



Understanding Economic and Capacity Impacts of the Options Penny Pilot

Post 3: September 28, 2007 – January 31, 2008

**NYSE Arca Options
February 29, 2008**

Summary

NYSE Arca finds that the third phase (Post 3) of the Penny Pilot program continues to demonstrate the overall success of the program. Customers have benefited from greatly reduced spreads, liquidity has been sufficient and trading systems and exchanges have functioned without incident.

Prior to the launch of the Penny Pilot, there were concerns that liquidity at the disseminated market would become so fragmented that orders would not be filled in their entirety at the disseminated price. NYSE Arca conducted an analysis of order size as it compares to Top of Book liquidity and found that 97% of Customer orders and 99% of Firm orders could be filled in their entirety at the NYSE Arca disseminated market.

The narrowest possible spread between the bid and ask provides a substantial benefit to customers. In the original thirteen Penny Pilot issues, the national volume-weighted average spread for penny series declined 56% from the pre-pilot period. Nickel series declined 16% for the same period. For the 22 new issues, the penny series declined 52% and nickel series declined 31%.

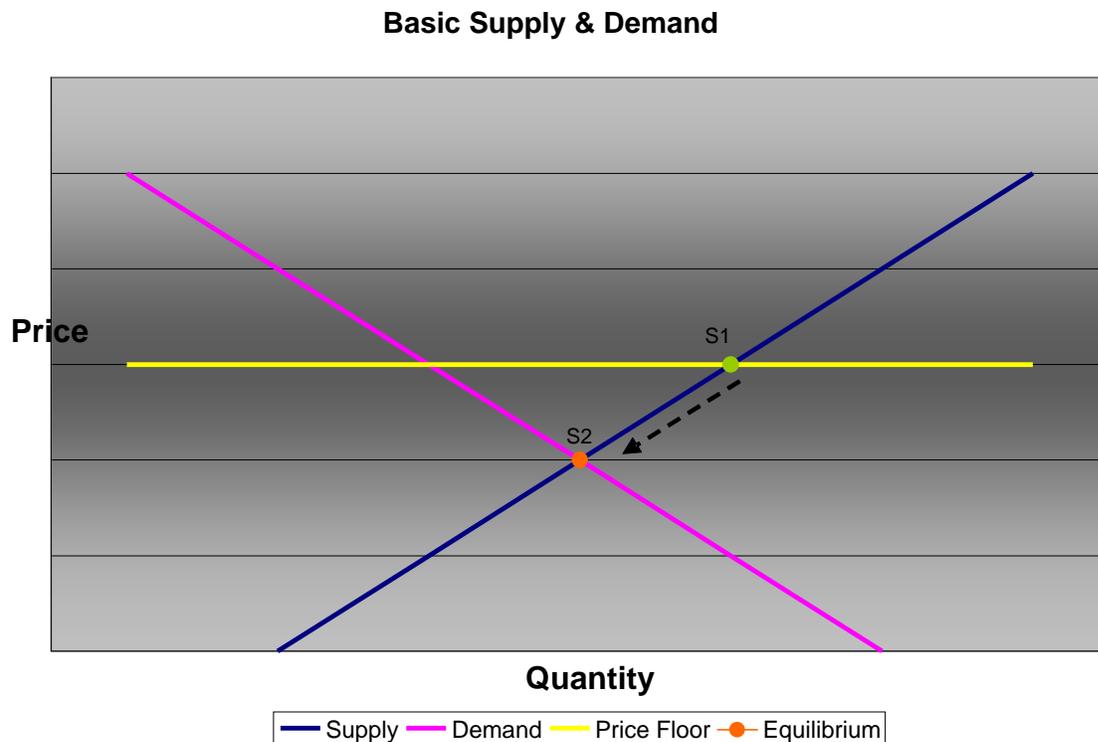
NYSE Arca's quote mitigation policy is highly effective and quantifiable. On average, over 26.5 million quotes per day were mitigated during the Post 3 period, representing approximately 9% of the Exchange's total. Over 40,750 series were mitigated, representing 21% of the total series traded on the Exchange.

Over the past several months, OPRA has met the demands of the Penny Pilot by greatly increasing capacity. While new peaks have occurred in January 2008, there have not been any significant operational or system-related problems. This is particularly noteworthy when one considers the market conditions under which the Penny Pilot has been conducted. The equity and options markets have experienced unprecedented volume and volatility, providing the ultimate test for system performance.

Supply and Demand

One of the conclusions that have been drawn from the movement to penny increment pricing in options is the decline in “top of book” liquidity. This is an accurate representation of what has developed. However, the significant decline in the spread between the bid and offer and the resulting increased volume in the Penny Pilot provides the support and proof that the implementation of the Penny Pilot has extensively benefited the market place. These two distinguishing factors highlight the true benefits of the Penny Pilot.

Liquidity is the market reaction to the basic economic concept of supply and demand. Prior to the Penny Pilot, a price support level was set arbitrarily above the equilibrium of supply and demand. In trading, the price is the spread between the bid/ask and supply is the liquidity available at a price. During the Penny Pilot, the price (spread) decreased over 50% for the penny increment series and has remained there for the duration of the pilot. The difference between pre-pilot minimum spreads and market determined post pilot spreads demonstrates how far the price floor was set above equilibrium. While supply and demand can take many forms, a basic rendition can illustrate how price floors lead to excess supply.



The graph above depicts a price floor representing the minimum spread prior to the Penny Pilot. The market reaction to a price floor set above equilibrium is to supply more (liquidity) than the market demands, note point S1 in the graph. We know from the pilot data that the market determined price (bid ask spread) is much lower, and the reaction to the price floor removal is a reduction in supply, note point S2 in the graph.

A second supply (liquidity) compounding factor must be considered when comparing the Penny Pilot's impact to top of book liquidity. Market maker pro-rata allocation incentivizes liquidity providers to quote maximum size. The incentive to quote large size is typically mitigated by the risk of trading the entire display size or pricing errors; however in an environment with price floor protection, the price risk of over sizing of market maker quotes is mitigated considerably thereby allowing market makers to quote size that they would not otherwise display in a competitive price environment. The removal of the price floor for Penny Pilot issues resulted in the elimination of a price protection in a pro-rata allocation structure, thereby compounding the decline in top of book supply (liquidity).

One measure to determine if there is enough supply (liquidity) to meet demand would be to review Penny Pilot volumes, which are in fact growing at double the rate of the industry volumes excluding Penny Pilot issues. For a full discussion of volumes please refer to the volume section of this report.

Order Size and Top of Book Liquidity

For purposes of this report, “Top of Book” liquidity is defined as the volume of contracts available at the NYSE Arca Best Bid or Offer. This is an important aspect of quote quality and determines whether or not incoming orders can be filled in their entirety at the Exchange’s disseminated quote.

