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Document title

**NYSE EURONEXT U.S. OPTIONS  
REPORT ON PENNY TRADING IN OPTIONS IN 2012**

Date

April 15, 2013

## EXECUTIVE SUMMARY

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NYSE Arca Inc. (“NYSE Arca” or “Exchange”) proposes to make permanent the Penny Pilot Program (“Pilot”) for the Exchange. This report underlines the proposal to revise the scope of symbols within the program by revealing that the benefits of the Pilot for Customers and all other market participants were concentrated in the 150 most active Penny Pilot issues (the “Top 150”). Thus, the Exchange seeks to improve the penny trading of options by adjusting the Pilot to include the 150 most active multiply listed options classes.

The analysis of the current program revealed the following key observations:

- Volume in Penny Pilot issues is concentrated in the Top 150, which represented 89.1% and 90.8% in 2011 and 2012, respectively
- The Pilot issues outside of the Top 150 (“Bottom 203”) underperformed equity options industry volume by 14.7 percentage points
- Significantly greater overhead for quote activity from Bottom 203, showing over 270% more quotes per contract executed than the Top 150 in the period studied<sup>1</sup>
- Widening of minimum price variation (“MPV”) in some issues is not a concern given currently available mechanisms for price improvement

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<sup>1</sup> The quote to volume ratio analysis was conducted with the OCC and S3 data from January 2012 to October 2012, inclusive. Please see the Methodology section for a more detailed discussion on methodology.

## METHODOLOGY

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This report compiles four analyses: i) volume performance of Pilot issues in relation to industry volume, ii) quote to volume ratios comparison of Pilot issues and issues outside of the Pilot excluding proprietary and index options (“Nonpenny”), iii) comparison of percentage of volumes between Pilot and Nonpenny issues receiving price improvement, and iv) size and spread at NBBO of Pilot issues. The analyses attempt to determine the effectiveness of the Pilot within the full range of the Pilot issues.

### i. Volume performance of Pilot issues in relation to industry volume

In order to compare volume growth from 2011 to 2012 of Pilot issues, the list of Pilot issues must be taken as of the end of 2012 in order to capture the subset of most actively traded Pilot issues within the preceding two years. The updated list of Pilot issues in January 2013 was not used as newly updated symbols would not have traded with a \$0.01 MPV, so a list of Pilot issues as of December 2012 was used. Correspondingly, Pilot issues added after January 2011 were removed from the list as well as Pilot issues with underlyings subject to extenuating circumstances.<sup>2</sup> Therefore, for the purpose of this study, the total number of 363 Pilot issues was adjusted to 353 Pilot issues (the “Pilot List”).

In order to generate the Top 150, the Pilot List was ranked by volume for 2012. While the Exchange recognizes the possibility of success bias inherent in the Top 150 as a result of a backwards-looking ranking process, the comparisons across different segments of options classes were performed in a consistent manner, i.e., all rankings of Pilot and Nonpenny issues in the subsequent quote-to-volume ratio analysis were conducted similarly.

Volume performances of Pilot issues were compared to equity options industry volume. While it is noted that one index options exists in the Pilot (Mini-NDX Index Options “MNX”), the thematic trends of equity options prevail in the data set given only one exception.

### ii. Quote-to-volume ratios comparison of Pilot and Nonpenny issues

For the purpose of maintaining consistency across analyses, the ratios of quotes to volumes for the Pilot List, i.e., the adjusted set of 353 Pilot issues, were generated using the rankings devised in the first analysis. The list of Nonpenny issues was taken as of the end of 2012; underlying issues which had undergone an initial public offering after January 2011 were excluded from the analysis on a best efforts basis, e.g., FB, GRPN, LNKD, etc. In order to make a fair comparison between the most active names in the Pilot List and those outside of the Pilot, the remaining list of Nonpenny issues were ranked similarly by 2012 volumes to obtain the top 200 most actively traded Nonpenny issues (“Nonpenny Top 200”). Accordingly, the activity and behavior of these issues in the Nonpenny Top 200 may reflect those of Pilot issues if removed from the Pilot.

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<sup>2</sup> For a list of Pilot issues removed from this study, please see Appendix I.

