

Nasdaq PHLX
Filing to Make PIXL Permanent
January 15, 2016

Introduction

This report covers PIXL activity from January 2, 2015 through June 30, 2015. It covers volume, characteristics of price improvement, and the outcome of auctions that terminated early.

Use of PIXL

PIXL auctions executed 34.8 million contracts over the 6 month period covered by this study (Table 1). That was 11.4% of total PHLX contract volume and 1.8% of total consolidated volume over the period. The average daily number of contracts traded on PIXL declined from 399,361 contracts per day in January 2015 to 187,062 contracts per day in June 2015. The percent of PHLX volume traded in PIXL auctions fell from 14.4% in January 2015 to 8.5% in June 2015. The percent of consolidated volume traded in PIXL auctions fell from 2.3% in January 2015 to 1.2% in June 2015.

The period analyzed for this report coincided with a decline in volatility, an important driver of options trading volume. The VIX declined from an average of 19.1 during January 2015 to 14.3 during June 2015. During the period consolidated options volume fell by 5.3%. PHLX volume fell by 12.3% and PIXL volume fell by 48.5%.

Volume (in millions)	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Total	Period % change
PIXL volume	8.0	8.1	5.7	4.6	4.2	4.1	34.8	-48.5%
PHLX volume	55.3	52.9	51.5	49.5	46.1	48.5	303.8	-12.3%
Consolidated volume	353.3	302.5	337.0	327.6	304.1	334.5	1,959.0	-5.3%
% PIXL-to-PHLX volume	14.4%	15.3%	11.2%	9.4%	9.1%	8.5%	11.4%	
% PIXL-to-Consolidated volume	2.3%	2.7%	1.7%	1.4%	1.4%	1.2%	1.8%	
VIX	19.1	15.9	14.8	13.5	13.3	14.3		-25.0%
Average daily volume (in thousands)	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jun-Jan	Period % change
PIXL average daily volume	399.4	425.5	261.1	220.5	210.6	187.1	280.4	-53.2%
PHLX average daily volume	2,764.3	2,786.5	2,340.6	2,356.8	2,305.4	2,203.1	2,449.9	-20.3%
Consolidated average daily volume	17,663.2	15,922.5	15,319.8	15,599.9	15,206.7	15,203.2	15,798.6	-13.9%
Number of days	20	19	22	21	20	22	124	

Price Improvement¹

Between January and June 2015, 68.6% of PIXL auctions executed at a price that was better than the national best bid or offer (NBBO) at the time the auction began (Table 2). The equal-weighted average amount of price improvement per contract for PIXL auctions was 5.5%. The average amount of price improvement was stable between January and June 2015.

The total amount of price improvement provided to customers was \$1.2 million. The monthly total amount of price improvement declined as volume in PIXL auctions declined.

Table 2 : Price improvement provided by PIXL auctions

Auctions	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Total
Price improvement	70.6%	67.3%	63.8%	66.6%	68.3%	75.5%	68.6%
No price improvement	29.4%	32.7%	36.2%	33.4%	31.7%	24.5%	31.4%
Total	491,564	471,691	357,342	347,333	326,633	302,438	2,297,001
Percent of contracts receiving price improvement	62.9%	59.4%	57.4%	59.5%	60.5%	64.5%	60.6%
Percent of contracts not receiving price improvement	37.1%	40.6%	42.6%	40.5%	39.5%	35.5%	39.4%
Total number of contracts	7,930,277	8,022,355	5,705,024	4,581,541	4,169,886	4,064,535	34,473,618
Average price improvement	5.7%	5.0%	4.9%	5.0%	6.2%	6.5%	5.5%
Total price improvement	\$296,242	\$238,038	\$159,915	\$148,791	\$150,895	\$174,371	\$1,168,251

Appendix tables

Appendix 1 presents detailed price improvement statistics for the volume transacted through PIXL for January to June 2015. Tables below summarize some of the information evident in the appendix tables.

Customer orders

Public customer agency orders initiated 99.2% of PIXL auctions and 99.1% of contracts executed by those auctions between January and June 2015 (Table 3). The share of customer orders in

¹ Price improvement for a buy order is the national best offer at the time the auction began minus the execution price. Price improvement for a sell order is the execution price minus the national best bid at the time the auction began. An auction may result in multiple executions at different prices with some contracts receiving more price improvement than others. The total price improvement for an auction is divided by the number of contracts in the auction to get the per-contract price improvement for the auction. Percent price improvement for an auction is calculated as the per-contract price improvement for the auction divided by the NBBO midpoint at the time the auction began. Percent price improvement per auction is then averaged across time without weights. In 0.7% of auctions no NBBO was available at the time the auction began. These cases were not included in the calculations (Tables 2-16) because the amount of price improvement is unknown.

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PIXL auctions was stable over the period. The share of orders receiving price improvement was 68.8% for customer orders and 36.5% for non-customer orders. The equal-weighted average price improvement was 5.5% for customer orders and 1.4% for non-customer orders.

Table 3 : Customers versus non-customers PIXL auctions

Auctions	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Total
Customers auctions	99.1%	99.3%	99.0%	99.0%	99.0%	99.7%	99.2%
Non customers auctions	0.9%	0.7%	1.0%	1.0%	1.0%	0.3%	0.8%
Total auctions	491,564	471,691	357,342	347,333	326,633	302,438	2,297,001
Customer traded contracts	99.2%	99.5%	98.7%	98.2%	99.0%	99.6%	99.1%
Non-customer traded contracts	0.8%	0.5%	1.3%	1.8%	1.0%	0.4%	0.9%
Total number of contracts	7,930,277	8,022,355	5,705,024	4,581,541	4,169,886	4,064,535	34,473,618
Percent of customer auctions receiving price improvement	70.8%	67.6%	64.1%	66.9%	68.7%	75.6%	68.8%
Percent of non-customer auctions receiving price improvement	49.8%	32.2%	32.4%	35.0%	27.0%	41.0%	36.5%
Percent of customer traded contracts receiving price improvement	62.9%	59.6%	57.8%	60.1%	60.8%	64.6%	60.8%
Percent of non-customer traded contracts receiving price improvement	58.1%	25.0%	26.7%	29.3%	30.9%	37.5%	34.5%
Percent price improvement received by customer auctions	5.7%	5.1%	4.9%	5.1%	6.2%	6.5%	5.5%
Percent price improvement received by non-customer auctions	3.5%	0.7%	0.5%	0.7%	0.7%	2.1%	1.4%

Order size

93.0% of PIXL auctions between January and June 2015 were for orders for less than 50 contracts (Table 4). The percent of auctions less than 50 contracts increased slightly over the period. Auctions for orders of less than 50 contracts traded 45.5% of contract volume traded in PIXL. Auctions of 50 contracts or more made up 7.0% of all PIXL auctions and traded 54.5% of contracts traded in PIXL.