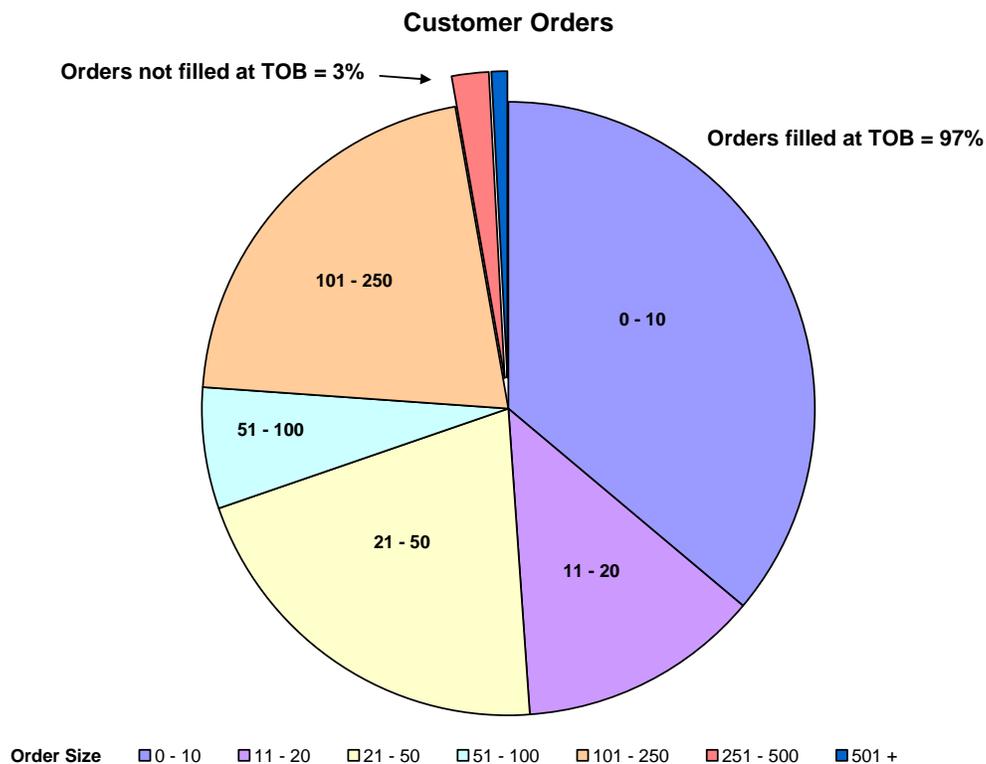
NYSE Arca examined the order size of Customer and Firm orders for the original 13 issues during the Post 3 period. Order sizes were broken down into the following categories: 0 - 10 contracts, 11 - 20 contracts, 21 - 50 contracts, 51 - 100 contracts, 101 - 250 contracts, 251 - 500 contracts and greater than 500 contracts. The number of orders in each category was tabulated and a daily average derived.

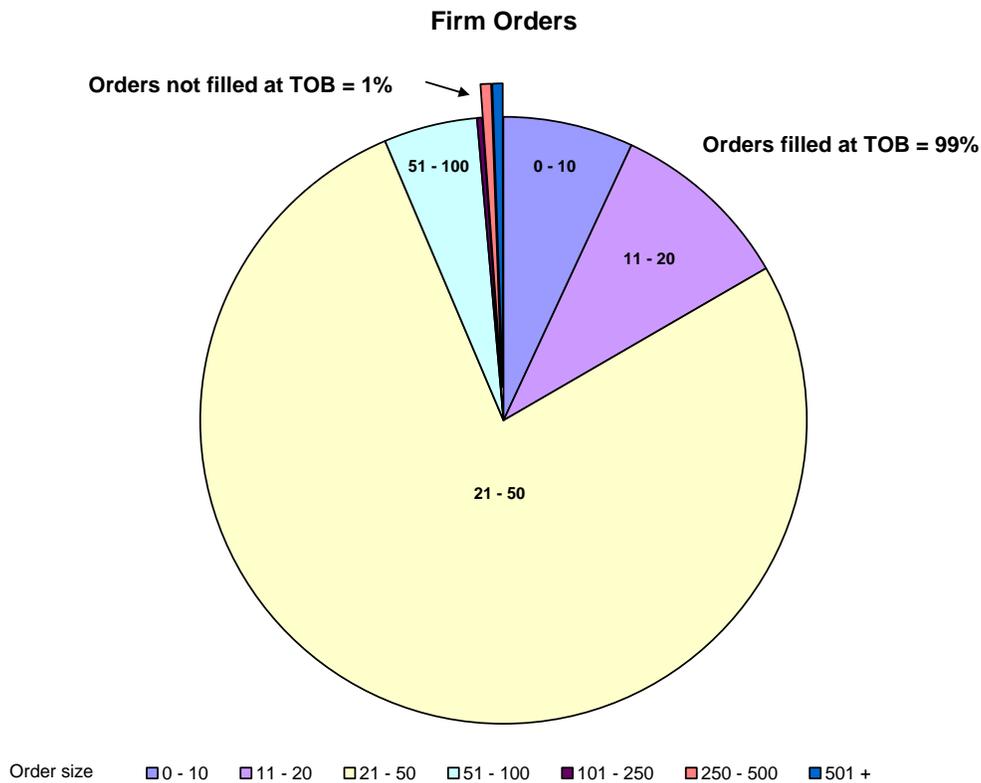
The average NYSE Arca Top of Book liquidity for this period was as follows:

Penny Series = 527 contracts

Nickel Series = 381 contracts

In the case of Customer orders, 97% could be filled at the Top of the Book. For Firm orders, the number was 99%. The following charts illustrate order size and the percentage of customer and firm orders that could be filled at the Top of the Book.





Since the liquidity available at the Top of the Book varied for Penny vs. Nickel series and because the order size categories did not exactly coincide with these numbers, the cut-off point was deemed to be orders of 250 contracts or greater.

Appendix A provides a breakdown of the daily average of orders received in each category for the 13 original issues.

Appendix B provides a breakdown of the daily average of orders receive in each category for the 22 new issues. TOB data was not available for these issues for this report but will be included in the next report.

National Volume-Weighted Average Spread

The National Best Bid and Offer (NBBO) for issues in the Penny Pilot were compiled using disseminated quotes from all six options exchanges. The difference between the bid and offer is referred to as the average spread; the tighter the spread the better for the customer. Since the pilot launched, the average spread has decreased dramatically providing substantial cost savings to all option traders.

Rather than use a simple average, NYSE Arca utilized a volume-weighted spread calculation for this report. This calculation includes the volume of each quote and gives proportional weight to each spread width calculation based on the volume of the quote.

The following table documents the change in the average spread of the original 13 issues and compares the current period (Post 3) to the Pre-Pilot spread.

Penny Series						Nickel Series				
Stock	Pre Pilot	Post 1	Post 2	Post 3	% Change	Pre Pilot	Post 1	Post 2	Post 3	% Change
A	0.10	0.05	0.05	0.04	58%	0.19	0.14	0.15	0.15	24%
AMD	0.07	0.04	0.04	0.03	60%	0.16	0.13	0.17	0.15	8%
CAT	0.08	0.05	0.05	0.04	53%	0.17	0.13	0.15	0.15	11%
FLEX	0.08	0.04	0.05	0.03	57%	0.14	0.13	0.17	0.13	4%
GE	0.07	0.03	0.03	0.03	57%	0.16	0.11	0.13	0.13	20%
INTC	0.06	0.03	0.03	0.02	62%	0.14	0.10	0.12	0.11	26%
IWM	0.08	0.04	0.04	0.03	58%	0.19	0.13	0.14	0.13	32%
MSFT	0.06	0.03	0.03	0.02	61%	0.13	0.10	0.13	0.12	12%
QQQQ	0.06	0.03	0.02	0.02	60%	NA	NA	NA	NA	NA
SMH	0.07	0.04	0.04	0.05	37%	0.14	0.11	0.12	0.14	-3%
TXN	0.07	0.04	0.04	0.03	56%	0.16	0.11	0.14	0.12	26%
WFMI	0.08	0.03	0.05	0.04	49%	0.20	0.12	0.16	0.15	26%
Average	0.07	0.04	0.04	0.03	56%	0.15	0.11	0.13	0.12	16%

All issues have seen substantial decreases compared to pre-pilot spread widths, with an average decrease of 56% for penny series and 16% for nickel series. During the Post 1 Period, spread widths declined substantially from the Pre-Pilot numbers. The Post 3 Period saw a further decrease in penny series, with many issues trading in \$.02 increments.

