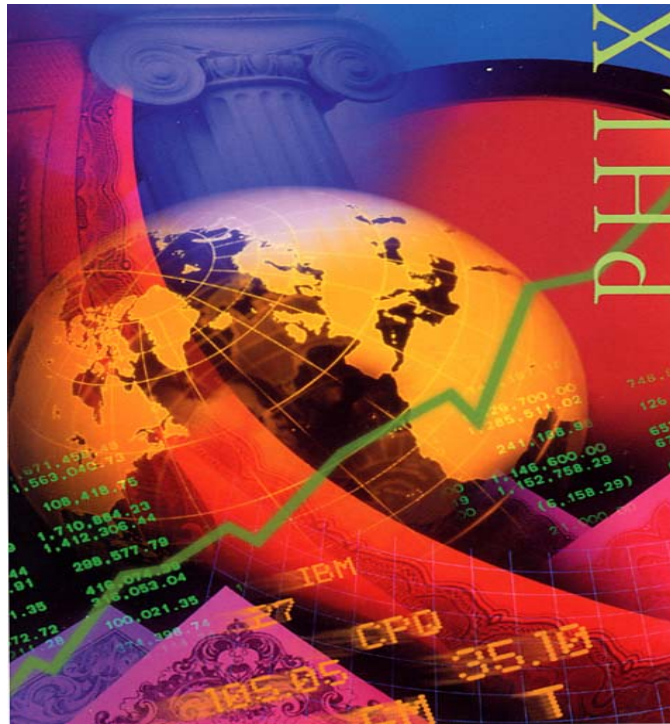




# Philadelphia Stock Exchange Options Penny Pricing Pilot Report



February 29, 2008

Prepared by: PHLX Financial Automation Group

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## Background

On June 7, 2006, the Philadelphia Stock Exchange (“Phlx”) received a letter from Chairman Cox of the Securities and Exchange Commission (“Commission”) urging the Phlx to begin quoting a limited number of options classes with a minimum price variation (“MPV”) of a penny by January 29, 2007. The options exchanges, in conjunction with the Commission, began a six-month pilot (“Penny Pilot”) in which 13 options would be quoted in penny and nickel increments. Under the Penny Pilot, all option series overlying QQQQ are quoted with an MPV of \$0.01, and all other options included in the Penny Pilot are quoted with an MPV of \$0.01 if priced below \$3.00 or with an MPV of \$0.05 if priced at \$3.00 and above. Subsequently, on August 17, 2007 Phlx filed a rule change with the Commission, and received approval by the Commission, to extend the original Penny Pilot and expand the Penny Pilot to include fifty additional option classes in two phases. Phase I of the expansion (“Penny Pilot Expansion-Phase I”) began on September 28, 2007 by adding an additional twenty-two option classes. Each of those 22 new options in the expansion are quoted with an MPV of \$0.01 for options priced below \$3.00 and with an MPV of \$0.05 for options priced at \$3.00 and above. Phase II of the expansion (“Penny Pilot Expansion-Phase II”) is scheduled to begin on March 28, 2008, and will continue for one year. For the Penny Pilot Expansion-Phase II, Phlx proposes adding an additional twenty-eight option classes from among the most actively-traded, multiply-listed option classes.

The exchange filed a report on May 31, 2007 (“Penny Pilot Initial Report”) that analyzed the results of the original thirteen issues trading in penny and nickel increments,

Phlx also committed in its rule filing to deliver four reports on the Penny Pilot to the Commission.

The first report filed during the pilot expansion (“Penny Pilot Expansion Report 1”) was issued on October 31, 2007. In that report, the exchange analyzed the Penny Pilot impacts on quality of markets and market data growth for the original thirteen option classes from May 1, 2007 through September 27, 2007 using a baseline of November 2006 to January 2007.

