

NASDAQ ACCESS FEE EXPERIMENT

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INTRODUCTION

On November 4, 2014 Nasdaq announced a fee pilot experiment where the access fee for fourteen stocks traded on Nasdaq would be lowered to \$0.0005/share or \$0.50 per 1000 shares and the liquidity provider rebate would also be lowered to \$0.0004/share or \$0.40 per 1000 shares for displayed liquidity. Accompanying that announcement was a commitment by Nasdaq to provide the industry with statistical reports of the effects of the experiment on a monthly basis. The purpose of these statistical reports is twofold. First, establish a common set of facts upon which the industry could agree when evaluating the experiment. And second, take the industry behind the facts by providing insight into the dynamics which Nasdaq is uniquely positioned to observe.

The access fee experiment began on February 2, 2015 and this is the first of the monthly statistical reports for the experiment.* This report will focus on two readily observable measures, market share and displayed liquidity, in order to begin establishing a common factual understanding of the effects of the experiment. By several measures, Nasdaq's market share has declined in most, but not all, of the stocks included in the experiment. Nasdaq's displayed liquidity has also declined in most but not all of the experiment stocks.

This report will also discuss some of the statistical and behavioral issues inherent in evaluating an experiment involving fourteen stocks. We believe that a technique called difference-in-difference ("diff-in-diff") provides the necessary statistical rigor for evaluating the experiment. We also find that the experiment has generated a great deal of behavioral change among certain market participants. We now turn to a more detailed analysis of these findings.

Our analysis of the impact of the pricing pilot compares various statistics between January ("Pre") and February ("Post"). There may be factors other than the pilot that impact these statistics, such as changes in market-wide volatility or volume. It is useful, therefore, to compare changes in the pilot stocks with a set of similar non-pilot control stocks. The "difference-in-difference" method proceeds by calculating the change in a variable of interest (such as displayed size) for both pilot and control groups, then finding the difference in these differences. This final difference is the best estimate of the impact of the pilot.