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The quote to volume ratio is the sum of the BBO bids and BBO asks per month per ranked segment divided by the volume in contracts of the respective segment in the Pilot List or Nonpenny Top 200, accordingly. These ratios were then mapped over time from January to October 2012.

iii. Comparison of percentage of volume between Pilot and Nonpenny issues receiving price improvement

As an indicative example of the many price improvement mechanisms available throughout the industry, the Boston Options Exchange (“BOX”) Price Improvement Period (“PIP”) auction data was used to compare the percentage of volume that received price improvement between symbols of a \$0.01 MPV versus symbols of a \$0.05 MPV. Using PIP Fee Pilot Reports<sup>3</sup> provided by BOX, the percentage of total volume entering PIP auctions which received price improvement over the NBBO, i.e., greater than but not equal to the NBBO, was calculated from the data provided. Given the most recent data available, the period of December 2012 to February 2013 was used in this analysis.

iv. Size and spread at NBBO of Pilot issues

The analysis of size and spread at NBBO of Pilot issues is compiled from the most recent Penny Pilot report conducted by NYSE Arca as part of a commitment to the Securities and Exchange Commission (“SEC”). The methodology is described in the report and relayed here.

“Based on the request of SEC staff, the Pilot stocks were broken into 3 groups for analysis. One group consists of the 10 least active securities of the original 63 added to the Pilot to be used as a Control Group. A second group consists of the 10 most active securities added to the Pilot. The last group consists of the 20 least active securities added to the Pilot. The mean or average results for each group were then used to make observations over time about the behavior of each group.”<sup>4</sup>

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<sup>3</sup> BOX PIP Fee Pilot Reports can be found on their website: <http://boxexchange.com/regulatory-circulars/pilot-reports/>

<sup>4</sup> Armstrong, Peter. “Arca Penny Pilot Report Oct 2011 to April 2012”. Penny Pilot Report IX, May 23, 2012. April 12, 2013. <https://globalderivatives.nyx.com/en/nyse-arca-options/penny-pilot>

## ANALYSES AND RESULTS

*The Bottom 203 Pilot issues lagged significantly in volume performance relative to industry volume in 2012*

From 2011 to 2012, trading volumes in the Top 150 declined 11.6%, whereas the Bottom 203 declined 26.9%. Given a year-over-year decline in equity options industry volume of 12.2%, the Bottom 203 underperformed the industry by 14.7 percentage points. Thus, the Bottom 203 lagged significantly in volume performance.

Within the subset of Customer participant type volume, the ranked segments of the Pilot List performed similarly to the segments of all participant types. The Customer volume of the Bottom 203 also underperformed the industry total Customer volume by 14.7 percentage points.

Additionally, the Exchange found that volumes in Pilot issues were concentrated in the Top 150, which represented 89.1% and 90.8% in 2011 and 2012, respectively.

Pilot List			
All Participants (ADV contracts)			
Pilot Rank	2011	2012	Y/Y
1-50	9,861,092	8,659,920	-12.2%
51-100	1,650,089	1,571,993	-4.7%
101-150	1,020,955	845,338	-17.2%
150-200	614,717	524,971	-14.6%
200+	919,947	597,548	-35.0%
<b>Top 150</b>	<b>12,532,136</b>	<b>11,077,251</b>	<b>-11.6%</b>
<b>151-353</b>	<b>1,534,664</b>	<b>1,122,519</b>	<b>-26.9%</b>
All Pilot Options	14,066,799	12,199,770	-13.3%
<b>Industry</b>	<b>16,764,304</b>	<b>14,727,283</b>	<b>-12.2%</b>
Customer (ADV contracts)			
Penny Rank	2011	2012	Y/Y
1-50	3,760,630	3,245,275	-13.7%
51-100	579,849	560,237	-3.4%
101-150	398,569	327,713	-17.8%
150-200	214,655	193,875	-9.7%
200+	364,440	229,533	-37.0%
<b>Top 150</b>	<b>4,739,048</b>	<b>4,133,225</b>	<b>-12.8%</b>
<b>151-353</b>	<b>579,095</b>	<b>423,409</b>	<b>-26.9%</b>
All Pilot Options	5,318,143	4,556,634	-14.3%
<b>Industry</b>	<b>6,420,935</b>	<b>5,629,641</b>	<b>-12.3%</b>

*The most inefficient quote traffic is generated in the least active issues in the Pilot List*

