

Individual Investors' Trading Strategies and Responsiveness to Information – A Virtual Stock Market Experiment*

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Abstract

We conduct a novel virtual stock market experiment that aims to investigate links between public information and short-term investment behavior at the individual decision-making level. In particular, we focus on individual investors' trading strategies in response to three types of public information – about prices, macroeconomic news, and relevant individual-stock information. The distinguishing feature of our experiment is the use of factual contemporaneous news items directly related to the stocks in subjects' portfolios. This allows us to find out in detail what kind of information drives individual investors trading behavior. Our main finding is that in a substantial majority of cases, the subjects adhere to positive feedback trading strategies. Also, when using stock price index data, the subjects predominantly follow the index, i.e. buy after an increase in its value and sell after a decline.

Keywords: Individual Investors, Public Information, Feedback Trading

1 Introduction

Theoretical research as well as empirical evidence offer mixed results regarding individual investor trading strategies and motives behind them. Are investors trading on information or are they simply trying to predict prices based on fads and/or behavioral biases? If investors follow certain patterns, what are those – trend-chasing or contrarian? Do investors watch closely news related to stocks in their portfolios *and* respond to them accordingly or perhaps they focus on market-wide macroeconomic information?

Empirical investigations into individual investor behavior have thus far focused on analyses of macro data. Among the most oft-cited papers in this vein is the work of Lakonishok, Shleifer, and Vishny (1994)[4].

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The authors find evidence that individual investors use positive feedback trading strategies and attribute it to irrational extrapolation of past growth rates. On the other hand, there is ample evidence for contrarian trading behavior among individual investors, a notion closely related to the so-called disposition effect. The first to provide theoretical background and empirical analysis of the disposition effect were Shefrin and Statman (1985)[5], who proclaim that individual investors tend to employ negative feedback strategies by selling past winners. More recently, and proving the issue to be of importance not only to academics but also to finance industry professionals, Tanaka (2006)[6] finds evidence that “individual investor activity exhibits a strong negative correlation with the TOPIX”.

Whereas these and numerous other similar studies use aggregate market data, in a controlled experiment we were able to gather detailed data on individual trading strategies – this was the main motivation behind our project. The other driving force behind our experiment was the need to advance our understanding behind the very motives for trading by individuals, particularly concerning the utilization and responsiveness to information. We feel conducting such an experiment was necessary to directly examine the relationship between trading behavior and information – we used real-world information and real stocks with real prices, albeit in a virtual stock market environment.

This experiment aims to investigate links between public information and short-term investment behavior at the individual decision-making level. As these issues are of particular importance in financial markets, we have designed a virtual stock market experiment to investigate the relevant decision processes directly. In particular, we focus on individual investors’ trading strategies in response to public information – about prices, macroeconomic news, and relevant individual-stock information. Our principal goals are to:

1. check whether investors do actually take into account contemporaneous information when making their trading decisions;
2. find out specifically which information they use;
3. examine whether investors adhere to distinctive trading patterns, i.e. whether they use positive feedback or negative feedback strategies.

Our main finding is that in a considerable majority of cases (roughly 75%) the subjects employ positive feedback trading strategies with respect to individual stock prices. Moreover, in about 90% of the cases where they use stock index data, the subjects follow the index – they buy after a rise in Nikkei 225 and sell after a drop in the value of the index. Also, for positive feedback trades with respect to individual stock price data, in roughly 70% of cases the subjects follow company-specific data in addition to the company stock price: they buy after good news and sell after bad news.

2 Experiment Design and Procedures

25 Keiai University students participated. The experiment spans a week between 10th and 17th of March 2008. The main procedures are summarized below.

- On the first day (10th of March) students were gathered and given a lecture explaining briefly the workings of a stock market. In particular, the relationships between the fundamental value, price and various types of information were explained and their complexities were duly pointed out.
- Following the lecture, the subjects were introduced to the Nomura Virtual Stock Market, where each subject was provided with their own account. A portfolio of ten stocks was chosen and each subject would during the week of the experiment (five times) have the opportunity to trade on these stocks (whilst adding new stocks was disallowed, selling all the holdings of a particular stock was not) in the virtual market based on information provided daily to the subjects' e-mail addresses by the instructors.
- Starting from Monday the 10th through Thursday the 13th (four days), a daily newsletter with information relevant to the stocks in the portfolio was sent to the participants. Subjects were divided into two groups according to differences in portfolio composition and in information provided.
- Out of ten stock in the portfolios, information about five companies was sent to each subject. Subjects in group B received each day five pieces of information about four selected stocks plus ten pieces of information about the Toyota stock. Subjects in group A received each day five pieces of information about the same three stocks as did group B and the Toyota stock plus ten pieces of information about one remaining stock.
- Company-specific information sent on a particular day included the closing price, percentage change from the previous day and turnover as one piece of information plus four (nine in case of one stock) pieces of public information related to the companies in subjects' portfolios that were reported on that day in the media.
- All the subjects also received common, economy-wide news package including details of index and exchange rate movements on a particular trading day.
- The information newsletter was sent by 4:00 pm on each "information day"; the subjects decided on their trades and made appropriate transactions in the Nomura Virtual Stock Market within two hours after receiving the newsletter. The subjects would then indicate in detail which information items propelled them to make their trading decisions, by e-mail sent to the instructors.