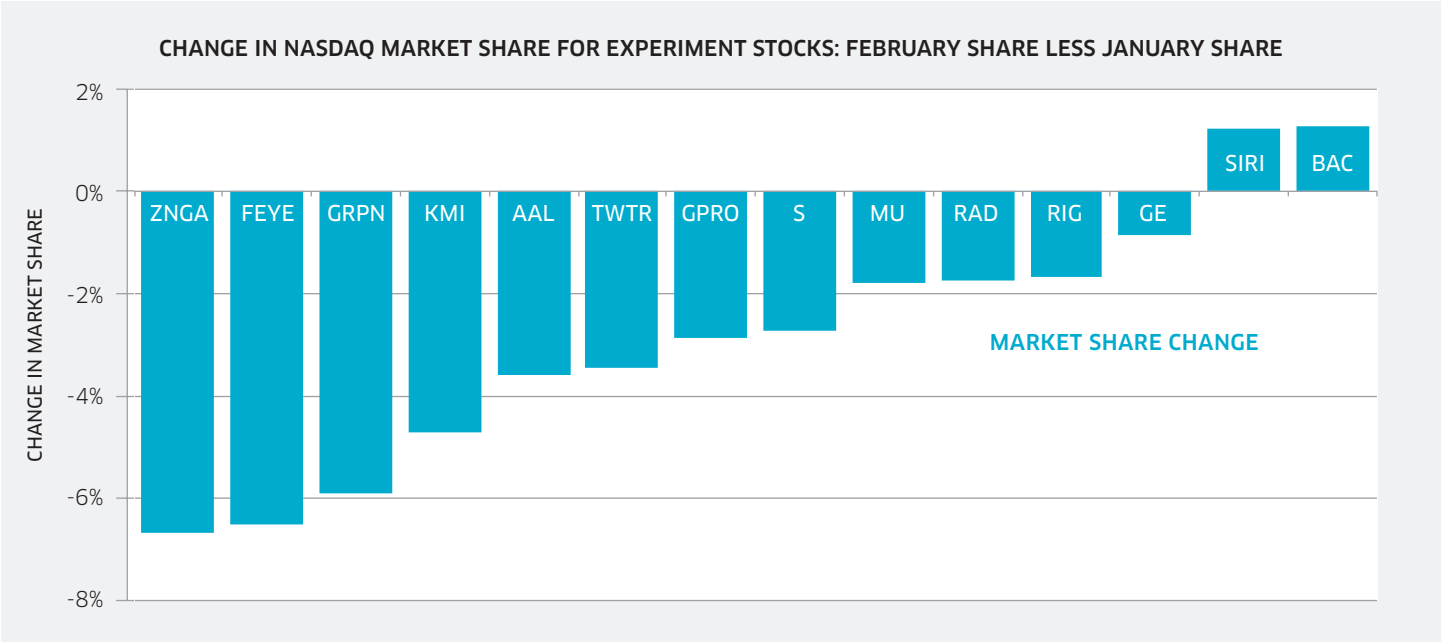
FINDINGS

Market Share

The experiment's reduction in the access fee and in the liquidity provider rebate are expected to create offsetting effects on market share since a lower access fee is likely to increase market share and a lower liquidity provider rebate is likely to decrease market share. In aggregate, Nasdaq's equally-weighted market share in the experiment stocks declined by 2.9 percentage points from January to February. This compares to a decline of 0.9 percentage points in Nasdaq market share in the control stocks. The change observed in the experiment stocks is statistically significant using the diff-in-diff measure. The considerable variation in Nasdaq market share across the experiment stocks is an interesting result (Figure 1). While the experiment stocks were intentionally chosen to represent securities with varying levels of size, trading activity, and stock price, the variation in the change in market share, almost 10 percentage points from high to low, at the individual stock level is greater than was anticipated.

* See Securities Exchange Act Release No. 73967 (December 30, 2014), 80 FR 594 (January 6, 2015)(SR-NASDAQ-2014-128)(available at http://nasdaq.cchwallstreet.com/NASDAQ/pdf/nasdaq-filings/2014/SR-NASDAQ-2014-128_Notice_Approval.pdf).

Figures 1

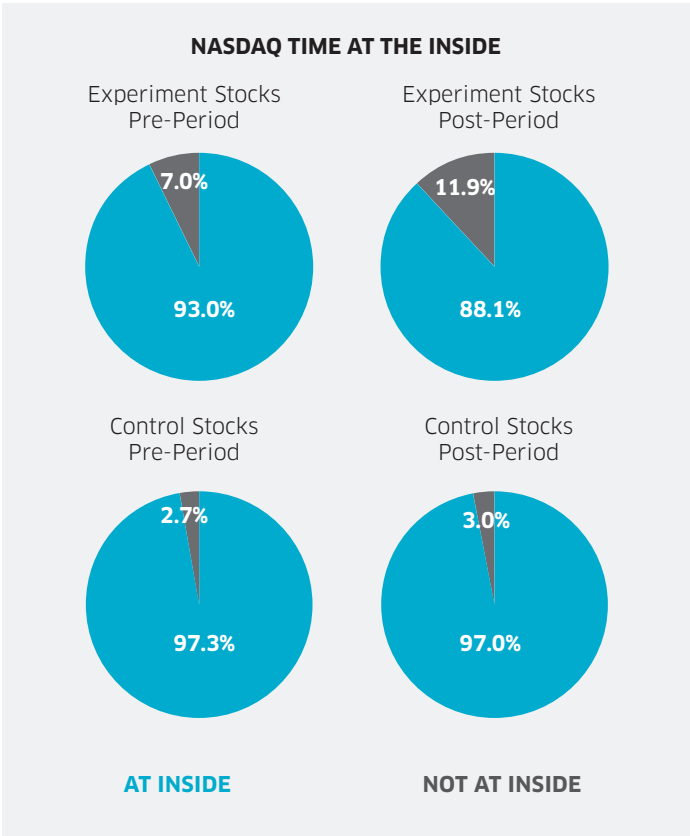


Displayed Liquidity

The experiment's reduction in the liquidity provider rebate had the expected negative impact on the displayed liquidity available on Nasdaq. We look at two measures of displayed liquidity, the percentage of time where Nasdaq is displaying prices equal to the National Best Bid and Offer (NBBO) and the time weighted number of shares displayed by Nasdaq at the NBBO. We do not explicitly look at changes in Nasdaq's quoted spread as that measure will be highly correlated with the time at the NBBO statistic.