This is the second report (“Penny Pilot Expansion Report 2”) issued on February 29, 2008. This report further analyzes the impacts on quality of markets and market data growth from September 28, 2007 through January 31, 2008 for the original thirteen issues in the Penny Pilot still using a baseline of November 2006 to January 2007. In addition, the report will include the twenty-two expansion issues that were added to the Penny Pilot on September 28, 2007. The report will analyze the impacts on quality of markets and market data growth from September 28, 2007 through January 31, 2008 using a baseline of July 2007 through September 27, 2007.

The third report (“Penny Pilot Expansion Report 3”) will be issued on or before August 28, 2008 and will analyze the impacts on quality of markets and market data growth from February 1, 2008 through July 31, 2008 for the original thirteen issues in the Penny Pilot using a baseline of November 2006 to January 2007. In addition, the report will include the twenty-two expansion issues added to the Penny Pilot on September 28,

2007. The activity from February 1, 2008 through July 31, 2008 will be analyzed using a baseline of June 2007 to September 27, 2007. Also the additional twenty-eight issues added on March 28, 2008 will be analyzed using data from March 28, 2008 through July 31, 2008 using a baseline of January 2008 through March 27, 2008.

The fourth and final report (“Penny Pilot Expansion Report 4”) will be issued on or before February 28, 2009 and will analyze the impacts on quality of markets and market data growth from August 1, 2008 through January 31, 2009 for the original thirteen issues, the initial twenty-two expansion options and the final twenty-eight pilot expansion options.

This report is the second report, Penny Pilot Expansion Report 2, which Phlx committed to publish in its filing.

#### *Option Issues for Analysis*

The original thirteen Penny Pilot option classes were phased in beginning on January 26, 2007 and were fully in the pilot by February 9, 2007 as follows:

- January 26, 2007
  - Whole Foods Market, Inc. (WFMI)
- February 2, 2007
  - General Electric Company (GE)
  - Microsoft Corporation (MSFT)

- February 9, 2007
  - Agilent Technologies, Inc. (A)
  - Advanced Micro Devices, Inc. (AMD)
  - Caterpillar Inc. (CAT)
  - Flextronics International Ltd. (FLEX)
  - Intel Corporation (INTC)
  - Ishares Russell 2000 Index (IWM)
  - NASDAQ-100 Trust Shares (QQQQ)
  - Semiconductor HDLRs (SMH)
  - Sun Microsystems, Inc. (SUNW)
  - Texas Instruments Incorporated (TXN)

The additional twenty-two option issues were added to the Penny Pilot on September 28, 2007 and are:

- AT&T, Inc. (T)
- Altria Group, Inc. (MO)
- Amazon.com, Inc. (AMZN)
- Amgen, Inc. (AMGN)
- Apple, Inc. (AAPL)
- Bristol-Myers Squibb Co. (BMY)
- Cisco Systems, Inc. (CSCO)
- Citigroup, Inc. (C)
- ConocoPhillips (COP)
- Dendreon Corp. (DNDN)

- DIAMONDS Trust, Series I (DIA)
- Energy Select Sector (XLE)
- Financial Select Sector SPDR (XLF)
- Freeport-McMoRan Copper & Gold, Inc. (FCX)
- General Motors Corporation (GM)
- Motorola, Inc. (MOT)
- NYSE Euronext, Inc. (NYX)
- Oil Service HOLDERS (OIH)
- QUALCOMM, Inc. (QCOM)
- Research in Motion, LTD. (RIMM)
- SPDRs (SPY)
- Yahoo!, Inc. (YHOO)

### Summary of Report Findings

The following is a summary of the data collected on the impacts to quality of markets and market data growth of the Penny Pilot covering the original thirteen option classes from September 28, 2007 through January 31, 2008 as compared to baseline data from November 1, 2006 through January 30, 2007, and the twenty-two additional option classes included in the Penny Pilot Expansion-Phase I from September 28, 2007 through January 31, 2008 as compared to baseline data from July 1, 2007 through September 27, 2007.