69.2% of auctions for less than 50 contracts received price improvement. 56.3% of auctions for 50 contracts or more received price improvement. 66.5% of contracts in auctions for less than 50 contracts received price improvement. 55.7% of auctions for 50 contracts or more received price improvement. The equal-weighted average price improvement was 5.5% for auctions of less than 50 contracts and 4.9% for auctions of 50 contracts or more.

Table 4 : PIXL auctions by size

Auctions	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Total
Auctions order size < 50	92.2%	92.3%	93.1%	93.8%	93.8%	93.6%	93.0%
Auctions order size >= 50	7.8%	7.7%	6.9%	6.2%	6.2%	6.4%	7.0%
Total auctions	491,564	471,691	357,342	347,333	326,633	302,438	2,297,001
Traded contracts in auctions with order size < 50	44.1%	41.1%	40.6%	49.6%	52.1%	52.5%	45.5%
Traded contracts in auctions with order size >= 50	55.9%	58.9%	59.4%	50.4%	47.9%	47.5%	54.5%
Total number of contracts	7,930,277	8,022,355	5,705,024	4,581,541	4,169,886	4,064,535	34,473,618
Percent of auctions with order size < 50 receiving price improvement	71.3%	68.2%	64.3%	67.0%	68.8%	76.2%	69.2%
Percent of auctions with order size >= 50 receiving price improvement	59.2%	55.2%	52.1%	54.9%	56.4%	59.5%	56.3%
Percent of traded contracts in auctions with order size < 50 receiving price improvement	67.8%	65.7%	62.5%	64.5%	66.3%	72.5%	66.5%
Percent of traded contracts in auctions with order size >= 50 receiving price improvement	59.0%	55.0%	53.9%	54.6%	54.1%	55.6%	55.7%
Percent price improvement received by auctions with order size < 50	5.7%	5.1%	4.9%	5.0%	6.2%	6.6%	5.5%
Percent price improvement received by auctions with order size >= 50	5.3%	4.7%	4.4%	4.3%	5.3%	5.2%	4.9%

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PHLX quote

93.4% of PIXL auction began when PHLX best bid or offer (PBBO) was at the NBBO² (Table 5). 68.8% of auctions that began when the PBBO was at the NBBO received price improvement. 64.8% of auctions that began when the PBBO was not at the NBBO received price improvement. Average price improvement was 5.6% when PBBO was at the NBBO and 3.4% when PBBO was not at the NBBO.

Table 5 : PIXL auctions by PHLX quote situation

Auctions	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Total
PBBO = NBBO	92.3%	93.6%	93.6%	93.9%	93.5%	94.3%	93.4%
PBBO ≠ NBBO	7.7%	6.4%	6.4%	6.1%	6.5%	5.7%	6.6%
Total auctions	491,564	471,691	357,342	347,333	326,633	302,438	2,297,001
Traded contracts when PBBO = NBBO	92.7%	93.8%	92.8%	92.4%	92.1%	92.6%	92.9%
Traded contracts when PBBO ≠ NBBO	7.3%	6.2%	7.2%	7.6%	7.9%	7.4%	7.1%
Total number of contracts	7,930,277	8,022,355	5,705,024	4,581,541	4,169,886	4,064,535	34,473,618
Percent of auctions with PBBO = NBBO receiving price improvement	71.0%	67.7%	64.0%	66.7%	68.3%	75.8%	68.8%
Percent of auctions with PBBO ≠ NBBO receiving price improvement	65.8%	62.0%	60.0%	64.7%	67.8%	70.1%	64.8%
Percent of traded contracts when PBBO = NBBO receiving price improvement	62.7%	59.4%	57.7%	59.6%	60.5%	64.9%	60.7%
Percent of traded contracts when PBBO ≠ NBBO receiving price improvement	65.1%	59.7%	54.0%	57.8%	59.7%	58.8%	59.6%
Percent price improvement received auctions when PBBO = NBBO	5.9%	5.2%	5.0%	5.1%	6.2%	6.6%	5.6%
Percent price improvement received auctions when PBBO ≠ NBBO	2.4%	2.7%	3.0%	3.6%	5.4%	4.9%	3.4%

NBBO spread width

The median quoted spread when a PIXL auction began was \$0.05 or 6.5%. The distribution of auctions and contracts traded by spread were similar (Tables 6 and 7). Auctions that began when spreads were wider were more likely to receive price improvement (Tables 8 and 9). Auctions that began when spreads were wider had higher average price improvement per contract (Table 10).

Table 6 : Distribution of PIXL auctions, by spread width when auction began

Quoted spread	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Total
0.01	4.5%	4.5%	4.4%	4.2%	3.9%	3.1%	4.2%
0.02	13.5%	15.1%	15.7%	14.3%	13.8%	10.2%	13.9%
0.03	13.3%	13.9%	15.2%	15.0%	13.9%	11.2%	13.8%
0.04	6.2%	5.6%	5.8%	6.2%	5.8%	4.9%	5.8%
0.05	8.7%	9.7%	10.1%	10.5%	10.8%	10.2%	9.9%
>.05,<=.10	16.9%	17.3%	16.8%	17.0%	17.2%	18.0%	17.2%
>.10,<=.20	16.8%	16.2%	15.2%	15.4%	15.7%	18.7%	16.3%
>.20,<=.30	7.5%	7.1%	6.4%	6.3%	6.6%	8.0%	7.0%
>.30,<=.40	3.9%	3.4%	3.2%	3.4%	3.8%	4.5%	3.7%
>.40,<=.50	2.7%	2.3%	2.3%	2.5%	2.7%	3.4%	2.6%
>.50	6.0%	4.7%	4.8%	5.4%	5.9%	7.8%	5.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

² Defined as when PHLX best offer was equal to national best offer for a buy initiating order, and PHLX best bid was equal to national best bid for a sell initiating order.

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Table 7 : Distribution of contracts traded in PIXL auctions, by spread width when auction began

Quoted spread	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Total
0.01	6.6%	7.5%	5.4%	7.1%	6.2%	4.8%	6.4%
0.02	17.5%	20.1%	19.0%	17.1%	17.3%	14.7%	18.0%
0.03	16.8%	16.1%	19.2%	17.1%	16.6%	15.0%	16.8%
0.04	7.4%	6.4%	7.6%	7.3%	6.3%	6.2%	6.9%
0.05	9.1%	10.2%	11.5%	11.7%	12.0%	11.5%	10.7%
>.05,<=.10	16.5%	16.3%	16.3%	16.7%	17.3%	18.4%	16.8%
>.10,<=.20	13.7%	13.1%	12.0%	12.5%	12.9%	15.6%	13.2%
>.20,<=.30	5.3%	4.7%	3.8%	4.2%	4.3%	5.7%	4.7%
>.30,<=.40	2.6%	2.2%	2.0%	2.2%	2.4%	2.8%	2.4%
>.40,<=.50	1.5%	1.3%	1.2%	1.4%	1.7%	1.9%	1.5%
>.50	2.9%	2.1%	2.1%	2.6%	3.0%	3.4%	2.6%
Total	100%	100%	100%	100%	100%	100%	100%