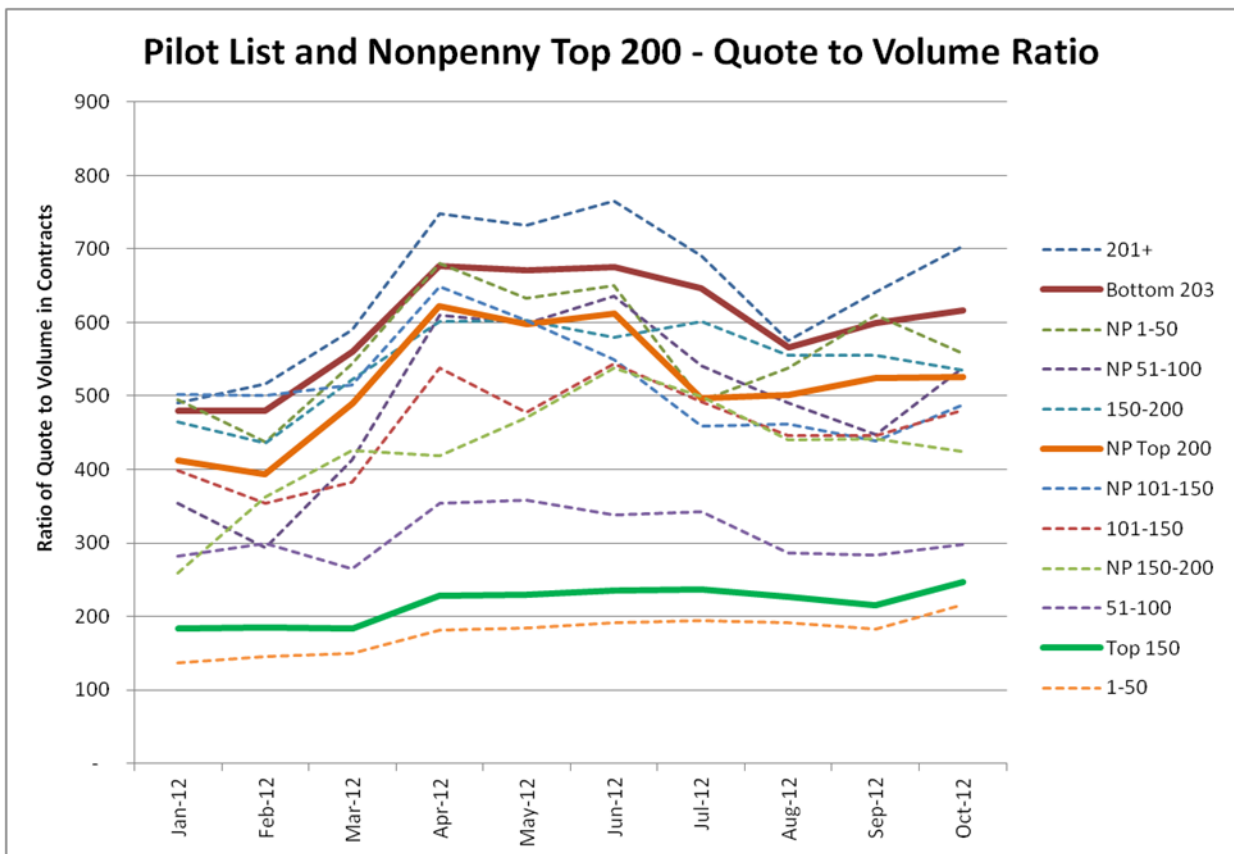
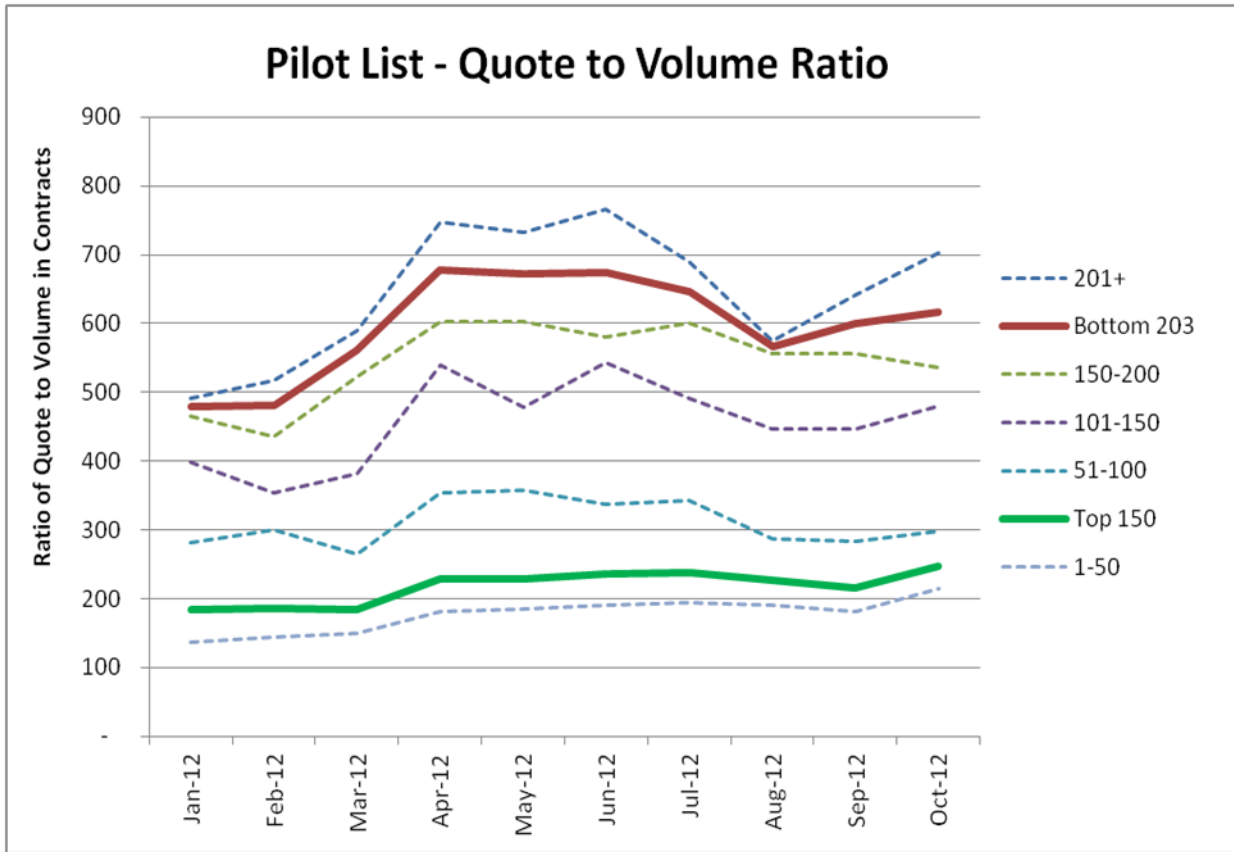
In Pilot issues, the quote-to-volume ratio of the Bottom 203 was significantly higher than that of the Top 150. From the period of January 2012 to October 2012, the total quote-to-volume ratio of the Bottom 203 was 589 quotes per contract, which is over 270% greater than the 216 quotes per contract generated by the Top 150 in the same period. In comparison, the top 50 ranked most actively traded issues from the Pilot List saw 176 quotes per contract. As a result, the analysis suggests a relationship between the reduced MPV and high quote traffic per contract in less active issues of the Pilot List. In the Nonpenny Top 200, the quote-to-volume ratio in the same period shows 514 quotes per contract, which suggests that the most liquid issues outside of the Pilot were 12.7% more efficient than the Bottom 203.<sup>5</sup>

