20,000 within 'x' basis points of the midpoint												
			1	2	3	4	5	6	7	8	9	10	20	35	50
< 100	2 - 5.99	244.0	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.99	99.98	99.79	98.45	96.55	93.85
< 100	6 - 9.99	94.2	100.00	100.00	100.00	100.00	99.93	99.66	99.54	99.37	99.37	99.28	98.38	94.44	88.70
< 100	10 - 19.99	92.8	100.00	100.00	99.86	99.77	99.61	99.58	99.50	99.47	99.39	99.24	97.10	92.18	85.52
< 100	20 - 39.99	19.2	99.98	99.86	99.86	99.81	99.75	99.73	99.63	99.61	99.50	99.42	98.33	94.48	89.01
< 100	≥ 40	1.6	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	98.51	92.06	82.63
100 - 250	2 - 5.99	144.2	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.96	99.48	98.57	87.70	73.41	60.60
100 - 250	6 - 9.99	108.1	100.00	100.00	100.00	100.00	99.74	99.22	98.19	97.62	97.62	97.51	92.76	78.87	63.97
100 - 250	10 - 19.99	146.0	100.00	99.99	99.74	98.97	98.60	98.56	98.40	98.24	97.95	97.71	91.45	75.50	59.35
100 - 250	20 - 39.99	49.2	99.99	99.79	99.73	99.44	99.35	99.18	99.03	98.74	98.42	98.21	93.52	78.81	60.93
100 - 250	≥ 40	13.8	100.00	99.94	99.94	99.86	99.86	99.71	99.60	99.54	99.20	98.76	95.35	76.73	53.26
250 - 500	2 - 5.99	60.8	100.00	100.00	100.00	100.00	100.00	100.00	100.00	98.79	91.82	86.29	49.38	27.55	16.58
250 - 500	6 - 9.99	79.4	99.99	99.99	99.99	99.99	98.79	95.68	89.76	84.22	84.18	83.63	63.58	35.94	22.40
250 - 500	10 - 19.99	175.1	100.00	100.00	99.11	97.84	97.32	96.87	96.33	95.28	93.69	91.85	65.50	35.89	20.13
250 - 500	20 - 39.99	98.8	99.95	99.05	98.97	98.64	98.32	97.77	96.76	96.07	94.95	93.53	71.45	37.54	18.89
250 - 500	≥ 40	27.9	99.19	98.88	98.85	98.39	98.20	97.71	97.24	96.66	95.99	95.07	74.82	39.59	19.84
500 - 1000	2 - 5.99	29.5	100.00	100.00	100.00	100.00	100.00	100.00	100.00	95.71	77.29	63.66	15.74	6.79	4.00
500 - 1000	6 - 9.99	51.0	99.99	99.99	99.99	99.99	86.11	64.30	48.57	37.76	37.72	36.09	14.76	5.36	3.30
500 - 1000	10 - 19.99	143.5	100.00	100.00	92.55	84.29	79.44	76.47	74.19	67.89	61.30	55.22	19.03	7.79	4.80
500 - 1000	20 - 39.99	166.1	99.94	97.77	97.55	96.43	94.25	90.83	85.20	80.31	73.45	66.52	24.27	6.99	3.09
500 - 1000	≥ 40	63.2	98.56	97.87	97.39	96.52	95.13	92.93	89.86	86.11	81.48	76.53	32.24	6.43	2.20
1000 - 2000	2 - 5.99	9.9	99.92	99.92	99.92	99.92	99.92	99.92	99.92	91.76	63.88	45.88	12.41	3.98	3.21
1000 - 2000	6 - 9.99	24.2	100.00	100.00	100.00	100.00	79.27	47.63	20.58	5.75	5.73	5.39	1.59	0.56	0.49
1000 - 2000	10 - 19.99	91.7	99.99	99.91	72.22	46.71	35.71	31.80	29.05	21.56	16.55	13.06	2.32	0.49	0.12
1000 - 2000	20 - 39.99	175.5	98.82	88.55	84.43	74.71	64.44	53.12	41.74	33.54	26.15	20.58	3.20	0.36	0.05
1000 - 2000	≥ 40	134.3	98.81	97.05	92.52	83.95	71.91	59.39	48.09	39.50	32.41	26.98	5.15	1.28	0.51
2000 - 5000	2 - 5.99	6.5	99.94	99.94	99.94	99.94	99.94	99.94	99.94	94.73	71.39	61.39	0.30	0.00	0.00
2000 - 5000	6 - 9.99	11.7	100.00	100.00	100.00	100.00	86.03	39.53	9.23	1.22	1.22	1.18	0.00	0.00	0.00
2000 - 5000	10 - 19.99	60.5	99.99	99.42	38.16	14.80	6.87	5.88	5.46	3.84	3.15	2.66	0.66	0.37	0.22
2000 - 5000	20 - 39.99	158.9	87.99	46.01	33.44	21.48	13.53	8.61	5.36	3.99	2.85	2.09	0.26	0.01	0.00
2000 - 5000	≥ 40	227.4	90.64	73.84	53.13	36.00	23.69	15.50	10.60	7.50	5.55	4.26	0.80	0.23	0.12

Panel D: Less than \$50,000