The following table documents the change in the average spread of the 22 issues added on September 28, 2007 and compares the current period (Post 3) to the Pre-Pilot spread. The average savings was 52% for penny series and 31% for nickel series.

Penny Series

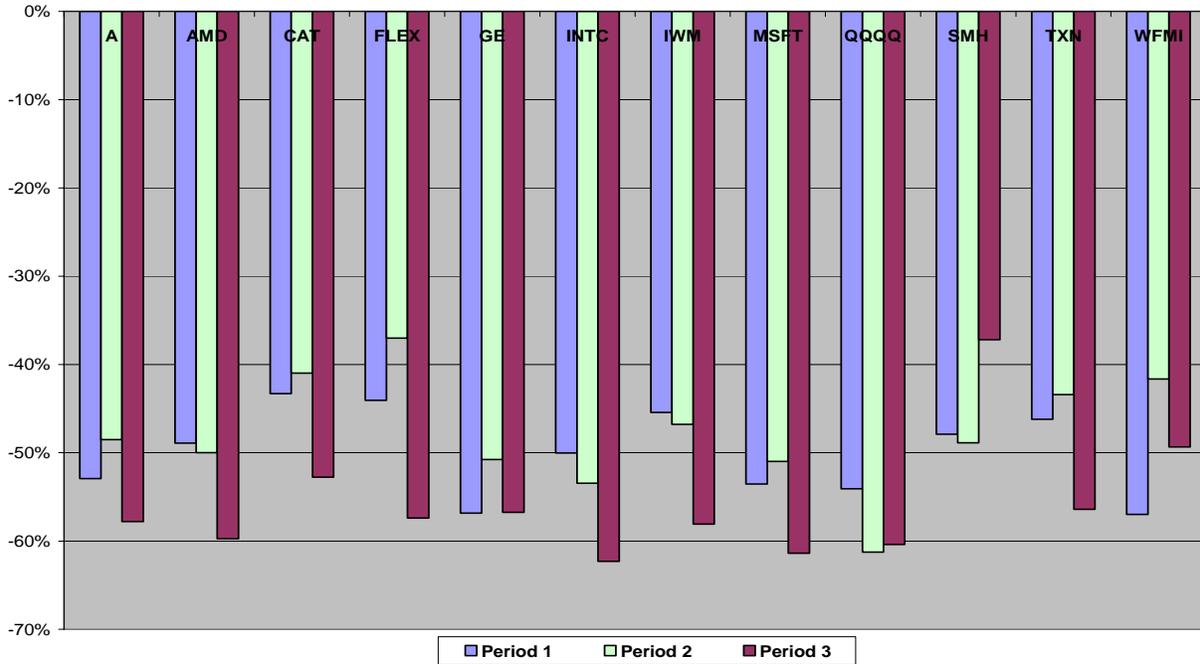
Stock	Pre Pilot	Post 3	% Change
AAPL	0.08	0.04	44%
AMGN	0.10	0.04	58%
AMZN	0.09	0.05	45%
BMJ	0.09	0.03	60%
C	0.10	0.04	60%
COP	0.10	0.04	55%
CSCO	0.07	0.03	65%
DIA	0.11	0.05	58%
DNDN	0.09	0.06	35%
FCX	0.13	0.08	37%
GM	0.09	0.04	57%
MO	0.08	0.04	52%
MOT	0.08	0.03	64%
NYX	0.12	0.08	37%
OIH	0.11	0.09	18%
QCOM	0.09	0.03	64%
RIMM	0.11	0.05	51%
SPY	0.09	0.04	60%
T	0.08	0.03	61%
XLE	0.10	0.05	49%
XLF	0.10	0.04	61%
YHOO	0.08	0.03	62%
Average	0.10	0.05	52%

Nickel Series

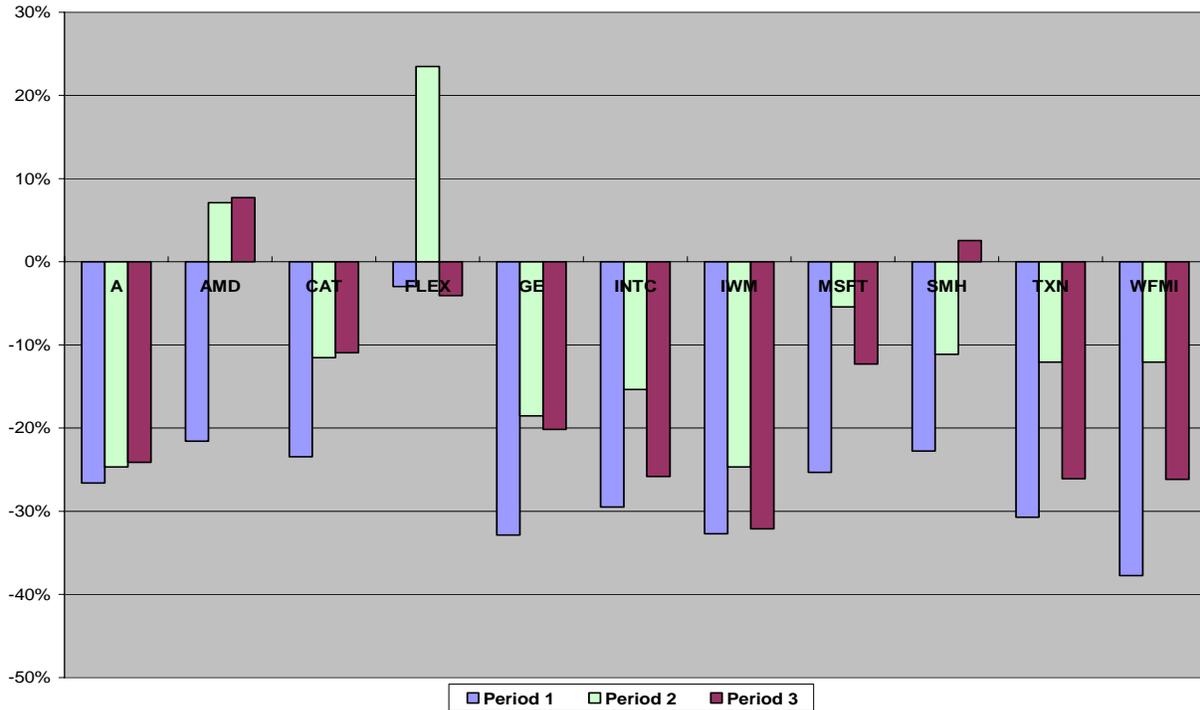
Pre Pilot	Post 3	% Change
0.20	0.15	27%
0.23	0.17	26%
0.22	0.15	31%
0.21	0.13	37%
0.26	0.17	34%
0.24	0.18	26%
0.19	0.11	40%
0.24	0.16	34%
0.23	0.19	15%
0.35	0.26	25%
0.23	0.17	28%
0.23	0.17	29%
0.20	0.13	36%
0.27	0.21	24%
0.23	0.22	7%
0.21	0.13	39%
0.29	0.16	45%
0.21	0.13	40%
0.22	0.14	36%
0.21	0.15	30%
0.21	0.15	31%
0.20	0.13	39%
0.23	0.16	31%

The following charts illustrate the percent change in spread widths for the original 13 issues for all three phases of the Penny Pilot.