Quote-to-volume ratio		
	Segment	Quote/Contract
Pilot List	Top 50	176
	Top 150	216
Nonpenny Top 200		514
Pilot List	Bottom 203	589

If GOOG options were excluded from the data, the quote-to-volume ratio of the Nonpenny Top 200 would become even more efficient, decreasing to 475 quotes per contract transacted in this category. As such, the most liquid symbols outside of the Pilot excluding GOOG is 19.4% more efficient than the Bottom 203.

<sup>5</sup> For the full comparison of quote-to-volume ratios of all segments of the Pilot List and Nonpenny Top 200, please see the table in Appendix II

NYSE Euronext U.S. Options Report on Penny Trading in Options in 2012



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*Price improvement is far more frequent in Nonpenny series*

Price improvement mechanisms currently available may offset any retail or investor concerns regarding the widening of spreads of issues taken out of the Pilot. Data from the BOX PIP auction mechanism compares the percentage of price improvement over the NBBO received by series with an MPV of \$0.05 versus an MPV of \$0.01. The analysis shows that 69.2% of contracts submitted in series with a \$0.05 MPV received price improvement over the NBBO, while only 17.4% of contracts submitted in series with \$0.01 MPV were price improved over the NBBO, from the period of December 2012 to February 2013. This result suggests that options series outside of the Pilot with an MPV of \$0.05 were much more likely to receive price improvement on BOX.