Table 8 : Percent of auctions receiving price improvement, by spread width when auction began

Quoted spread	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Total
0.01	5.2%	3.3%	3.4%	3.6%	3.9%	5.2%	4.0%
0.02	15.2%	10.9%	7.7%	8.6%	7.8%	8.6%	10.2%
0.03	40.7%	36.0%	26.8%	29.1%	26.7%	32.6%	32.6%
0.04	64.4%	64.3%	60.1%	61.9%	62.1%	69.1%	63.5%
0.05	80.4%	82.2%	82.1%	85.3%	87.2%	85.6%	83.6%
>.05,<=.10	91.7%	91.2%	90.9%	92.4%	94.1%	93.5%	92.2%
>.10,<=.20	97.6%	96.8%	96.5%	97.3%	97.8%	97.7%	97.3%
>.20,<=.30	99.2%	98.8%	98.4%	98.7%	98.9%	98.8%	98.8%
>.30,<=.40	99.5%	99.4%	99.3%	99.4%	99.5%	99.4%	99.4%
>.40,<=.50	99.7%	99.6%	99.3%	99.6%	99.6%	99.7%	99.6%
>.50	99.8%	99.8%	99.7%	99.8%	99.7%	99.8%	99.8%

Table 9 : Percent of contracts receiving price improvement, by spread width when auction began

Quoted spread	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Total
0.01	4.4%	4.1%	2.3%	17.1%	6.4%	4.0%	6.1%
0.02	17.2%	15.1%	10.3%	9.2%	10.4%	8.1%	12.8%
0.03	41.2%	38.9%	33.9%	30.7%	29.6%	30.7%	35.4%
0.04	65.5%	64.6%	60.2%	62.8%	60.6%	61.5%	63.0%
0.05	79.1%	81.3%	80.3%	81.4%	83.0%	79.9%	80.8%
>.05,<=.10	91.5%	89.6%	89.6%	89.5%	91.5%	91.1%	90.4%
>.10,<=.20	97.0%	96.5%	95.0%	96.5%	96.5%	96.8%	96.5%
>.20,<=.30	99.2%	96.8%	98.6%	98.3%	98.0%	97.5%	98.1%
>.30,<=.40	99.5%	99.5%	99.3%	99.2%	98.8%	98.8%	99.2%
>.40,<=.50	97.7%	97.8%	99.1%	99.1%	98.7%	99.1%	98.5%
>.50	98.8%	99.6%	99.8%	99.6%	99.4%	99.7%	99.4%

Table 10 : Average price improvement for PIXL auctions, by spread width when auction began

Quoted spread	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Total
0.01	0.9%	0.6%	0.4%	0.5%	0.5%	0.5%	0.6%
0.02	2.1%	1.3%	0.7%	0.7%	0.6%	0.6%	1.0%
0.03	1.8%	1.5%	1.0%	1.0%	1.0%	1.1%	1.2%
0.04	2.8%	2.8%	1.8%	1.9%	1.9%	2.0%	2.2%
0.05	7.2%	7.8%	8.4%	8.5%	11.9%	11.6%	9.2%
>.05,<=.10	6.1%	5.5%	5.9%	5.4%	6.9%	6.6%	6.1%
>.10,<=.20	6.8%	6.4%	6.4%	6.4%	7.8%	7.3%	6.8%
>.20,<=.30	7.6%	7.1%	7.1%	7.3%	8.3%	8.2%	7.6%
>.30,<=.40	10.5%	9.7%	10.6%	10.8%	11.5%	11.0%	10.7%
>.40,<=.50	10.5%	9.4%	10.1%	10.6%	11.3%	10.2%	10.4%
>.50	14.3%	13.5%	13.7%	13.6%	14.5%	12.7%	13.7%

Number of unique participants

The mean number of unique participants in PIXL auctions was 4.0 and median was 3.0. The distribution of auctions and contracts traded by number of unique participants were similar, with a single participant in about ¼ of auctions and volume (Tables 11 and 12). The probability that an auction provided price improvement does not vary systematically with the number of

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participants (Tables 13 and 14). Auctions that had fewer participants had higher average price improvement per contract (Table 15).

Table 11 : Distribution of PIXL auctions, by number of participants

PIXL auctions number of participants	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Total
1	24.1%	24.9%	24.3%	23.7%	26.2%	35.3%	26.0%
2	13.5%	15.3%	14.7%	14.3%	14.9%	16.2%	14.7%
3	10.3%	12.0%	11.2%	10.3%	10.6%	10.2%	10.8%
4	9.8%	10.9%	10.1%	9.3%	9.3%	8.2%	9.7%
5	9.9%	10.2%	9.7%	9.0%	8.6%	7.2%	9.3%
6	9.6%	8.9%	8.9%	8.6%	7.8%	6.3%	8.5%
7	8.2%	7.0%	7.5%	7.6%	6.8%	5.3%	7.2%
8	6.3%	4.9%	5.8%	6.3%	5.6%	4.2%	5.6%
9	4.2%	3.0%	3.7%	4.6%	4.2%	2.9%	3.8%
10	2.3%	1.6%	2.2%	3.1%	2.8%	1.9%	2.3%
>10	1.6%	1.1%	1.8%	3.3%	3.2%	2.1%	2.1%

Table 12 : Distribution of contracts traded in PIXL auctions, by number of participants

PIXL auctions number of participants	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Total
1	25.3%	28.2%	29.0%	26.1%	28.9%	34.3%	28.2%
2	14.4%	15.2%	14.2%	14.6%	15.0%	15.5%	14.8%
3	10.8%	11.4%	10.7%	11.2%	11.1%	10.6%	11.0%
4	9.9%	10.6%	9.9%	10.0%	9.9%	9.0%	10.0%
5	10.1%	10.3%	8.9%	9.3%	8.8%	7.7%	9.4%
6	9.4%	8.2%	8.9%	8.2%	7.5%	7.3%	8.4%
7	7.6%	6.3%	6.0%	6.8%	6.2%	5.4%	6.5%
8	5.5%	4.3%	5.0%	5.2%	4.7%	3.9%	4.8%
9	3.6%	2.8%	3.1%	3.7%	3.3%	2.6%	3.2%
10	1.9%	1.6%	2.0%	2.3%	2.1%	1.7%	1.9%
>10	1.5%	1.0%	2.2%	2.7%	2.5%	1.9%	1.8%

Table 13 : Percent of PIXL auctions receiving price improvement, by number of participants