**1. Average quote spread width at the Phlx Best/Bid Offer (“PBBO”)**

- a. The original thirteen issues of the Penny Pilot
  - i. Initial report
    - 1. Average spread widths decreased by 36%
      - a. Data period Pilot start through 04/30/07
      - b. Baseline 11/01/06 through 01/30/07
  - ii. Penny Pilot Expansion Report 1
    - 1. Average spread width decreased by 32%
      - a. Slight increase in spread width from prior report
      - b. Data period 05/01/07 through 09/27/07
      - c. Baseline 11/01/06 through 01/30/07
  - iii. Penny Pilot Expansion Report 2 (current)
    - 1. PBBO spread width *increased* by 7%
      - a. Reversed entire gain
      - b. Spreads in options under \$3 decreased by 42%
      - c. Spreads in options over \$3 *increased* by less than 15%...concentrated in options over \$10
      - d. Data period 09/28/07 through 01/31/08
      - e. Baseline 11/01/06 through 01/30/07
- b. The twenty-two options in the expansion of the Penny Pilot
  - i. Penny Pilot Expansion Report 2 (current)
    - 1. Average spread width decreased by 16%
    - 2. Spreads in options under \$3 decreased by 33%
    - 3. Spreads in options over \$3 and under \$20 decreased by less than 16%
    - 4. Spreads in options over \$20 *increased* by 20%
    - 5. Data period 09/28/07 through 01/31/08
    - 6. Baseline 07/01/07 through 09/27/07

Avg. PBBO Quote Spread Width <i>Change from baseline</i>	Penny Pilot Initial Report	Penny Pilot Expansion Report 1	Penny Pilot Expansion Report 2
Orig. 13 Options	- 36 %	- 32%	+ 7%
22 Expansion Options			- 16%

**2. Average disseminated size at the Phlx Best/Bid Offer (“PBBO”)**

- a. The original thirteen issues of the Penny Pilot
  - i. Initial Report
    - 1. Disseminated size at the PBBO decreased by 71%
      - a. Data period Pilot start through 04/30/07
      - b. Baseline 11/01/06 through 01/30/07
  - ii. Penny Pilot Expansion Report 1
    - 1. Disseminated size at the PBBO decreased by 73%
      - a. Slight decrease in size from prior report
      - b. Data period 05/01/07 through 09/27/07
      - c. Baseline 11/01/06 through 01/30/07
  - iii. Penny Pilot Expansion Report 2 (current)
    - 1. Disseminated size at the PBBO decreased by 63%
      - a. Size in the front month decreased by 80%
      - b. Size in QQQQ decreased by 87%
      - c. Size in the QQQQ front month decreased by 94%
      - d. Data period 09/28/07 through 01/31/08
      - e. Baseline 11/01/06 through 01/30/07
- b. The twenty-two options in the expansion of the Penny Pilot
  - i. Penny Pilot Expansion Report 2 (current)
    - 1. Disseminated size at the PBBO decreased by 64%
    - 2. Data period 09/28/07 through 01/31/08
    - 3. Baseline 07/01/07 through 09/27/07

Avg. PBBO Quote Size <i>Change from baseline</i>	Penny Pilot Initial Report	Penny Pilot Expansion Report 1	Penny Pilot Expansion Report 2
Orig. 13 Options	- 71 %	- 73%	- 63%
22 Expansion Options			- 64%