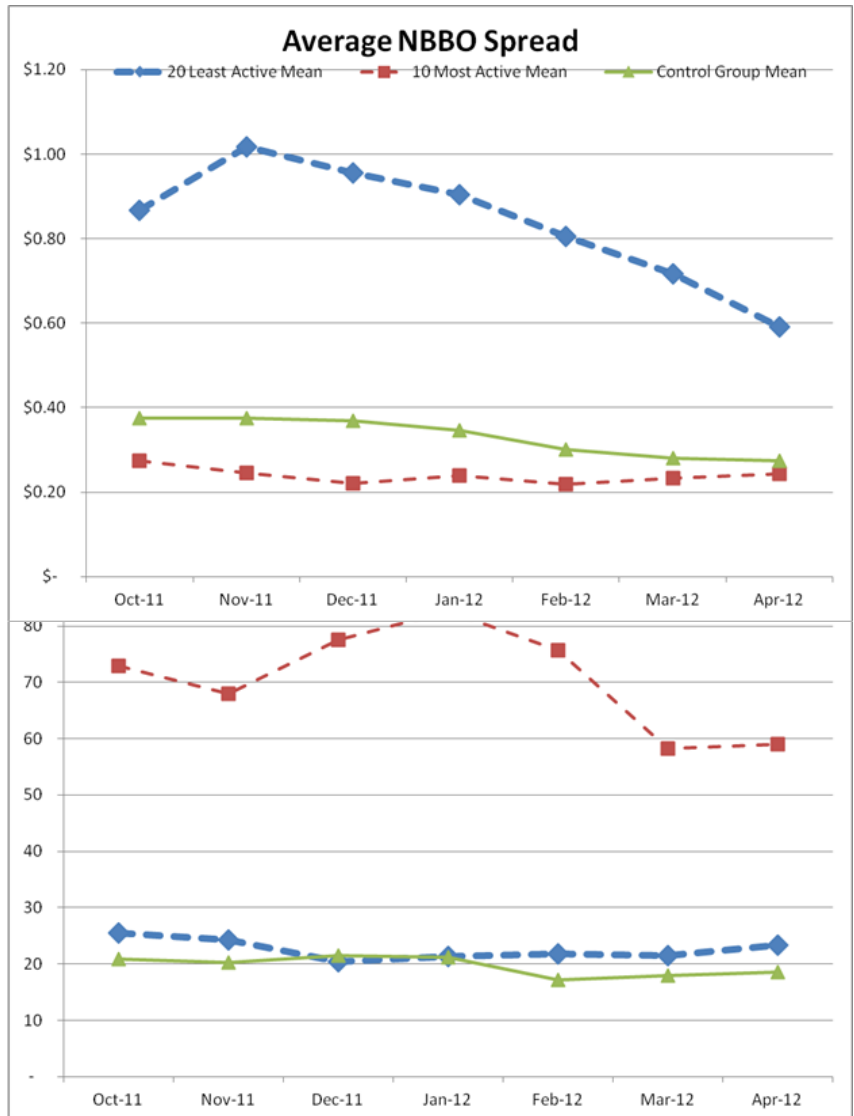
<b>Percent of Total BOX PIP Volume Receiving Price Improvement Over NBBO</b>			
December 2012			
% Contracts Improved By:	Series with MPV		All Series
	\$0.01	\$0.05	
Initiator	16.2%	67.4%	31.9%
Directed MM	18.1%	84.7%	20.1%
Other	16.2%	71.1%	39.3%
% Monthly Total PIP Volume Receiving Price Improvement Over NBBO	<b>16.3%</b>	<b>69.3%</b>	34.9%
January 2013			
% Contracts Improved By:	Series with MPV		All Series
	\$0.01	\$0.05	
Initiator	17.6%	63.1%	36.8%
Directed MM	14.7%	86.0%	17.1%
Other	15.4%	71.1%	38.7%
% Monthly Total PIP Volume Receiving Price Improvement Over NBBO	<b>16.4%</b>	<b>67.0%</b>	37.1%
February 2013			
% Contracts Improved By:	Series with MPV		All Series
	\$0.01	\$0.05	
Initiator	23.0%	68.4%	42.5%
Directed MM	8.9%	86.6%	11.2%
Other	17.9%	75.0%	41.9%
% Monthly Total PIP Volume Receiving Price Improvement Over NBBO	<b>19.8%</b>	<b>71.6%</b>	41.1%
Dec 2012 - Feb 2013 Combined			
% Contracts Improved By:	Series with MPV		All Series
	\$0.01	\$0.05	
Initiator	18.6%	66.1%	36.8%
Directed MM	13.0%	86.0%	15.3%
Other	16.4%	72.3%	39.9%
% 3-month Total PIP Volume Receiving Price Improvement Over NBBO	<b>17.4%</b>	<b>69.2%</b>	37.6%