Percent Change in Volume Weighted Average Spread – Penny Series



Percent Change in Volume Weighted Average Spread – Nickel Series



Quote mitigation

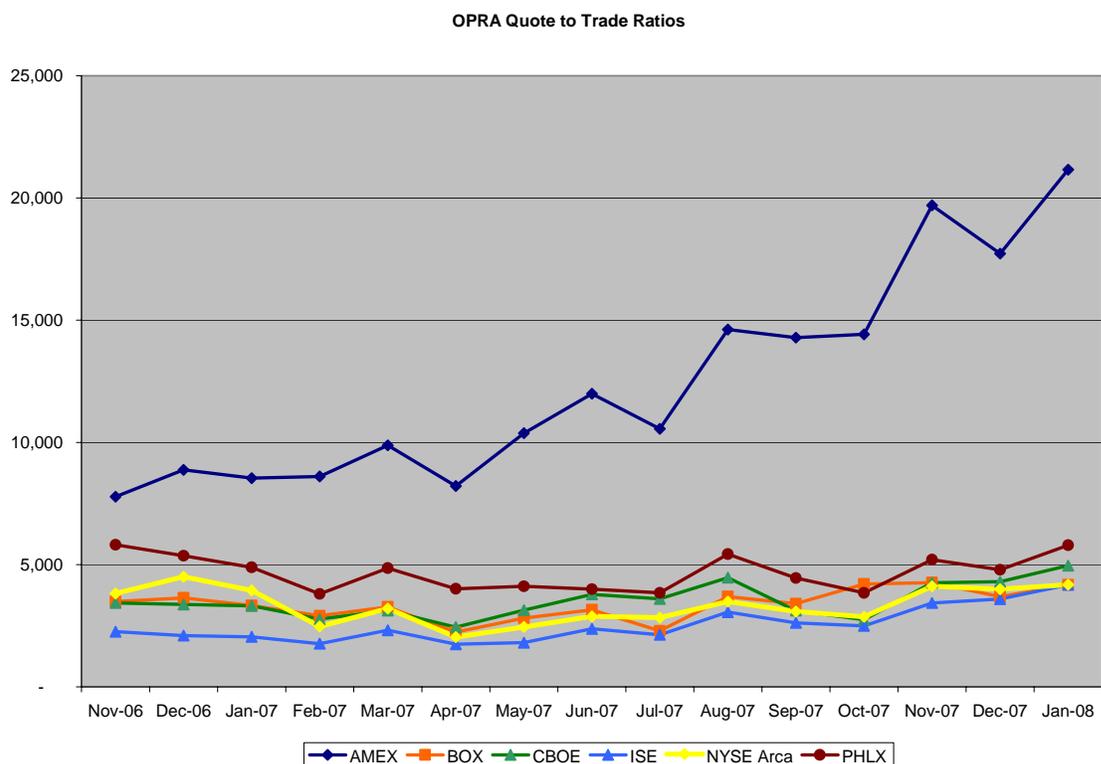
NYSE Arca's quote mitigation policy is highly effective and quantifiable. It is based on the premise that quotes in inactive series are less valuable than those in active series. Active options series are defined as the following:

- the series has traded on any options exchange in the previous 14 calendar days; or
- the series is solely listed on NYSE Arca; or
- the series has been trading 10 days or less; or
- the Exchange has an order in the series.

Series that fall outside of these categories are deemed inactive, and the Exchange does not disseminate quotes to OPRA. If the series trades on any exchange or if NYSE Arca receives an order or request for a quote, then the series is activated and quote dissemination is resumed. This policy applies to all issues listed on the Exchange, not just issues included in the Pilot Program.

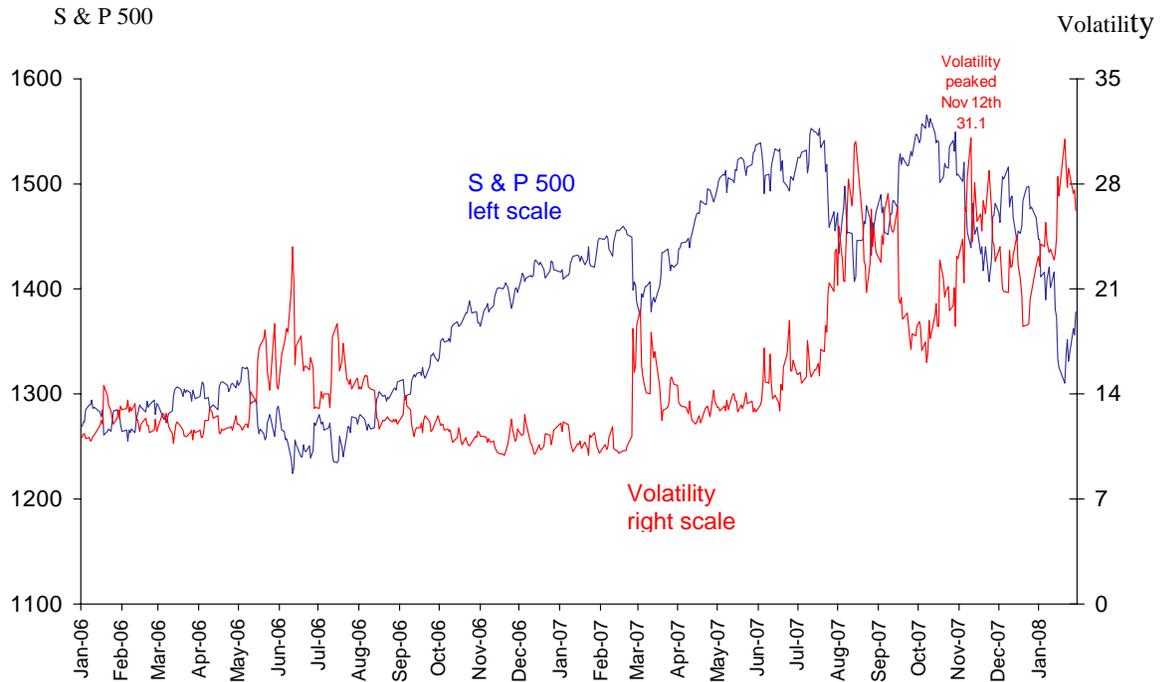
On average, over 26.5 million quotes/day were mitigated during the Post 3 period of the Penny Pilot. This represents approximately 9% of the exchanges total quote traffic. Similar savings were achieved with series mitigation. On average, 40,750 series/day were mitigated, representing approximately 21% of all series traded on the exchange.