**3. Average disseminated size at the National Best/Bid Offer (“NBBO”)**

- a. The original thirteen issues of the Penny Pilot
  - i. Initial Report
    - 1. Disseminated size at the NBBO decreased by 78%
      - a. Data period Pilot start through 04/30/07
      - b. Baseline 11/01/06 through 01/30/07
  - ii. Penny Pilot Expansion Report 1
    - 1. Disseminated size at the NBBO decreased by 78%
      - a. Data period 05/01/07 through 09/27/07
      - b. Baseline 11/01/06 through 01/30/07
  - iii. Penny Pilot Expansion Report 2 (current)
    - 1. Disseminated size at the NBBO decreased by 66%
      - a. Size in the front month decreased by 82%
      - b. Size in QQQQ decreased by 91%
      - c. Size in the QQQQ front month decreased by 95%
      - d. Data period 09/28/07 through 01/31/08
      - e. Baseline 11/01/06 through 01/30/07
- b. The twenty-two options in the expansion of the Penny Pilot
  - i. Penny Pilot Expansion Report 2 (current)
    - 1. Size decreased by 66%
    - 2. Size in the QQQQ decreased by 91%
    - 3. Size in the QQQQ front month decreased by 95%
    - 4. Data period 09/28/07 through 01/31/08
    - 5. Baseline 07/01/07 through 09/27/07

Avg. NBBO Quote Size <i>Change from baseline</i>	Penny Pilot Initial Report	Penny Pilot Expansion Report 1	Penny Pilot Expansion Report 2
Orig. 13 Options	- 78 %	- 78%	- 66%
22 Expansion Options			- 66%

#### 4. PBBO quotes sent to OPRA and contracts traded

##### a. The original thirteen issues of the Penny Pilot

##### i. Penny Pilot Expansion Report 2 (current)

##### 1. All 13 original pilot options

- a. Outbound PBBO quotes sent to OPRA increased by 325%

Outbound PBBO Quote change <i>Change from baseline</i>	Initial Report	Expansion Report 1	Expansion Report 2
Orig. 13 Options	+ 72 %	+ 43%	+ 325%
Orig. 13 less QQQQ	+ 40 %	+ 13%	+ 218%
QQQQ	+ 192 %	+ 157%	+ 729%

- b. PHLX pilot contract trade volume increased by 160%

- i. Dominated by a 284% increase in QQQQ volume
- ii. Total PHLX volume increased by 61%
- iii. Total national volume increased by 63%

Electronic PBBO contract volume <i>Change from baseline</i>	Initial Report	Expansion Report 1	Expansion Report 2
Orig. 13 Options	-9%	+ 151%	+ 160%
Orig. 13 less QQQQ	-11%	+ 80%	+ 72%
QQQQ	-5%	+ 253%	+ 284%

##### c. Pilot options under \$1.00

- i. 13% of all PBBO pilot quotes
- ii. 52% of all PHLX pilot contracts traded
- iii. 50% of all PHLX pilot orders received

##### d. Pilot options under \$3.00 (inclusive of options under \$1.00)

- i. 37% of all PBBO pilot quotes
- ii. 88% of all PHLX pilot contracts traded
- iii. 85% of all PHLX pilot orders received

##### e. Pilot options with 2 months or less until expiration (all prices)

- i. 29% of all PBBO pilot quotes
- ii. 77% of all PHLX pilot contracts traded
- iii. 75% of all PHLX pilot orders received

- f. Pilot options under \$3.00 and with 2 months or less until expiration (all prices)
    - i. 5% of all PBBO pilot quotes
    - ii. 38% of all PHLX pilot contracts traded
    - iii. 33% of all PHLX pilot orders received
  - g. Data period 09/28/07 through 01/31/08
  - h. Baseline 11/01/06 through 01/30/07
- ii. Twenty-two options in the expansion of the Penny Pilot
- a. Outbound PBBO quotes sent to OPRA increased by 477%

Outbound PBBO Quote change <i>Change from baseline</i>	Initial Report	Expansion Report 1	Expansion Report 2
22 Expansion Options	n/a	n/a	+ 477%