PIXL auctions number of participants	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Total
1	81.2%	78.6%	73.9%	76.8%	79.9%	87.5%	80.0%
2	63.9%	63.8%	62.7%	66.9%	71.1%	79.5%	67.4%
3	57.6%	57.9%	57.7%	61.1%	64.3%	72.3%	61.0%
4	58.4%	58.6%	55.3%	59.3%	59.8%	65.9%	59.1%
5	63.7%	61.0%	56.3%	59.4%	58.1%	63.0%	60.4%
6	70.5%	65.3%	58.9%	61.1%	58.7%	62.4%	63.7%
7	75.4%	69.4%	63.4%	63.3%	61.9%	62.1%	67.2%
8	78.6%	71.9%	66.2%	66.4%	64.4%	64.2%	69.8%
9	80.4%	73.9%	68.8%	68.8%	68.0%	63.8%	71.8%
10	80.5%	74.1%	69.4%	69.0%	70.2%	63.7%	72.0%
>10	75.0%	65.1%	60.7%	65.1%	68.1%	59.6%	66.1%

Table 14 : Percent of contracts traded receiving price improvement, by number of participants

PIXL auctions number of participants	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Total
1	82.2%	79.5%	79.0%	77.2%	77.1%	80.9%	79.6%
2	63.3%	58.4%	56.4%	59.9%	62.5%	68.4%	61.1%
3	52.4%	49.6%	52.3%	53.2%	56.8%	58.7%	53.1%
4	48.5%	46.6%	47.4%	50.7%	50.8%	50.3%	48.6%
5	48.4%	43.0%	46.8%	51.3%	47.6%	50.2%	47.2%
6	52.6%	48.1%	42.3%	50.7%	47.6%	47.4%	48.5%
7	58.1%	52.4%	46.7%	51.7%	49.4%	50.5%	52.4%
8	63.1%	54.8%	42.1%	53.6%	52.1%	55.1%	54.3%
9	67.3%	63.2%	44.5%	51.5%	55.1%	53.8%	57.6%
10	70.5%	69.7%	38.9%	54.4%	54.9%	52.3%	58.3%
>10	66.6%	51.5%	53.2%	45.8%	49.2%	44.6%	52.3%

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Table 15: Average percent price improvement, by number of participants

PIXL auctions number of participants	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Total
1	9.0%	8.0%	7.9%	8.3%	10.2%	9.2%	8.8%
2	6.8%	5.5%	5.4%	5.6%	7.3%	7.4%	6.3%
3	5.1%	4.0%	4.0%	4.1%	5.2%	5.8%	4.6%
4	4.3%	3.5%	3.4%	3.6%	4.3%	4.8%	3.9%
5	4.2%	3.4%	3.3%	3.7%	3.9%	4.2%	3.7%
6	3.9%	3.6%	3.3%	3.7%	4.0%	4.0%	3.7%
7	3.9%	3.8%	3.8%	3.5%	3.8%	3.7%	3.8%
8	3.7%	3.8%	3.8%	3.6%	3.9%	3.5%	3.7%
9	3.6%	3.8%	3.7%	3.5%	3.7%	3.0%	3.6%
10	3.2%	3.5%	3.5%	3.1%	3.2%	2.7%	3.2%
>10	2.4%	2.5%	2.6%	2.2%	2.5%	2.0%	2.4%

Auctions terminated early

Between January and June 2015 320 auctions terminated early because the PBBO crossed the PIXL order stop price (Table 16). No auctions terminated early because of halts. The number of auctions that terminated early was 1/100th of 1% of all PIXL auctions over the period. The auctions that terminated early included 1/100th of 1% of contracts traded in PIXL auctions. The share of auctions that terminated early was stable between January and June 2015.

Between January and June 2015, 76.3% of PIXL auctions that terminated early executed at a price that was better than the NBBO at the time the auction began. 71.9% of contracts in auctions that terminated early received price improvement. The average amount of price improvement per contract for PIXL auctions that terminated early was 4.1%.

Table 16: Early terminated PIXL auctions

	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Total
Early terminated auctions	57	86	56	41	35	45	320
Percent early terminated auctions	0.01%	0.02%	0.02%	0.01%	0.01%	0.01%	0.01%
Traded contracts in early terminated auctions	384	1016	628	684	673	508	3893
Percent of traded contracts in early terminated auctions	0.00%	0.01%	0.01%	0.01%	0.02%	0.01%	0.01%
Percent of early terminated auctions receiving price improvement	71.9%	74.4%	67.9%	85.4%	82.9%	82.2%	76.3%
Percent of traded contracts in early terminated auctions receiving price improvement	71.9%	69.7%	72.1%	89.5%	64.2%	63.0%	71.9%
Percent price improvement received by early terminated auctions	4.4%	2.8%	2.2%	4.9%	4.5%	7.6%	4.1%

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Appendix: Detailed price improvement statistics for the volume transacted through PIXL for January 2015.

Customer

Month Jan 2015

Order size greater than or equal to 50

Quoting at NBBO

Spread	Improvement												Total Contracts Traded	Average Number of Participants	Average Percent of Orders Initiator Receives	Average Percent of Contracts	
	0	0.01	0.02	0.03	0.04	0.05	>.05,<=.10	>.10,<=.20	>.20,<=.30	>.30,<=.40	>.40,<=.50	>.50					
0.01	844,181	29,434	250	0	50	0	0	0	0	0	0	0	0	873,915	4	52	49
0.02	536,092	300,066	9,462	50	0	150	0	0	0	0	0	0	0	845,820	4	59	58
0.03	194,718	165,962	10,807	1,876	116	0	63	0	0	0	0	0	0	373,542	5	54	53
0.04	67,805	123,859	77,574	1,661	496	0	0	0	0	0	0	0	0	271,395	4	64	63
0.05	88,173	118,894	87,802	26,271	10,253	7,541	391	42	0	0	0	0	0	339,367	4	59	54
>.05,<=.10	55,971	162,012	130,658	107,215	58,305	92,355	32,886	84	0	0	0	0	0	639,486	4	62	57
>.10,<=.20	23,484	52,573	35,808	46,719	36,610	78,776	158,603	18,686	50	0	0	0	0	451,309	4	62	55
>.20,<=.30	5,777	3,597	7,888	9,133	6,859	15,243	56,779	45,244	5,982	0	0	0	0	156,502	4	62	58
>.30,<=.40	732	1,593	734	1,621	1,814	4,574	18,182	30,723	9,606	566	0	0	0	70,145	4	62	58
>.40,<=.50	2,694	40	426	77	496	1,547	8,727	14,862	8,616	2,020	293	0	0	39,798	4	65	54
>.50	2,662	375	71	143	477	706	4,881	20,384	12,497	11,398	7,846	12,264	0	73,704	4	63	59
Total Contracts Traded													4,134,983				