Cap \$ Million	Price \$	Ticker/Day	% of Ticker-Days with less than \$50,000 within 'x' basis points of the midpoint												
			1	2	3	4	5	6	7	8	9	10	20	35	50
< 100	2 - 5.99	244.0	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.85	99.39	99.04	98.59
< 100	6 - 9.99	94.2	100.00	100.00	100.00	100.00	99.97	99.81	99.73	99.63	99.63	99.58	99.23	98.43	97.08
< 100	10 - 19.99	92.8	100.00	100.00	99.91	99.89	99.80	99.76	99.73	99.71	99.69	99.62	99.03	97.44	95.24
< 100	20 - 39.99	19.2	100.00	99.96	99.96	99.94	99.88	99.86	99.86	99.83	99.77	99.77	99.48	98.66	96.94
< 100	≥ 40	1.6	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.26	95.53
100 - 250	2 - 5.99	144.2	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.94	99.80	97.20	94.05	90.11
100 - 250	6 - 9.99	108.1	100.00	100.00	100.00	100.00	99.87	99.71	99.38	99.27	99.26	99.21	98.45	95.65	90.77
100 - 250	10 - 19.99	146.0	100.00	100.00	99.85	99.36	99.20	99.20	99.17	99.13	99.11	99.04	97.92	93.96	87.92
100 - 250	20 - 39.99	49.2	100.00	99.91	99.86	99.75	99.73	99.64	99.60	99.42	99.35	99.21	98.22	94.83	89.03
100 - 250	≥ 40	13.8	100.00	100.00	100.00	99.97	99.97	99.91	99.89	99.89	99.89	99.83	98.59	94.92	86.53
250 - 500	2 - 5.99	60.8	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.78	97.71	96.01	79.16	63.50	47.66
250 - 500	6 - 9.99	79.4	99.99	99.99	99.99	99.99	99.73	99.31	98.21	96.82	96.80	96.76	92.13	75.21	57.72
250 - 500	10 - 19.99	175.1	100.00	100.00	99.67	99.20	99.14	99.10	99.07	98.96	98.78	98.60	93.58	76.44	58.38
250 - 500	20 - 39.99	98.8	99.99	99.51	99.49	99.33	99.24	99.15	98.92	98.81	98.57	98.38	93.30	77.97	62.60
250 - 500	≥ 40	27.9	99.63	99.32	99.32	99.12	98.95	98.74	98.65	98.52	98.34	98.13	92.36	74.67	54.57
500 - 1000	2 - 5.99	29.5	100.00	100.00	100.00	100.00	100.00	100.00	100.00	97.68	84.52	73.30	29.07	12.67	10.27
500 - 1000	6 - 9.99	51.0	99.99	99.99	99.99	99.99	95.01	87.61	80.48	74.01	74.00	73.67	48.35	23.40	11.90
500 - 1000	10 - 19.99	143.5	100.00	100.00	98.29	95.97	94.77	94.56	94.32	92.78	90.67	88.34	59.28	27.16	15.10
500 - 1000	20 - 39.99	166.1	99.98	98.86	98.82	98.72	98.62	98.33	97.75	97.23	96.31	95.06	66.43	31.21	17.67
500 - 1000	≥ 40	63.2	99.28	98.70	98.42	97.99	97.58	97.21	96.77	95.95	94.87	93.54	66.95	32.35	14.99
1000 - 2000	2 - 5.99	9.9	99.96	99.96	99.96	99.96	99.96	99.96	99.96	93.69	67.38	49.50	17.56	12.82	11.49
1000 - 2000	6 - 9.99	24.2	100.00	100.00	100.00	100.00	83.94	58.48	34.71	20.12	20.02	19.68	8.76	2.75	0.79
1000 - 2000	10 - 19.99	91.7	100.00	100.00	88.73	75.34	68.59	67.12	65.89	60.45	54.47	49.02	14.11	3.39	1.49
1000 - 2000	20 - 39.99	175.5	99.65	96.91	96.51	94.92	92.06	86.80	80.57	75.24	68.93	62.81	19.29	4.41	1.59
1000 - 2000	≥ 40	134.3	99.46	99.31	98.87	97.72	95.19	90.65	84.55	77.44	69.83	62.17	18.55	4.85	2.27
2000 - 5000	2 - 5.99	6.5	99.94	99.94	99.94	99.94	99.94	99.94	99.94	95.21	71.88	61.39	0.30	0.00	0.00
2000 - 5000	6 - 9.99	11.7	100.00	100.00	100.00	100.00	86.74	42.27	12.55	4.23	4.23	4.23	1.86	0.10	0.00
2000 - 5000	10 - 19.99	60.5	100.00	99.79	46.73	25.63	18.52	17.82	17.52	13.81	11.92	10.78	3.13	0.95	0.52
2000 - 5000	20 - 39.99	158.9	96.18	74.90	69.37	58.60	45.80	34.72	26.47	20.49	15.90	12.43	2.00	0.32	0.07
2000 - 5000	≥ 40	227.4	98.13	95.08	85.21	71.14	56.82	44.31	34.36	26.50	20.20	15.49	2.48	0.84	0.54