- b. PHLX pilot contract trade volume increased by 14%
  - i. Total PHLX volume, all classes, increased by 61%
  - ii. Total national volume, all classes, increased by 63%
- c. Pilot options under \$1.00
  - i. 8% of all PBBO pilot quotes
  - ii. 31% of all PHLX pilot contracts traded
  - iii. 20% of all PHLX pilot orders received
- d. Pilot options under \$3.00 (inclusive of options under \$1.00)
  - i. 23% of all PBBO pilot quotes
  - ii. 60% of all PHLX pilot contracts traded
  - iii. 44% of all PHLX pilot orders received
- e. Pilot options with 2 months or less until expiration (all prices)
  - i. 30% of all PBBO pilot quotes
  - ii. 75% of all PHLX pilot contracts traded
  - iii. 72% of all PHLX pilot orders received
- f. Data period 09/28/07 through 01/31/08
- g. Baseline 07/01/07 through 09/27/07

Findings

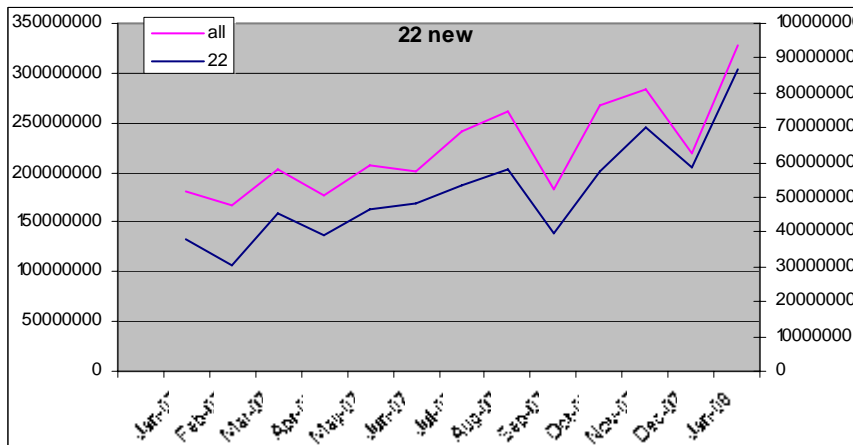
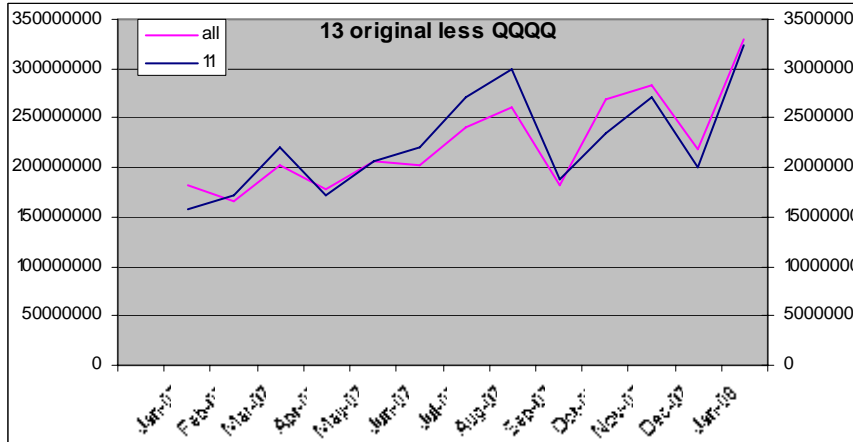
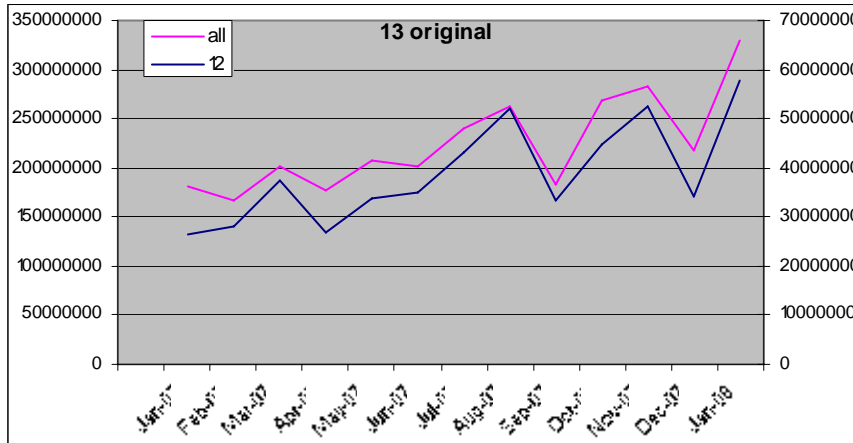
Quote volumes have increased at a much faster rate than contract volumes during the 9/28/07-1/31/08 period compared to the 7/1/07-9/27/07 period:

22 pilot expansion options outbound PBO quotes up 477%

22 pilot expansion options traded contract volume up 69%

Total PHLX options traded contract volume up 61%

*Monthly contract volumes industry-wide, all stocks vs. penny pilot stocks*



Industry overall monthly volume in pink, axis to the left

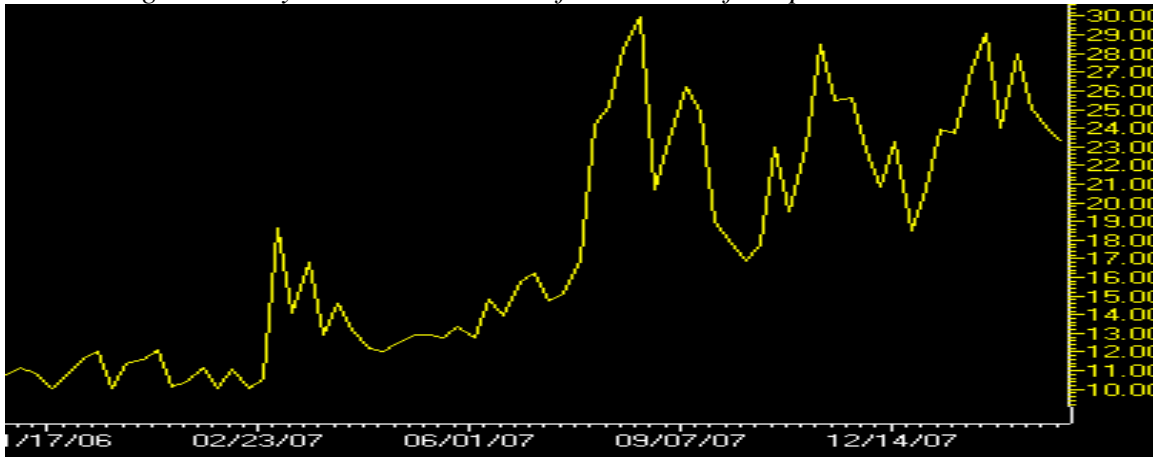
Industry monthly volume in blue, axis to the right

Market forces - Volatility

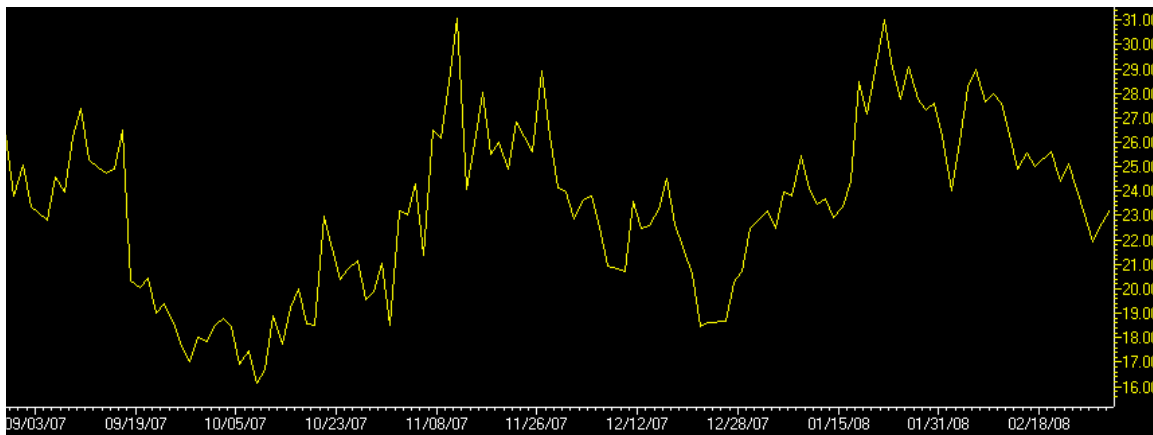
- There has been a dramatic shift in volatility since the pilot has started
- Impacts spread widths
  - Generally higher volatility will cause wider bid-ask spread widths
- Impacts quote size
  - Generally higher volatility will cause smaller quote size
- Impacts volume
  - Generally higher volatility will cause increased uncertainty leading to broader hedging and speculative activity in the options markets