Customer

Month Jan 2015

Order size greater than or equal to 50

Not Quoting at NBBO

Spread	Improvement												Total Contracts Traded	Average Number of Participants	Average Percent of Orders Initiator Receives	Average Percent of Contracts	
	0	0.01	0.02	0.03	0.04	0.05	>.05,<=.10	>.10,<=.20	>.20,<=.30	>.30,<=.40	>.40,<=.50	>.50					
0.01	39,280	7,554	1,183	70	0	0	75	0	0	0	0	0	0	48,162	3	65	58
0.02	46,005	32,762	1,934	210	19	81	0	0	0	0	0	0	0	81,011	4	56	50
0.03	16,026	24,066	3,572	1,026	134	0	0	0	0	0	0	0	0	44,824	5	50	48
0.04	7,387	10,085	7,645	681	227	0	0	0	0	0	0	0	0	26,025	5	55	49
0.05	6,809	7,531	4,145	1,463	764	528	133	0	0	0	0	0	0	21,373	4	55	50
>.05,<=.10	5,157	14,125	6,597	11,223	3,601	3,945	2,792	0	0	0	0	0	0	47,440	5	57	53
>.10,<=.20	2,781	1,261	1,726	1,975	1,970	2,203	5,955	1,182	0	0	0	0	0	19,053	4	53	44
>.20,<=.30	350	459	180	285	162	954	2,642	1,982	329	0	0	0	0	7,343	4	65	55
>.30,<=.40	111	0	149	310	4	86	774	2,012	531	100	0	0	0	4,077	4	47	35
>.40,<=.50	100	239	40	20	40	776	460	360	292	28	0	0	0	2,355	3	82	61
>.50	1,000	0	0	0	0	0	671	200	457	120	340	1,445	0	4,233	3	71	62
Total Contracts Traded													305,896				

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Appendix: Detailed price improvement statistics for the volume transacted through PIXL for January 2015.

Customer

Month Jan 2015

Order size less than 50

Quoting at NBBO

Spread	Improvement													Total Contracts Traded	Average Number of Participants	Average Percent of Orders Initiator Receives	Average Percent of Contracts
	0	0.01	0.02	0.03	0.04	0.05	>.05,<=.10	>.10,<=.20	>.20,<=.30	>.30,<=.40	>.40,<=.50	>.50					
0.01	490,929	16,852	203	87	35	6	9	44	0	0	0	0	0	508,165	4	61	53
0.02	293,795	163,984	2,403	29	3	0	0	0	0	0	0	0	0	460,214	4	64	57
0.03	103,641	131,703	6,599	665	21	49	0	0	0	0	0	0	0	242,678	5	63	56
0.04	33,266	74,027	55,956	2,459	332	1	2	0	0	0	0	0	0	166,043	4	69	63
0.05	62,997	104,242	94,845	32,943	18,705	3,170	430	2	0	1	0	0	0	317,335	4	69	64
>.05,<=.10	29,748	80,704	115,121	120,019	79,206	100,531	45,564	178	1	0	46	5	571,123	4	72	66	
>.10,<=.20	8,330	13,890	24,870	38,817	48,325	78,267	221,170	36,544	32	2	1	0	470,248	4	72	65	
>.20,<=.30	1,164	1,878	2,795	5,098	8,050	11,687	75,153	77,048	6,175	22	0	0	189,070	4	74	64	
>.30,<=.40	396	568	709	1,073	1,659	3,017	21,256	47,184	16,547	1,845	0	10	94,264	4	75	66	
>.40,<=.50	132	155	181	475	633	1,158	8,086	21,359	17,039	5,629	972	20	55,839	4	76	64	
>.50	244	258	262	392	636	786	7,545	23,965	28,837	22,685	16,480	42,805	144,895	4	77	65	
Total Contracts Traded													3,219,874				

Customer

Month Jan 2015

Order size less than 50

Not Quoting at NBBO

Spread	Improvement													Total Contracts Traded	Average Number of Participants	Average Percent of Orders Initiator Receives	Average Percent of Contracts
	0	0.01	0.02	0.03	0.04	0.05	>.05,<=.10	>.10,<=.20	>.20,<=.30	>.30,<=.40	>.40,<=.50	>.50					
0.01	36,833	4,908	783	148	64	5	15	35	1	0	0	0	0	42,792	3	73	66
0.02	35,998	21,833	2,088	372	22	40	29	5	0	0	0	0	0	60,387	4	65	56
0.03	14,766	18,753	4,729	907	255	90	25	0	0	0	0	0	0	39,525	5	61	52
0.04	5,660	10,233	6,040	1,466	399	97	14	0	0	0	0	0	0	23,909	5	64	56
0.05	4,724	6,277	4,604	2,187	623	259	192	8	1	1	0	0	0	18,876	4	67	60
>.05,<=.10	4,757	7,562	7,363	6,157	3,868	3,236	2,729	115	2	0	0	0	35,789	5	68	56	
>.10,<=.20	1,672	1,637	1,984	2,242	1,966	2,610	7,965	1,677	72	9	0	1	21,835	5	69	56	
>.20,<=.30	473	337	343	413	458	598	2,360	2,998	317	11	2	0	8,310	5	73	60	
>.30,<=.40	109	81	52	180	79	109	788	1,327	468	37	3	3	3,236	5	77	64	
>.40,<=.50	80	33	26	37	60	77	350	800	417	156	21	1	2,058	4	78	68	
>.50	211	9	12	70	77	50	361	1,000	1,092	834	548	1,801	6,065	4	78	62	
Total Contracts Traded													262,782				

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Appendix: Detailed price improvement statistics for the volume transacted through PIXL for January 2015.

Non-Customer

Month Jan 2015

Order size greater than or equal to 50

Quoting at NBBO

		Improvement												Total Contracts Traded	Average Number of Participants	Average Percent of Orders Initiator Receives	Average Percent of Contracts
Spread		0	0.01	0.02	0.03	0.04	0.05	>.05,<=.10	>.10,<=.20	>.20,<=.30	>.30,<=.40	>.40,<=.50	>.50				
0.01		1,095	1,763	0	0	0	0	0	0	0	0	0	0	2,858	2	71	71
0.02		1,671	1,713	1,188	0	0	0	0	0	0	0	0	0	4,572	2	80	75
0.03		100	448	0	292	0	0	0	0	0	0	0	0	840	3	72	73
0.04		0	768	100	0	0	0	0	0	0	0	0	0	868	2	83	83
0.05		0	584	252	0	0	1,607	0	0	0	0	0	0	2,443	3	77	70
>.05,<=.10		305	1,059	1,439	721	1,106	100	100	0	0	0	0	0	4,830	2	74	71
>.10,<=.20		0	100	0	291	178	1,321	1,016	144	0	0	0	0	3,050	3	74	69
>.20,<=.30		0	0	0	0	0	70	176	533	167	0	0	0	946	2	89	87
>.30,<=.40		0	0	0	0	50	30	70	150	0	0	0	0	300	4	72	56
>.40,<=.50		0	0	0	0	0	0	54	43	6	6	16	0	125	3	16	17
>.50		0	0	0	0	0	0	138	79	74	50	0	100	441	2	80	80
Total Contracts Traded														21,273			