In aggregate, Nasdaq's time at the NBBO in the experiment stocks declined 4.9 percentage points from 93.0% in January to 88.1% February (Figure 2). This compares to a decline of 0.3 percentage points in the control stocks. The difference between the experiment and control stocks is statistically significant. As with market share, there is considerable variation across individual stocks. Time at the NBBO declined in 13 experiment stocks and rose in 1. The range of changes in time at the NBBO was from a decrease of 21.4 percentage points to an increase of 0.7 percentage points. Clearly, there is significantly more variation in time at the NBBO than there is in market share which underscores the point that displayed liquidity is only one of the factors affecting market share in this experiment.

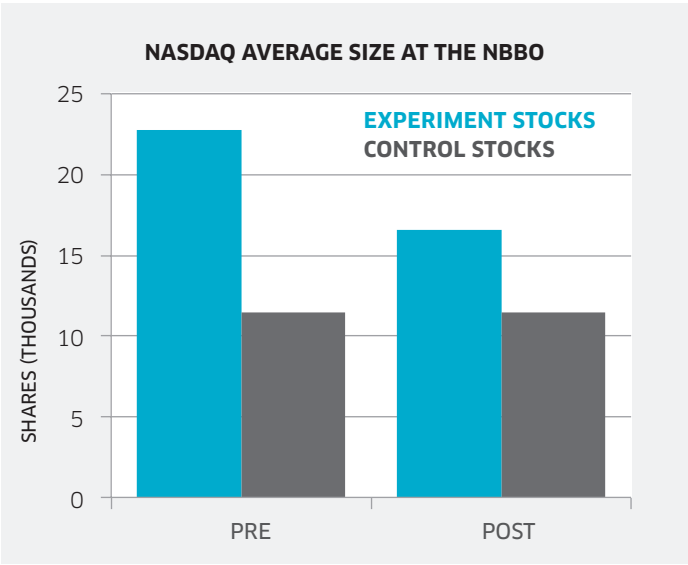
Figure 2



Note: Pre Period is January 2015 and Post Period is February 2015

The number of shares displayed by Nasdaq at the NBBO shows considerable variation on a month to month basis in many stocks including those in the access fee experiment. Consequently, there is no statistically significant change in Nasdaq's displayed size in the experiment stocks. In absolute terms, displayed shares at the NBBO declined in 12 of 14 stocks from an average of 22,800 shares in January to 16,600 shares in February but to reiterate, this decline is within the range of variation we commonly observe. So the decline in the displayed shares should not be taken as a definitive impact of the experiment. As the experiment continues, we expect some of the month-to-month uncertainty to resolve itself as discussed more fully later in this report.

Figure 3



Note: Pre Period is January 2015 and Post Period is February 2015

SAMPLE SIZE

Some commentators on the access fee experiment have indicated that a voluntary change in the access fee by one exchange in fourteen stocks does not tell you what would happen if there were a mandatory change in the regulatory maximum access fee across all exchanges in a considerable number of stocks of NMS stocks. We do not disagree with that point. Nasdaq believed in launching the experiment that fourteen stocks were enough to induce behavioral changes with statistically and economically measurable changes. The results from February have proven that belief was correct.

Statistically and Economically Significant Change

Fourteen stocks provide a sufficient sample size for testing of statistical, as well as economic, significance of the access fee experiment as should be clear from the analysis of market share and time at the NBBO. What should also be clear is that there is considerable noise in certain variables of interest, such as displayed size, which makes it difficult to distinguish between random noise and the effects of the experiment. A number of variables of interest, such as price impact, in the experiment stocks have not been covered in this report simply because the changes were not statistically significant based on the results of the first month of the experiment. Furthermore it is clear to us that some, but not all, market participants engaged in significant behavioral change and experimentation during February as is discussed more fully in the next subsection.