- The trades were reflected in the subjects' virtual market portfolios the morning following the day particular buy and sell orders were entered.
- On the last day of the experiment, 17th of March, the subjects were gathered again and the final payments are made, including heterogeneous rewards according to the subjects' trading performance. Subjects were also asked to fill out a final questionnaire on that day.
- The structure of payments to the participants was made up of three components: (i) a uniform payment for participation in the opening lecture and instructional lesson; (ii) a predefined daily compensation for proper reporting of information used for trading; (iii) performance-related compensation after the completion of the experiment.

A few remarks are in order.

As we used factual contemporaneous information as it was made public, there was no possibility to bias the information in favor of good or bad news.

All our subjects were beginners when it comes to stock market trading. The trades were only virtual and the subjects did understand that they were price-takers. This experiment did not involve trade between subjects and thus there was no incentive for the subjects to communicate with each other. Moreover, as the experiment was conducted during spring break, the possibility of contact between subjects was effectively attenuated. We thus have reason to believe our results indeed reflect individual decision making processes.

This round of the experiment¹ lasted only five days as the burden to the subjects during such an experiment is quite substantial: a subject is provided with 35 pieces of information every day for four consecutive days, has to log on to their account, make the trades and report back. Longer span, though it would provide us with more data, entails the risk of more invalid responses.

3 Main Results

In cases where the subjects reported using individual stock price data when deciding their strategies, in 44 cases out of 59 (or roughly 75%) they used positive feedback trading strategies, i.e. they submitted a buy order following a price increase or they submitted a sell order following a price decline.

Out of the 44 positive feedback trading cases, in 31 instances (or roughly 70%) subjects reported also using other, company-specific news when forming their strategies. Furthermore, in 28 out of these 31 instances (or roughly 90%), the subjects were responding to those company-specific information items, i.e. they bought after good news and sold after bad news.

¹The next round is planned to be conducted in the fall of 2008.

For subjects who reported using the Nikkei 225 stock index data, in 38 out of 42 cases (or roughly 90%) the subjects exhibited positive feedback trading behavior, i.e. they bought after an increase in the value of the index and sold after a decline.

There were no considerable discernible discrepancies between the trading strategies of subjects with heterogeneous portfolios or those of subjects who were provided with different information packages.

In addition to the above-mentioned results on individual trading strategies and information, we obtain a number of results on investment performance, trading frequency and their relationships to used information, as well as on responsiveness to different types of information².

4 Discussion

Individual investors who consider investing in individual stocks have a lot of information to process: they are bombarded with a flood of information, some of which might be relevant for their decisions, some of which might be not. Perhaps instead of trying to obtain that information people simply follow their gut-feelings or a fad and are thus “behavioral” traders. There are numerous theories as well as empirical studies in support of either thesis and most probably it is the combination of information and sentiment that drives individual investor behavior in the end. Our study offers a new, experimental approach based on real-world information provision to add to the body of extant research.

Amidst several theoretical papers that our experimental results relate to is the seminal work of De Long, Shleifer, Summers, and Waldmann (1990)[2]. Our results lend support to their theory. In their model, early buying or selling by rational informed speculators triggers positive-feedback trading from less informed investors. This type of behavior by an individual trader – a “less informed investor”, is exactly what characterizes the participants of our experiment, who trade on public news and in that they most probably follow the trades of early-informed speculators or insiders.

On the empirical front, our results support the findings of both Bange (2000)[1] for the American stock market, who claims that “shifts in equity portfolio holdings reflect positive feedback trading”, as well as Kamesaka, Nofsinger, and Kawakita (2003)[3], who find in the Japanese market that “individual investors appear to be short-term positive feedback traders”. What is more important, we were able to investigate and identify the motives behind such trading behavior. Specifically, we were able to examine whether public information was taken into account, and if so, what kind of public information it was.

The issue of whether individual investors are positive feedback or negative feedback traders, if either, is not resolved and does need further research. It is particularly important as individual investors are becoming

²These tangential results will be discussed in detail in the full version of the paper.

increasingly active and influential in today's financial markets, not least because of the spread of the Internet and the resulting abundance of online-trading opportunities. In fact, Tanaka (2006)[6] reports that while individual investors occupied less than 20% of the first section of the Tokyo Stock Exchange around the turn of the century, their share of trading started to grow rapidly in 2003 and by the end of 2005 stood at almost 40%. The growing importance of individual investors is bound to have serious impact on liquidity, volatility, and other crucial areas of financial markets. This experimental project attempts to contribute a step forward in our journey to a deeper understanding of individual trading behavior and especially of the motives behind specific investment decisions.

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