Volatility as measured by the VIX	11/06-02/07	03/07-04/07	05/07-09/07	010/07-01/08
	10-12%	10-18%	12-30% *	17-29%

*\*high volatility concentrated in the final weeks of the period*



*Weekly VIX close 11/1/06-2/28/08*



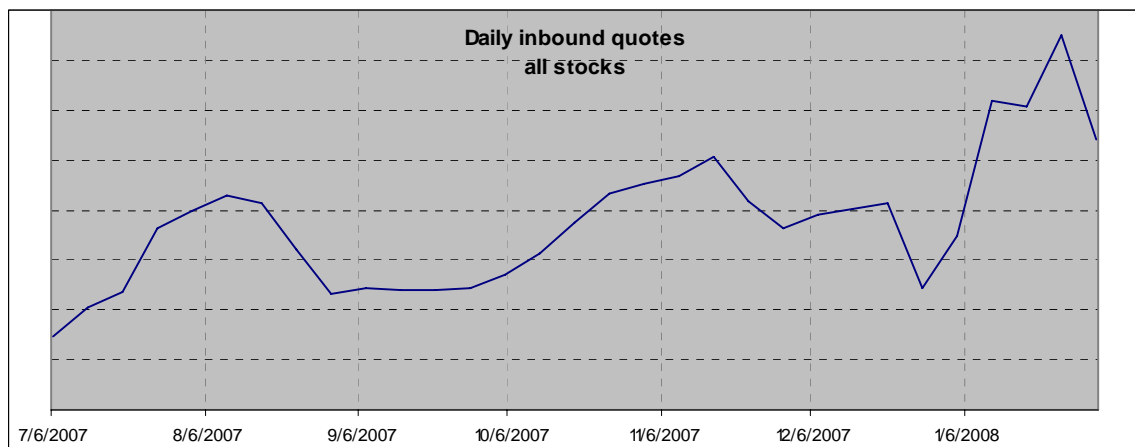
*Daily VIX close 9/1/07-2/28/08*

Reduced quote spread width, reduced quote size

- The average quote spread of the PBBO in the original thirteen issues of the Penny Pilot is 7% above the pre-pilot level
  - This follows 36% and 32% below the pre-pilot levels as experienced in the two prior two reporting periods
- The average quote spread of the PBBO in the twenty-two expansion issues of the Penny Pilot is 16% below the pre-pilot level
  - Spreads had already widened some during the baseline period as volatility had increased during that same baseline time period
- The average size available at the PBBO in the original thirteen issues of the Penny Pilot is 63% below the pre-pilot level
- The average size available at the PBBO in the front month options in the original thirteen issues of the Penny Pilot is 80% below the pre-pilot level
- The average size available at the PBBO in the QQQQ options is 87% below the pre-pilot level
- The average size available at the PBBO in the twenty-two expansion issues of the Penny Pilot is 64% below the pre-pilot level
- There has been a dramatic increase in volatility as measured by the VIX since the start of the penny pilot
  - Increased volatility impacts market spread width
    - Widened bid/ask spread widths due to increased market risk
  - Increased volatility impacts market size
    - Decreased size due to increased market risk