There are several reasons to believe that the effects of the experiment will become clearer over time. The first reason is that the pace of behavioral change by market participants will slow as the experiment matures allowing more accurate measurement. The second reason is simply that more time means more data and more data improves the quality of statistical tests.

Behavioral Changes

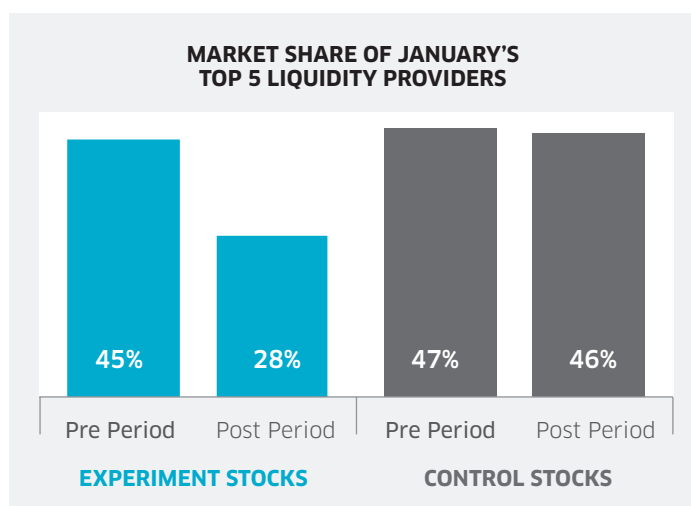
Trading in electronic order books is often described as a cart-before-the-horse problem. You need both active and passive orders for trades to occur but an electronic order book needs passive displayed orders in order to attract active orders. So starting with displayed orders seems appropriate in looking for behavioral change due to the experiment.

We calculate the percentage of liquidity providing volume executed on Nasdaq by the top five liquidity providers in each of the fourteen stocks in January and then the percentage of liquidity providing volume by the same "January" top liquidity providers in the same fourteen stocks in February. Fourteen stocks and five top liquidity providers in each stock means there are 70 stock-liquidity provider pairs of pre- and post- data under consideration for the experiment stocks and similarly for the control stocks.

The "January" top liquidity providers accounted for 45.2% or the liquidity in the experiment stocks in January and 28.4% in February, a decline of 16.8 percentage points. In the control stocks the decline from January to

February of the top “January” liquidity providers was only 1 percentage point. The decline in liquidity provision in the experiment stocks from the “January” top five is statistically and economically significant. Across the 70 stock-liquidity provider pairs the range in the change in liquidity provision was from an increase of 10.4 percentage points to a decrease of 14.1 percentage points. Liquidity provision decreased in 50 stock-liquidity provider pairs and increased in 20 pairs. The mean change was a decrease of 3.4 percentage points. Not surprisingly, almost all of the top “January” liquidity providers showing large changes in liquidity provision from January to February would be considered rebate sensitive traders and their reaction to the experiment is as expected.

Figure 4



Note: Pre Period is January 2015 and Post Period is February 2015

Interestingly enough, active liquidity taking behavior also showed considerable variation when the experiment was launched with firms generally considered fee sensitive leading the way. There are sharp changes in activity on the part of individual firms during February so liquidity taking behavior in aggregate is difficult to characterize and will be left to subsequent reports.

CONCLUSION

This first report has covered only select topline measures affected by the access experiment. Market share, displayed liquidity, and individual firm behavior all indicate that many market participants reacted to the fee experiment, in some cases dramatically. In subsequent reports reactions to the experiment will stabilize and we will turn to other topics such as the fill rate for active and passive orders, price impact, the quality of the quote, differential effects on Nasdaq- and NYSE-listed stocks and other topics. By doing so we hope to provide the industry with an agreed upon set of facts with respect to reactions to the experiment as well as to provide insights into reactions not readily apparent to outsiders. We have lower expectations that the facts we provide, even if they are agreed upon, will produce an agreed upon set of conclusions and look forward to a lively discussion about the implications of Nasdaq's access fee experiment.

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