Non-Customer

Month Jan 2015

Order size greater than or equal to 50

Not Quoting at NBBO

		Improvement												Total Contracts Traded	Average Number of Participants	Average Percent of Orders Initiator Receives	Average Percent of Contracts
Spread		0	0.01	0.02	0.03	0.04	0.05	>.05,<=.10	>.10,<=.20	>.20,<=.30	>.30,<=.40	>.40,<=.50	>.50				
0.01		841	145	0	0	0	0	0	0	0	0	0	0	986	2	76	76
0.02		776	110	0	0	0	0	0	0	0	0	0	0	886	3	53	42
0.03		150	149	0	0	0	0	0	0	0	0	0	0	299	2	65	55
0.04		320	90	0	0	0	0	0	0	0	0	0	0	410	3	72	55
0.05		522	0	0	0	0	0	0	0	0	0	0	0	522	3	45	45
>.05,<=.10		76	206	110	149	0	0	100	0	0	0	0	0	641	4	52	47
>.10,<=.20		0	0	100	50	0	0	0	76	0	0	0	0	226	4	50	50
>.20,<=.30		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>.30,<=.40		0	0	0	0	0	0	0	50	0	0	0	0	50	2	50	50
>.40,<=.50		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>.50		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Contracts Traded														4,020			

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Appendix: Detailed price improvement statistics for the volume transacted through PIXL for January 2015.

Non-Customer
 Month Jan 2015
 Order size less than 50
 Quoting at NBBO

		Improvement												Total Contracts Traded	Average Number of Participants	Average Percent of Orders Initiator Receives	Average Percent of Contracts
		0	0.01	0.02	0.03	0.04	0.05	>.05,<=.10	>.10,<=.20	>.20,<=.30	>.30,<=.40	>.40,<=.50	>.50				
Spread	0.01	11,426	417	1	0	0	0	0	0	0	0	0	0	11,844	3	64	59
	0.02	4,206	5,672	100	15	0	0	0	0	0	0	0	0	9,993	3	53	48
	0.03	1,172	1,102	123	20	0	0	0	0	0	0	0	0	2,417	4	54	48
	0.04	299	803	583	60	0	0	0	0	0	0	0	0	1,745	4	60	59
	0.05	72	553	412	181	39	74	1	0	0	0	0	0	1,332	4	63	61
	>.05,<=.10	48	434	774	370	433	289	179	0	0	0	0	0	2,527	4	64	62
	>.10,<=.20	6	72	35	140	130	118	495	192	0	0	0	0	1,188	4	61	55
	>.20,<=.30	1	1	1	10	24	26	217	105	43	0	0	0	428	4	85	76
	>.30,<=.40	0	0	0	1	0	38	73	148	27	7	0	0	294	4	87	86
	>.40,<=.50	3	1	0	1	0	3	14	94	27	18	0	0	161	4	88	88
	>.50	0	0	0	0	1	3	6	101	99	74	35	72	391	3	81	72
Total Contracts Traded														32,320			

Non-Customer
 Month Jan 2015
 Order size less than 50
 Not Quoting at NBBO

		Improvement												Total Contracts Traded	Average Number of Participants	Average Percent of Orders Initiator Receives	Average Percent of Contracts
		0	0.01	0.02	0.03	0.04	0.05	>.05,<=.10	>.10,<=.20	>.20,<=.30	>.30,<=.40	>.40,<=.50	>.50				
Spread	0.01	1,746	149	0	10	0	0	0	0	0	0	0	0	1,905	2	71	64
	0.02	1,200	531	81	30	32	0	0	0	0	0	0	0	1,874	4	55	50
	0.03	367	300	57	45	0	0	0	0	0	0	0	0	769	4	59	59
	0.04	298	161	98	30	15	0	0	0	0	0	0	0	602	3	53	51
	0.05	30	80	49	17	0	0	1	0	0	0	0	0	177	4	69	66
	>.05,<=.10	21	174	99	25	2	20	13	0	0	0	0	0	354	4	59	58
	>.10,<=.20	44	47	31	34	50	0	53	0	0	0	0	0	259	4	55	49
	>.20,<=.30	0	0	32	13	0	1	58	5	0	0	0	0	109	4	47	47
	>.30,<=.40	0	0	0	0	0	0	0	5	0	0	0	0	5	2	0	0
	>.40,<=.50	0	0	0	0	0	0	0	1	0	0	0	0	1	6	0	0
	>.50	0	0	0	0	0	0	2	5	3	1	0	1	12	2	100	100
Total Contracts Traded														6,067			

Appendix: Detailed price improvement statistics for the volume transacted through PIXL for May 2015.

Non-Customer
 Month May 2015
 Order size less than 50
 Quoting at NBBO

		Improvement												Total Contracts Traded	Average Number of Participants	Average Percent of Orders Initiator Receives	Average Percent of Contracts
		0	0.01	0.02	0.03	0.04	0.05	>.05,<=.10	>.10,<=.20	>.20,<=.30	>.30,<=.40	>.40,<=.50	>.50				
Spread	0.01	13,053	266	45	0	0	0	0	0	0	0	0	0	13,364	3	66	64
	0.02	4,131	754	20	0	0	0	0	0	0	0	0	0	4,905	5	71	53
	0.03	1,178	542	31	0	0	0	0	0	0	0	0	0	1,751	7	80	56
	0.04	178	383	46	0	0	0	0	0	0	0	0	0	607	5	80	74
	0.05	73	272	196	57	17	0	0	0	0	0	0	0	615	4	84	75
	>.05,<=.10	50	92	193	192	125	53	11	0	0	0	0	0	716	6	86	74
	>.10,<=.20	7	72	41	24	31	2	30	5	0	0	0	0	212	5	76	72
	>.20,<=.30	0	0	0	0	0	0	119	31	0	0	0	0	150	5	66	66
	>.30,<=.40	0	0	0	0	0	0	2	0	0	0	0	0	2	1	100	100
	>.40,<=.50	0	0	0	0	0	0	1	14	2	0	1	0	18	4	100	100
	>.50	0	0	0	0	0	0	0	35	24	0	6	9	74	5	55	38
Total Contracts Traded														22,414			

Non-Customer
 Month May 2015
 Order size less than 50
 Not Quoting at NBBO

		Improvement												Total Contracts Traded	Average Number of Participants	Average Percent of Orders Initiator Receives	Average Percent of Contracts
		0	0.01	0.02	0.03	0.04	0.05	>.05,<=.10	>.10,<=.20	>.20,<=.30	>.30,<=.40	>.40,<=.50	>.50				
Spread	0.01	1,676	235	79	0	0	0	0	0	0	0	0	0	1,990	2	86	85
	0.02	455	257	143	20	0	0	0	0	0	0	0	0	875	5	77	65
	0.03	174	133	23	30	15	0	0	0	0	0	0	0	375	5	83	68
	0.04	8	115	32	0	1	0	0	0	0	0	0	0	156	5	59	54
	0.05	27	45	38	7	6	0	0	0	0	0	0	0	123	3	73	68
	>.05,<=.10	55	42	38	58	0	0	0	0	0	0	0	0	193	4	74	74
	>.10,<=.20	6	5	20	5	1	0	0	0	0	0	0	0	37	3	67	67
	>.20,<=.30	3	43	0	0	0	0	0	0	0	0	0	0	46	4	41	41
	>.30,<=.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	>.40,<=.50	0	0	0	0	0	0	0	1	1	0	0	0	2	2	50	50
	>.50	0	0	0	0	0	0	0	2	3	0	0	2	7	2	50	50
Total Contracts Traded														3,804			

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Appendix: Detailed price improvement statistics for the volume transacted through PIXL for June 2015.