### Quote Message Traffic and Efficiency

- Quote traffic, measured by volume of PBBO quotes, sent from PHLX to OPRA
- 325% increase in PBBO quote volume in the original thirteen issues of the Penny Pilot compared to pre-pilot levels
  - This follows 72% and 43% higher rates experienced in the two prior reporting periods
- 729% increase in PBBO quote volume in the QQQQ compared to pilot levels
  - This follows 192% and 157% higher rates experienced in the two prior reporting periods
- 218% increase in PBBO quote volume in the original thirteen issues of the Penny Pilot excluding the QQQQ is compared to pre-pilot level
  - This follows 40% and 13% higher rates experienced in the two prior reporting periods
- 729% increase in PBBO quote volume in the twenty-two expansion issues of the Penny Pilot is 477% above the pre-pilot level
- There has been a dramatic increase in volatility as measured by the VIX since the start of the penny pilot
  - Increased volatility impacts quote velocity because underlying market prices change at an increasing rate
  - Increased volatility adds uncertainty to existing markets
- Inbound PHLX participant quote rates have increased by 54% in the current report period from the 7/1/07 through 9/28/07 baseline period



## Conclusions

The Exchange has found a number of significant results from the Penny Pilot, particularly a dramatic increase in quote traffic and a decrease in quote sizes. In comparing the recent performance to the first several months of the Penny Pilot, the Exchange found that the PBBO and NBBO spreads have widened. Likely as a result of an increase in market volatility, the initial benefit of narrowing of quote spreads has been reduced.

The Exchange also observed that these results were particularly pronounced in the series with 2 months or less until expiration priced under \$3.00, which are the most actively traded series in the options marketplace. Thus, the Penny Pilot's impact on the quality of markets overall was most pronounced in the most active series.

The Exchange believes that the most positive impact of the Penny Pilot for the investing public has been in the near month options that trade under \$1.00. The customers benefit from tighter markets, even in times of higher volatility. While quote size at the top-of-the-market has been reduced, generally public customer orders can be satisfied.

The exchange suggests modifying the pilot to allow for three tiers of quote widths: \$0.01 minimum width for options under \$1.00, \$0.05 minimum width for options from \$1.00 to \$5.00 and \$0.10 minimum width for options over \$5.00. The impact will be providing improvement in quote width in the options most actively traded by public customers while maintaining a mechanism of pricing similar to existing methodologies to



minimize technological changes for all market participants. The effects of reducing quote throughput, both into the Exchange and out from the Exchange through OPRA, benefits all market participants that depend on receiving that data. This holds down technology costs and system latencies for all market participants.

Even though the Exchange has experienced a benefit in market share as a result of the Penny Pilot, we believe that limiting the pilot, as defined above, would benefit the entire industry and the investing public.

## Data

In addition to the charts and other summaries of data that appear in this Report, attached in the Appendix is the methodology associated with collecting such data.

# APPENDIX A

## **1. Data and Methodology**

The methodology used to measure and compare the different data statistics for the Penny Pilot was to capture electronic data on the Penny Pilot options for the three months prior to the start of the Penny Pilot (the “baseline data”) and to any expansions to Penny Pilot issues. This electronic data was compared to electronic data gathered from the first three months, the latter portion of the Penny Pilot and Penny Pilot Expansion-Phase I. In all our reports we provided average percentage changes of the baseline data as compared to the first three months, the latter portion of the Penny Pilot and the first three months of Penny Pilot Expansion-Phase I. This report is intended to measure the short-term impact of the Penny Pilot on quoting and trading.

### Resources

The primary resource used to capture data came from our trading systems database logs (trade log, quote log and order log). The required data was extracted through customized programs on our Trade Data Access System (“TDAS”) regulatory system and loaded into a PC spreadsheet application for analysis. The TDAS system is a comprehensive database that receives and archives detailed order, quote and trade information.