Quote to trade ratio is an effective measurement of an exchange's quoting efficiency and utilization of OPRA capacity. The quote-to-trade ratio indicates the usefulness of the information being distributed. A high ratio indicates quote traffic that does not present meaningful opportunities to trade; a low ratio indicates desirable pricing information that spurs transactions. The graph below represents the ratios for all six option exchanges for the past several months, including the period of time prior to the launch of the Penny Pilot.



With the exception of the AMEX, it is clear that all other exchanges have maintained or reduced their quote to trade ratios.

This is particularly impressive when you consider the growth in options volume and equity market volatility during the Penny Pilot. The equity markets have experienced unprecedented volatility and this has a direct impact on the options markets. The table below illustrates equity market volatility for the pre and post pilot periods.

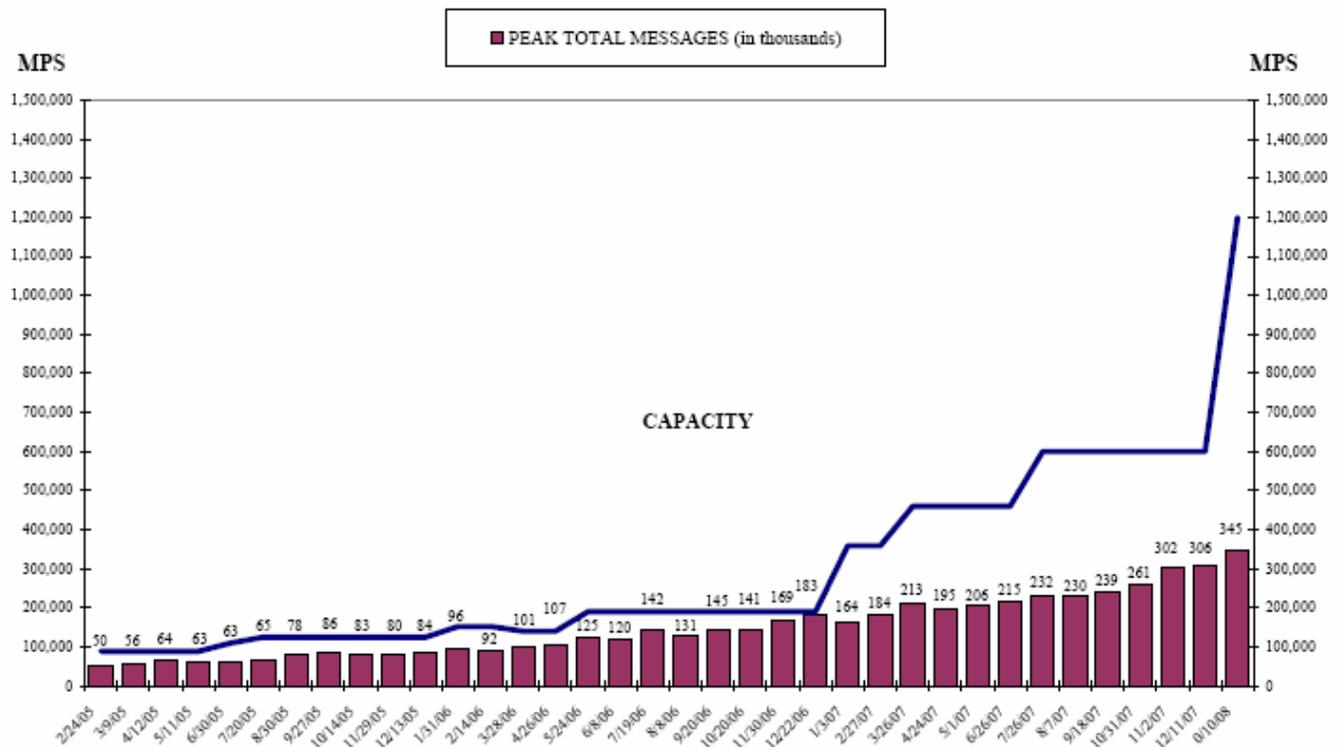


OPRA Capacity

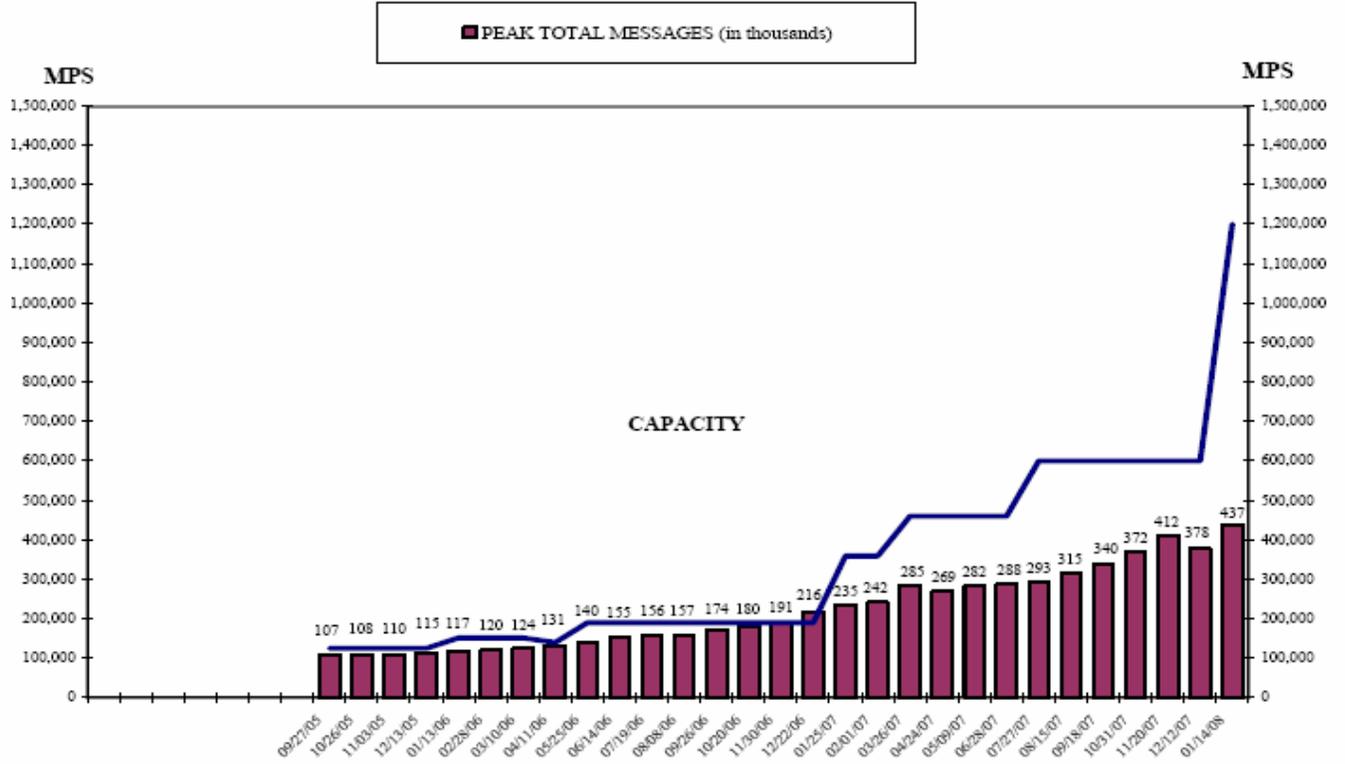
Over the course of the latest review period, OPRA has increased its output capacity to 701,000 messages per second (“mps”), yet on a one-minute basis (the traditional capacity measure) OPRA has only needed about half that capacity: on January 16, 2008 OPRA had a record sustained one minute peak of 345,254 mps. The OPRA system has significant room for additional growth in quote rates, and plans to increase capacity to 801,000 mps in March, 2008, and will again expand in July, 2008 to 1.2M mps.