Customer

Month Jun 2015

Order size greater than or equal to 50

Quoting at NBBO

Spread	Improvement													Total Contracts Traded	Average Number of Participants	Average Percent of Orders Initiator Receives	Average Percent of Contracts
	0	0.01	0.02	0.03	0.04	0.05	>.05,<=.10	>.10,<=.20	>.20,<=.30	>.30,<=.40	>.40,<=.50	>.50					
0.01	336,600	19,482	150	50	0	0	0	0	0	0	0	0	0	356,282	4	58	55
0.02	249,339	70,792	3,895	0	0	100	0	0	0	0	0	0	0	324,126	5	50	52
0.03	101,662	71,526	57,399	1,060	0	0	50	0	0	0	0	0	0	231,697	5	61	59
0.04	26,099	92,420	19,977	10,375	292	0	0	71	0	0	0	0	0	149,234	4	65	61
0.05	62,490	90,450	55,105	22,758	11,882	1,316	184	0	0	0	0	0	0	244,185	3	73	67
>.05,<=.10	30,803	67,871	64,901	51,274	37,126	34,612	13,706	0	0	0	0	0	0	300,293	3	71	65
>.10,<=.20	7,738	17,515	17,245	20,837	21,642	35,047	65,956	9,814	0	0	0	0	0	195,794	3	77	71
>.20,<=.30	4,348	1,712	2,030	2,899	3,012	5,539	29,925	19,546	804	0	0	0	0	69,815	2	77	71
>.30,<=.40	1,118	535	233	409	710	1,059	6,303	12,126	2,863	226	710	0	0	25,582	2	79	73
>.40,<=.50	506	70	50	0	200	1,995	2,676	7,037	12,114	754	100	0	0	25,502	2	84	82
>.50	204	106	175	55	140	305	2,817	4,502	7,219	3,376	1,837	3,873	0	24,609	2	79	73
Total Contracts Traded														1,947,119			

Customer

Month Jun 2015

Order size greater than or equal to 50

Not Quoting at NBBO

Spread	Improvement													Total Contracts Traded	Average Number of Participants	Average Percent of Orders Initiator Receives	Average Percent of Contracts
	0	0.01	0.02	0.03	0.04	0.05	>.05,<=.10	>.10,<=.20	>.20,<=.30	>.30,<=.40	>.40,<=.50	>.50					
0.01	27,800	1,884	499	50	200	0	0	0	0	0	0	0	0	30,433	2	81	75
0.02	35,590	11,471	622	50	100	0	0	0	0	0	0	0	0	47,833	5	60	58
0.03	12,347	8,053	2,556	200	0	0	0	0	0	0	0	0	0	23,156	4	60	54
0.04	4,359	5,968	1,577	333	200	0	50	0	0	0	0	0	0	12,487	5	55	50
0.05	6,857	3,180	2,241	350	192	58	0	66	0	0	0	0	0	12,944	3	67	57
>.05,<=.10	3,092	8,865	3,727	1,978	1,868	1,707	1,276	0	0	0	0	0	0	22,513	4	65	56
>.10,<=.20	1,396	1,166	1,566	936	3,017	1,834	3,570	867	0	0	0	0	0	14,352	4	63	54
>.20,<=.30	756	222	308	439	286	211	1,314	968	367	0	0	0	0	4,871	3	63	55
>.30,<=.40	265	20	40	100	50	100	417	227	181	0	0	0	0	1,400	2	80	77
>.40,<=.50	0	0	0	0	0	25	422	412	281	80	0	0	0	1,220	3	59	58
>.50	161	0	20	0	0	54	334	545	200	356	90	590	0	2,350	3	84	79
Total Contracts Traded														173,559			

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Appendix: Detailed price improvement statistics for the volume transacted through PIXL for June 2015.

Customer

Month Jun 2015

Order size less than 50

Quoting at NBBO

Spread	Improvement													Total Contracts Traded	Average Number of Participants	Average Percent of Orders Initiator Receives	Average Percent of Contracts
	0	0.01	0.02	0.03	0.04	0.05	>.05,<=.10	>.10,<=.20	>.20,<=.30	>.30,<=.40	>.40,<=.50	>.50					
0.01	237,725	4,834	299	29	74	0	54	38	28	1	2	1	243,085	4	60	55	
0.02	180,878	47,148	739	38	10	0	14	0	0	0	0	0	228,827	6	59	51	
0.03	47,015	72,147	7,275	194	25	20	0	0	0	0	0	0	126,676	4	70	64	
0.04	12,374	52,537	14,780	2,308	166	3	22	0	0	0	0	0	82,190	4	69	63	
0.05	46,339	106,505	75,489	45,435	25,890	1,319	145	33	0	1	0	0	301,156	3	79	77	
>.05,<=.10	15,551	54,794	80,860	80,445	59,733	48,659	36,077	109	2	9	6	0	376,245	3	77	73	
>.10,<=.20	5,211	10,077	16,954	26,705	35,861	51,717	151,770	18,039	19	16	0	0	316,369	3	82	77	
>.20,<=.30	1,380	1,428	1,719	2,874	4,519	7,224	56,166	50,276	3,132	52	0	0	128,770	3	84	78	
>.30,<=.40	302	429	512	643	734	1,708	16,064	36,617	10,012	934	4	0	67,959	3	84	78	
>.40,<=.50	133	265	149	227	465	660	5,411	18,890	12,446	3,218	377	0	42,241	3	85	78	
>.50	226	265	194	257	417	464	4,222	16,273	23,451	18,738	11,173	31,008	106,688	3	87	79	
Total Contracts Traded													2,020,206				