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*Increasing tick size in least active names is unlikely to materially impact spreads*

Within the period of October 2011 to April 2012, Pilot issues traded at spreads much greater than a nickel despite the MPV of \$0.01. In April 2012, the 10 most active names at the time traded at an average spread of \$0.25 at NBBO compared to \$0.60 spread at NBBO for the 20 least active names. Given the already apparent wide quotes, a change in the MPV for these least active names will likely have no material impact on spreads.

Despite a wider spread in the 20 least active names, the average size at NBBO of this subset was less than 25 contracts in April 2012. Throughout the period of this analysis, the size at NBBO of the 20 least active names remained below 30 contracts, despite a consistently wider spread in comparison to the 10 most active names of the time. This small size at NBBO suggests that liquidity could be improved if minimum trading increments were increased.





## APPENDIX I

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The following issues in the Penny Pilot program at the end of 2012 were removed from the analysis due to the underlying symbol listing after January 2011.

	<u>Symbol</u>	<u>Date Added</u>
1	<b>AGNC</b>	Jan. 4, 2012
2	<b>LULU</b>	Jan. 4, 2012
3	<b>SINA</b>	Jan. 4, 2012
4	<b>KMI</b>	July 3, 2012
5	<b>ZNGA</b>	July 3, 2012
6	<b>RVBD</b>	July 6, 2011
7	<b>FFIV</b>	July 6, 2011
8	<b>GM</b>	July 6, 2011
9	<b>MCP</b>	July 6, 2011

The underlying **YRCWD** was also removed due to a 1-for-300 reverse common stock split on December 9, 2011 which caused volumes to drop from an ADV of 13,010 contracts in 2011 to an ADV of 6 contracts in 2012. As the most drastic decline in volume from 2011 to 2012, YRCWD was removed from the Pilot List, for a total of 10 issues removed from the Pilot for the purposes of this study.

## APPENDIX II

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The table below shows the quote-to-volume ratios of all segments of the Pilot List and Nonpenny Top 200, ranked in descending ratio order in October 2012.

Segments of the Pilot List are highlighted in green, while Nonpenny Top 200 segments are highlighted in gray. The key segments of Top 150 and Bottom 203 in the Pilot List and the Nonpenny Top 200 are highlighted in yellow.

Quote to Volume, in contracts											
	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Jan-Oct 2012
201+	491	516	590	748	732	766	691	575	642	704	631
<b>Bottom 203</b>	<b>480</b>	<b>480</b>	<b>560</b>	<b>677</b>	<b>672</b>	<b>675</b>	<b>647</b>	<b>566</b>	<b>600</b>	<b>617</b>	<b>589</b>
NP 1-50	495	437	543	681	633	650	493	539	610	558	564
NP 51-100	354	293	412	611	599	635	541	490	447	539	476
150-200	465	436	522	602	603	580	601	556	556	536	541
<b>NP Top 200</b>	<b>412</b>	<b>393</b>	<b>489</b>	<b>622</b>	<b>598</b>	<b>613</b>	<b>497</b>	<b>502</b>	<b>524</b>	<b>526</b>	<b>514</b>
NP 101-150	502	500	515	649	603	549	458	462	438	487	516
101-150	399	354	382	539	478	544	492	446	446	481	448
NP 150-200	260	362	426	419	470	538	500	441	442	425	411
51-100	282	299	265	354	358	338	342	286	283	298	309
<b>Top 150</b>	<b>183</b>	<b>185</b>	<b>184</b>	<b>228</b>	<b>229</b>	<b>236</b>	<b>237</b>	<b>226</b>	<b>216</b>	<b>246</b>	<b>216</b>
1-50	137	145	149	182	184	191	194	191	182	215	176