While this seems to place an ever-increasing burden for bandwidth on OPRA data distributors, OPRA has taken the additional step of invoking a new data compression protocol (FAST) which will greatly increase the efficiency of the telecommunications networks. The following charts were obtained from the OPRA Management report for January 2008 and illustrates OPRA quote capacity for one minute and one second peaks.

**OPRA ONE MINUTE EQUITY/INDEX PEAK MESSAGE RATES
JANUARY 2008**



**OPRA ONE SECOND EQUITY/INDEX PEAK MESSAGE RATES
JANUARY 2008**



Quote Traffic

Quote traffic in the original 13 issues grew substantially in the Post 1 and Post 2 periods, and leveled off in the Post 3 period. We believe that this can be attributed to Market Makers utilizing new technologies to quote more efficiently and Exchanges implementing various additional quote mitigation policies and programs.

NYSE Arca Average Daily Quotes – 13 Original Issues

Stock	Pre Pilot	Post 1	from Pre-Pilot to Post 1	Post 2	Change from Post 1 to Post 2	Post 3	Change from Post 2 to Post 3
A	17,022	81,562	379%	91,822	13%	42,275	-54%
AMD	83,067	144,073	73%	147,776	3%	93,230	-37%
CAT	86,547	311,631	260%	704,673	126%	493,482	-30%
FLEX	6,163	14,702	139%	14,661	0%	23,091	58%
GE	59,197	137,905	133%	547,414	297%	289,135	-47%
INTC	60,626	98,029	62%	186,847	91%	241,858	29%
IWM	166,611	707,144	324%	2,272,113	221%	2,072,014	-9%
MSFT	59,603	168,406	183%	173,800	3%	327,816	89%
QQQQ	300,782	768,351	155%	2,015,531	162%	2,907,461	44%
SMH	55,578	83,075	49%	154,123	86%	75,249	-51%
TXN	55,358	192,652	248%	248,592	29%	242,798	-2%
WFMI	67,013	154,192	130%	202,430	31%	220,359	9%
Simple Average			178%		88%		-0.14%

Quote traffic for the 22 new issues experienced substantial increases, but not as dramatic as the first “post period” for the original 13 issues. A simple average of the quote gains for the original 13 issues was 178% for the first “post period” while the gains for the 22 new issues was only 79% for the first “post period”.

NYSE Arca Average Daily Quotes – 22 New Issues

Stock	Pre Pilot	Post Pilot	Change
AAPL	3,497,708	4,276,043	22%
AMGN	168,928	168,530	0%
AMZN	617,621	1,542,244	150%
BMJ	65,548	68,550	5%
C	221,458	348,391	57%
COP	541,442	564,563	4%
CSCO	113,361	262,619	132%
DIA	1,164,051	974,069	-16%
DNDN	22,932	38,085	66%
FCX	744,331	1,669,229	124%
GM	259,929	440,930	70%
MO	284,375	310,720	9%
MOT	76,186	145,330	91%
NYX	323,661	702,742	117%
OIH	1,055,949	1,724,136	63%
QCOM	221,836	271,212	22%
RIMM	1,830,112	6,088,140	233%
SPY	2,834,345	4,416,100	56%
T	128,472	193,253	50%
XLE	838,689	1,309,334	56%
XLF	132,342	337,162	155%
YHOO	89,005	323,422	263%
Simple Average			79%

Volumes

While the recognized goals of the Penny Pilot may not have included increasing average daily volume (ADV), the concept of ADV as a measure of success and the market response to the structural change has gained attention and therefore requires addressing.

Volumes for most US equity options historically tend to fluctuate, increasing and retracting period to period depending on events surrounding each underlying security. In the case of options on common stocks, the volumes are influenced by any number of events, including but not limited to: earnings, business/product developments, sector volatility, legal events, mergers and acquisition activity. Economic events such as the credit crisis or commodities bull market have large impacts on both ETF option volumes as well as options on common stocks. To appropriately draw conclusions from volume changes, given the naturally high deviation in monthly volumes, one needs to consider a significant sample set of issues over a representative period of time rather than focusing on any one individual issue.

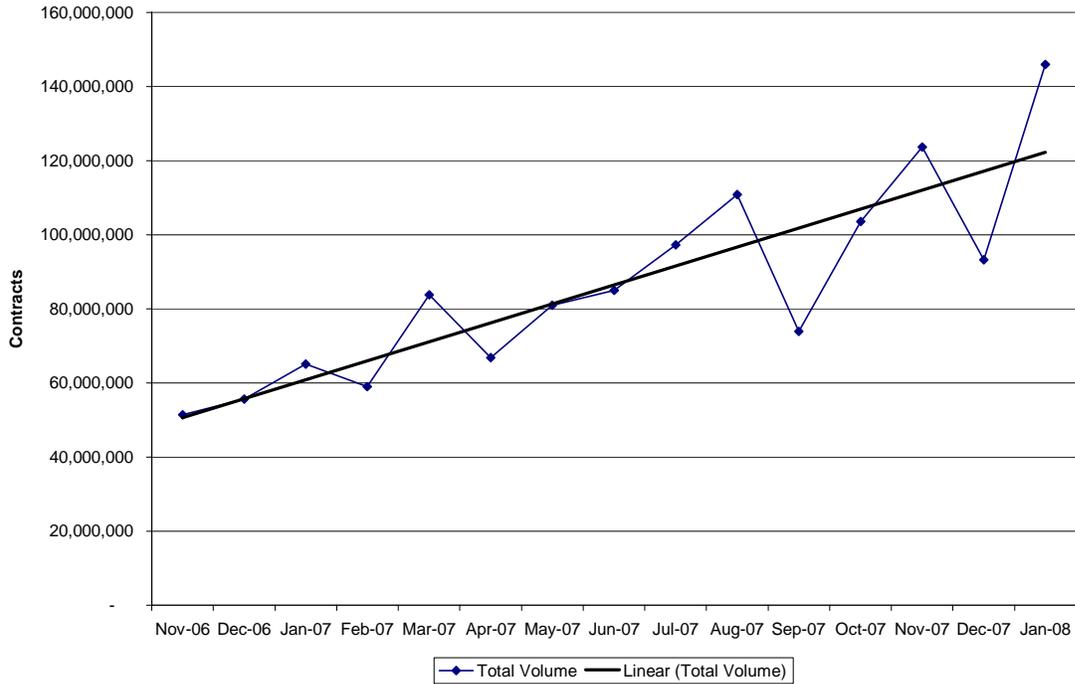
To illustrate why focusing on individual issues can provide misleading results, consider the deviation in monthly volumes for individual issues and contrast that with the deviation in total monthly volume for the full population of 35 issues. In order to compare deviation across issues it must be expressed as a percentage of the mean volume. The average standard deviation in monthly volume for any single issue is 52% of the mean monthly volume. Alternatively, the standard deviation of total volume for the entire population of 35 pilot issues was 31%. If ETF's are excluded, those numbers fall even further to 20% of the mean. Based on this data, NYSe Arca concludes that while volumes for individual issues may exhibit dramatic increases and decreases month to month, the entire population of Penny Pilot issues, as a single unit, is more consistent. Simply stated, the volume gainers tend to cancel out the volume losers in the long run.