Customer

Month Jun 2015

Order size less than 50

Not Quoting at NBBO

Spread	Improvement													Total Contracts Traded	Average Number of Participants	Average Percent of Orders Initiator Receives	Average Percent of Contracts
	0	0.01	0.02	0.03	0.04	0.05	>.05,<=.10	>.10,<=.20	>.20,<=.30	>.30,<=.40	>.40,<=.50	>.50					
0.01	18,393	2,541	584	139	39	29	10	11	0	0	1	13	21,760	3	80	77	
0.02	16,841	10,130	818	113	56	27	42	0	0	0	0	0	28,027	5	66	59	
0.03	5,340	7,943	2,031	266	100	24	18	6	1	0	0	0	15,729	5	68	62	
0.04	2,234	3,847	1,855	448	138	8	4	0	0	0	0	0	8,534	5	68	60	
0.05	2,374	3,536	2,002	872	318	79	138	22	13	0	0	0	9,354	3	78	71	
>.05,<=.10	2,030	2,621	2,798	2,145	1,673	1,164	1,726	103	9	2	0	0	14,271	4	77	69	
>.10,<=.20	932	765	790	1,097	984	1,546	4,340	1,085	55	4	0	0	11,598	3	83	77	
>.20,<=.30	428	136	245	173	186	352	2,184	1,354	110	9	8	23	5,208	3	86	80	
>.30,<=.40	105	39	5	34	33	97	534	1,275	384	49	28	0	2,583	3	85	78	
>.40,<=.50	144	5	12	43	14	17	205	883	556	176	75	28	2,158	3	86	77	
>.50	149	42	7	42	26	30	156	868	1,226	1,000	565	2,223	6,334	2	87	76	
Total Contracts Traded													125,556				

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Appendix: Detailed price improvement statistics for the volume transacted through PIXL for June 2015.

Non-Customer

Month Jun 2015

Order size greater than or equal to 50

Quoting at NBBO

		Improvement												Total Contracts Traded	Average Number of Participants	Average Percent of Orders Initiator Receives	Average Percent of Contracts
		0	0.01	0.02	0.03	0.04	0.05	>.05,<=.10	>.10,<=.20	>.20,<=.30	>.30,<=.40	>.40,<=.50	>.50				
Spread	0.01	1,058	0	0	0	0	0	0	0	0	0	0	0	1,058	5	58	58
	0.02	1,000	0	0	0	0	0	0	0	0	0	0	0	1,000	5	47	47
	0.03	244	193	0	0	0	0	0	0	0	0	0	0	437	7	39	39
	0.04	150	150	225	0	0	0	0	0	0	0	0	0	525	5	81	81
	0.05	50	150	0	100	0	0	0	0	0	0	0	0	300	6	40	40
	>.05,<=.10	0	273	187	147	100	61	0	0	0	0	0	0	768	6	51	50
	>.10,<=.20	0	0	0	0	0	100	59	0	0	0	0	0	159	6	0	0
	>.20,<=.30	0	0	0	0	0	0	105	0	0	0	0	0	105	4	50	50
	>.30,<=.40	0	50	0	30	0	0	20	0	0	0	0	0	100	6	50	17
	>.40,<=.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	>.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Contracts Traded														4,452			

Non-Customer

Month Jun 2015

Order size greater than or equal to 50

Not Quoting at NBBO

		Improvement												Total Contracts Traded	Average Number of Participants	Average Percent of Orders Initiator Receives	Average Percent of Contracts
		0	0.01	0.02	0.03	0.04	0.05	>.05,<=.10	>.10,<=.20	>.20,<=.30	>.30,<=.40	>.40,<=.50	>.50				
Spread	0.01	0	100	0	0	0	0	0	0	0	0	0	0	100	6	0	0
	0.02	100	0	50	0	0	0	0	0	0	0	0	0	150	4	50	50
	0.03	299	50	0	0	0	0	0	0	0	0	0	0	349	3	78	63
	0.04	0	202	86	50	0	0	0	0	0	0	0	0	338	5	5	6
	0.05	56	200	0	0	0	0	0	0	0	0	0	0	256	6	40	40
	>.05,<=.10	0	0	0	171	0	0	0	0	0	0	0	0	171	3	50	50
	>.10,<=.20	0	0	0	44	88	25	52	0	0	0	0	0	209	7	50	50
	>.20,<=.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	>.30,<=.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	>.40,<=.50	0	0	0	0	0	0	0	66	0	0	0	0	66	2	50	50
	>.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Contracts Traded														1,639			

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Appendix: Detailed price improvement statistics for the volume transacted through PIXL for June 2015.

Non-Customer

Month Jun 2015

Order size less than 50

Quoting at NBBO

		Improvement												Total Contracts Traded	Average Number of Participants	Average Percent of Orders Initiator Receives	Average Percent of Contracts
		0	0.01	0.02	0.03	0.04	0.05	>.05,<=.10	>.10,<=.20	>.20,<=.30	>.30,<=.40	>.40,<=.50	>.50				
Spread	0.01	4,585	93	0	0	0	5	0	0	0	0	0	0	4,683	4	60	60
	0.02	1,289	231	0	0	0	0	0	0	0	0	0	0	1,520	5	56	48
	0.03	203	212	0	0	0	0	0	0	0	0	0	0	415	6	68	60
	0.04	73	240	18	0	0	0	0	0	0	0	0	0	331	6	75	74
	0.05	47	205	101	28	0	35	0	0	0	0	0	0	416	4	76	72
	>.05,<=.10	44	110	51	63	47	5	5	0	0	0	0	0	325	5	71	61
	>.10,<=.20	2	25	41	10	109	23	165	29	0	0	0	0	404	5	71	69
	>.20,<=.30	0	0	0	0	0	10	6	22	0	0	0	0	38	4	69	58
	>.30,<=.40	4	0	0	0	0	3	12	29	0	0	0	0	48	3	68	66
	>.40,<=.50	0	0	0	0	0	0	0	18	3	7	0	0	28	5	75	75
	>.50	0	0	0	0	0	0	5	25	19	0	0	11	60	6	59	59
Total Contracts Traded														8,268			

Non-Customer

Month Jun 2015

Order size less than 50

Not Quoting at NBBO

		Improvement												Total Contracts Traded	Average Number of Participants	Average Percent of Orders Initiator Receives	Average Percent of Contracts
		0	0.01	0.02	0.03	0.04	0.05	>.05,<=.10	>.10,<=.20	>.20,<=.30	>.30,<=.40	>.40,<=.50	>.50				
Spread	0.01	290	23	0	0	0	0	0	0	0	0	0	0	313	2	64	57
	0.02	151	198	0	2	3	0	0	0	0	0	0	0	354	5	61	57
	0.03	27	17	40	0	0	0	0	0	0	0	0	0	84	5	64	60
	0.04	43	18	25	0	0	0	0	0	0	0	0	0	86	5	64	64
	0.05	0	55	11	0	0	10	20	0	0	0	0	0	96	4	62	51
	>.05,<=.10	40	37	50	39	11	0	1	0	0	0	0	0	178	4	73	73
	>.10,<=.20	0	0	0	0	28	1	25	0	0	0	0	0	54	7	0	0
	>.20,<=.30	0	0	0	0	0	0	44	3	0	0	0	0	47	3	80	65
	>.30,<=.40	0	0	0	0	0	0	25	0	0	0	0	0	25	4	48	48
	>.40,<=.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	>.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Contracts Traded														1,237			