The analysis of the Penny Pilot impact to monthly volumes is difficult to isolate due to the multivariate influences on any single security. However, with a year of data to analyze, and a larger sample set of issues, one can begin to draw conclusions on the market reaction to the Penny Pilot at a macro level.

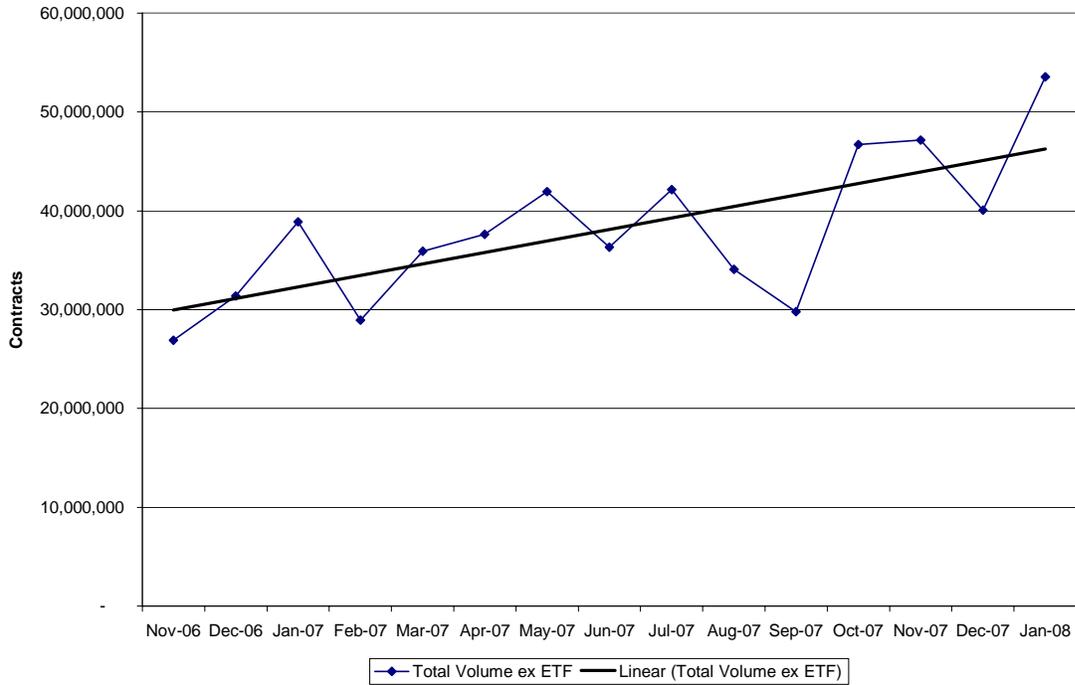
Analysis of the Penny Pilot volumes, dating back to November 2006 for the current 35 securities in the pilot, provides some telling statistics. Average monthly volume for all issues during the pre pilot period was 57.4 million contracts, compared to 116.6 million contracts for the October to January 2008 period, over 100% growth. Certainly ETF volume explosion was the primary driver for industry volume growth in 2007, but even if ETFs are excluded, pilot volumes grew from 32.4 million to 46.9 million per month, growth of 44%.

To provide volume growth context, consider total industry volumes excluding the 35 Penny Pilot issues. This adjusted industry volume figure, tracked from the pre pilot period to the October to January 2008 period, grew nearly 47%. Industry volume growth, while impressive, was less than half the pace of the 35 Penny Pilot issues.

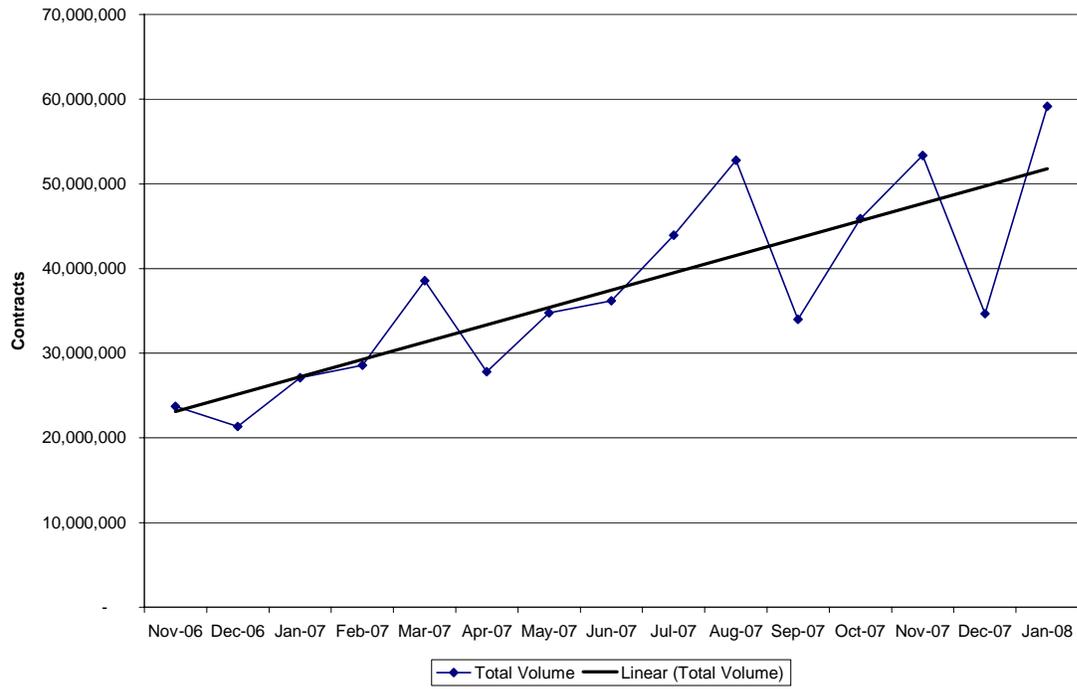
Total Monthly Volume for the Current 35 Penny Pilot Issues



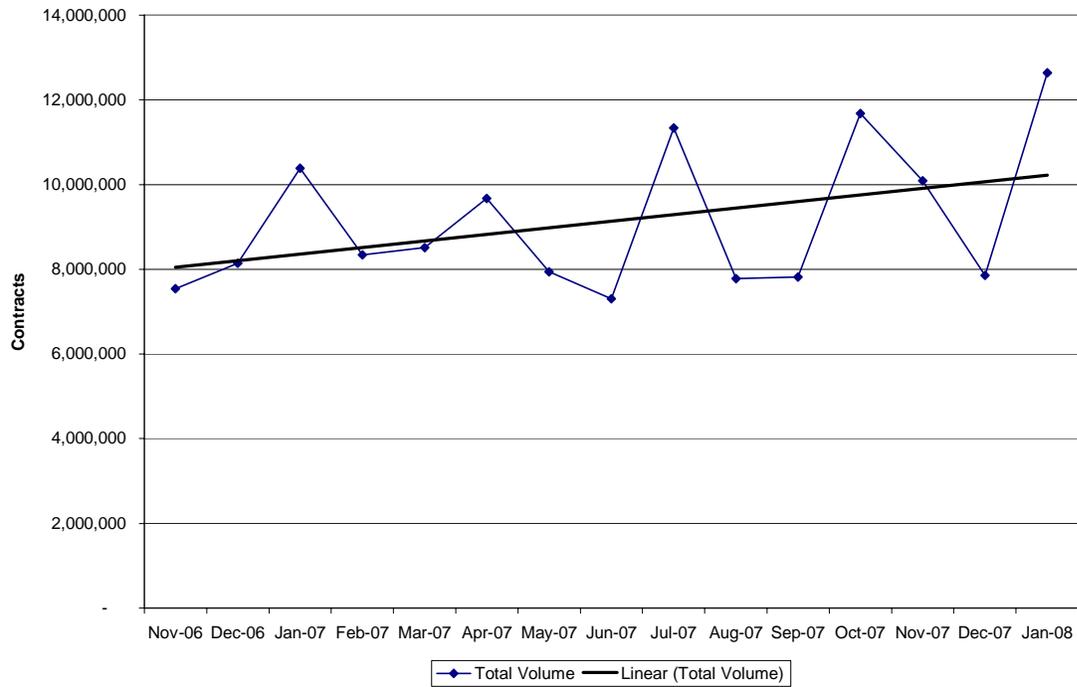
Total Monthly Volume for the Current Penny Pilot Issues Excluding ETFs



Total Monthly Volume for the Original 13 Penny Pilot Issues



Total Monthly Volume for the Original 13 Penny Pilot Issues Excluding ETFs



Appendix A (Daily average of number of orders in each category for 13 original issues)

Number of orders received in each category by Customer and Firm for the Post 3 period. The green (or shaded) section (depending on the format being viewed) indicates those orders that were filled at the Top of the Book.

Customer Orders - Daily Average

Stock	Total Orders	0 - 10	11 - 20	21 - 50	51 - 100	101 - 250	251 - 500	500+
A	31	23	5	2	0	1	-	-
AMD	809	193	118	442	36	13	5	2
CAT	444	365	36	26	12	4	1	0
FLEX	84	58	10	11	4	1	0	0
GE	538	251	54	186	28	13	3	2
INTC	1,242	474	451	222	54	27	12	4
IWM	2,891	475	132	191	225	1,809	40	20
JAVA	138	71	21	24	13	6	2	1
MSFT	1,264	545	293	281	82	44	13	7
QQQQ	4,104	1,839	415	574	331	697	166	81
SMH	87	32	8	36	7	3	1	0
TXN	814	149	33	607	15	7	1	1
WFMI	161	116	23	15	4	1	0	1
Total	12,607	4,589	1,599	2,619	811	2,626	245	119
% of Total		36%	13%	21%	6%	21%	2%	1%

Firm Orders - Daily Average

Stock	Total Orders	0 - 10	11 - 20	21 - 50	51 - 100	101 - 250	251 - 500	500+
A	68	45	16	7	1	0	0	-
AMD	7,736	2,748	555	4,426	3	2	1	0
CAT	57	44	6	4	1	0	0	0
FLEX	4	2	1	1	0	0	0	0
GE	22,106	4,273	7,341	10,330	157	3	2	1
INTC	26,426	1,966	3,219	21,230	4	3	2	1
IWM	872,591	146,719	214,822	510,806	222	10	5	7
MSFT	48,576	4,279	2,578	41,481	227	6	2	1
QQQQ	1,749,187	29,417	39,523	1,550,235	129,962	11	12	27
SMH	406	396	1	3	2	2	1	0
TXN	3,028	1,001	1,456	567	2	1	0	0
WFMI	11	5	2	3	1	0	0	-
Total	2,730,195	190,895	269,520	2,139,094	130,583	41	25	38
% of Total		7%	10%	78%	5%	0.00%	0.00%	0.00%

Appendix B (Daily average of number of orders in each category for 22 new issues)

Customer Orders - Daily Average

Stock	Total Orders	0 - 10	11 - 20	21 - 50	51 - 100	101 - 250	251 - 500	500+
AAPL	8,681	6,194	1,104	1,010	253	91	20	9
AMGN	299	185	32	54	17	9	2	1
AMZN	782	573	96	76	23	10	3	1
BMY	160	88	27	22	12	9	2	1
C	3,197	1,371	816	858	75	49	15	13
COP	316	229	34	36	10	4	1	1
CSCO	1,406	514	518	287	54	23	8	3
DIA	685	456	90	78	37	17	5	2
DNDN	783	455	123	108	72	18	4	4
FCX	1,444	1,185	105	119	23	9	1	1
GM	2,090	264	116	1,656	34	14	3	2
MO	267	196	28	27	9	4	1	1
MOT	252	148	45	32	17	6	3	1
NYX	358	183	33	128	9	2	2	0
OIH	5,629	457	3,594	1,550	17	9	2	1
QCOM	479	174	211	55	19	14	4	2
RIMM	3,706	2,593	610	343	108	37	10	5
SPY	4,953	2,121	464	731	493	718	369	57
T	617	226	48	317	17	7	2	1
XLE	8,115	221	5,273	1,866	39	710	4	2
XLF	2,139	477	470	1,083	50	37	14	9
YHOO	796	411	85	208	55	27	6	3
Total	47,154	18,720	13,923	10,645	1,443	1,827	478	117
% of Total		40%	30%	23%	3%	4%	1%	0%

Firm Orders - Daily Average

Stock	Total Orders	0 - 10	11 - 20	21 - 50	51 - 100	101 - 250	251 - 500	500+
AAPL	872,839	490,000	264,548	118,266	15	6	2	3
AMGN	56	30	5	6	3	11	0	0
AMZN	8,106	3,326	2,853	1,924	2	1	0	0
BMY	47	21	11	6	4	4	1	0
C	87	37	11	13	10	10	3	3
COP	27	12	3	6	4	2	0	0
CSCO	13,886	3,118	1,857	8,904	3	2	1	0
DIA	64,012	27,690	19,158	17,161	1	1	0	0
DNDN	47	35	6	5	1	0	0	0
FCX	2,031	1,902	86	14	21	6	1	0
GM	16,546	1,585	4,645	9,247	1,065	4	1	0
MO	55	31	8	9	5	2	0	0
MOT	41	22	11	4	2	2	0	0
NYX	10	5	2	2	0	0	0	-
OIH	7,682	7,650	10	9	8	5	0	0
QCOM	4,973	882	696	3,253	134	6	1	0
RIMM	714,570	506,533	185,193	22,833	5	3	1	1
SPY	1,433,827	29,097	89,239	1,174,901	140,325	252	8	6
T	48	27	9	7	3	2	0	0
XLE	52,145	35,583	7,617	8,906	21	14	3	1
XLF	14,779	4,960	4,590	5,160	42	14	8	5
YHOO	42,420	11,503	14,884	16,017	8	5	1	1
Total	3,248,233	1,124,049	595,442	1,386,653	141,680	352	34	23
% of Total		35%	18%	43%	4%	0.01%	0.00%	0.00%