
Effect of Behavioral Biases on Market Efficiency and Investors' Welfare

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Individual investors, in general, trade more than is good for them. Behavioral finance offers several explanations for why this is true. The behavioral biases of individual investors as well as the constraints placed on institutional investors by risk aversion and other limits of arbitrage act in opposition to total market efficiency. The trading behavior of the two constituencies creates a tug of war between stock prices and fundamentals.

Benjamin Graham once said, "The investor's chief problem—and even his worst enemy—is likely to be himself." Why? Because to really understand finance, an investor has to understand probability, and human beings have difficulty intuitively grasping this concept. Consequently, investors use a plethora of mental shortcuts to make probability assessments. Sometimes, those mental shortcuts work reasonably well. But often, they lead to systematic biases, and these systematic biases lead many investors astray.

Eugene Fama, one of the major proponents of the efficient market hypothesis, defines an efficient market as one "in which prices always 'fully reflect' available information." Of course, not everybody agrees with Fama that markets are efficient. Warren Buffett once said, "I'd be a bum in the street with a tin cup if the markets were efficient." Indeed, if the markets are efficient, there is no room for a Buffett—no room for active money management. Personally, I believe markets are not fully efficient. Some investors do generate a true alpha. But it is difficult to do, and it is earned at the expense of ordinary investors, who make persistent and thoroughly typical mistakes.

Individual Investors and Market Efficiency

The behavioral finance view of markets and market efficiency encompasses five basic tenets. The first is

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that institutional, or informed, traders are constrained by risk aversion and other limits of arbitrage; in other words, informed traders are unable to *always* keep prices efficient.

A second tenet of behavioral finance is that the trading decisions of individual investors are biased. Individual investors make investment decisions for reasons that are often unrelated to the fundamental value of a company or a stock.

Third, the purchases and sales of individual investors are highly correlated. If, instead, these actions were random, these trades might be expected to more or less cancel each other out. On the contrary, based on what other researchers and I have found, individual investors tend to be systematic in their decision making. They tend to get enthusiastic about the same stocks at the same time and thus to buy and sell the same stocks at the same time.

This herding behavior leads to the fourth tenet, which is the potential for individual, or uninformed, investors to create buy-sell imbalances that drive prices away from fundamental value.

And finally, over time, prices will be pushed back toward fundamental value by informed traders.

This presentation will focus mainly on the biased trading decisions of individual investors, which has been the subject of most of my research.

Informed Traders' Constraints. That informed traders are constrained by risk aversion and other limits of arbitrage runs counter to the typical argument used to support market efficiency: Wealthy,

well-informed, risk-tolerant investors “know” where prices should be, and when prices deviate from that point, they push prices back in line. These wealthy, well-informed arbitrageurs cannot always push prices back, however, because of the associated risks. These risks include information risk, model risk, liquidity risk, fundamental risk, noise-trader risk, and agency risks.

For example, in March 1998, Julian Robertson and George Soros would have been on anyone's short list of informed investors. Both ran hedge funds with reasonably similar exposures to high-tech stocks in 1998 and early 1999. But by the summer of 1999, Robertson pulled out of the high-tech market, stating publicly that the market was irrational and overvalued. Soros made the opposite bet and upped his fund's exposure to 60 percent. So, clearly, it cannot be that obvious, even to informed investors, where prices are going or Robertson and Soros would not have placed opposite bets.

Who was right? On the one hand, Robertson was right because nine months after he made the decision to get out of the high-tech market, it collapsed. On the other hand, Soros was right because in the fall of 1999, the NASDAQ went wild—before it collapsed. Another consideration is that money was pouring into Soros' hedge fund (\$250 million) in November 1999, while Robertson was hemorrhaging investors, ultimately closing his fund in March 2000. This example highlights one of the many risks that institutional investors face: They may make the right decision but make it too early. Clients often do not have a great deal of patience for being on the wrong side of the market, even briefly.

Individual Investor Trading Decisions. Four biases typical of individual investors affect their trading behavior. Individual investors tend to be overconfident, trade to reduce regret, have limited attention, and love to chase trends.

■ *Overconfidence.* Overconfidence is the state of believing that your information is more accurate and precise than it is and that your investment ability is outstanding when it really is not. Overconfident investors trade more frequently than is in their best interest and earn less than if they adopted a more conservative buy-and-hold strategy. They tend to underdiversify because, believing they are right, they see no reason to hedge. Volatility also rises in a market populated by overconfident traders who trade frequently and, often, speculatively.

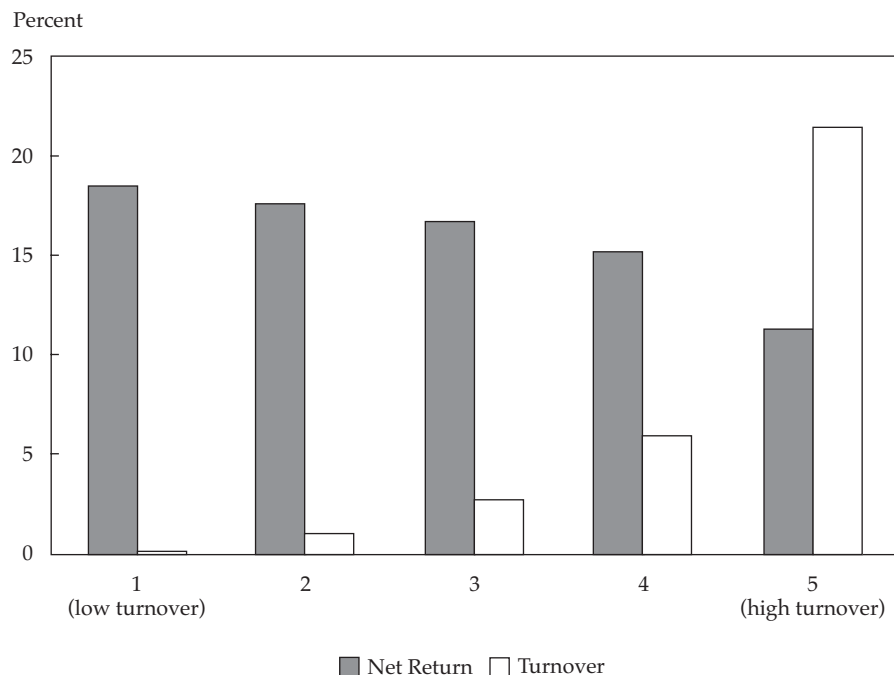
I have tested this assertion in several studies, both alone and together with my colleague Brad Barber. My first study was based on the trading records of 10,000 clients of a discount brokerage firm (Odean 1999). I wanted to know if these investors

were trading more than they should, so I calculated whether the stocks they bought outperformed those they sold by enough to cover their trading costs. Based on a one-year horizon, the stocks these investors bought, on average, underperformed the stocks they sold by 3.22 percentage points (pps), and that was before deducting trading costs—commissions and the bid-ask spread.

Of course, reasons other than pure speculation spur trading, such as harvesting tax losses or meeting liquidity needs. Therefore, I filtered out trades likely to have been made for nonspeculative reasons. For example, only those trades where the investor sold a stock for a profit and bought another stock within three weeks were selected. A profit-taking sale is not likely to be tax motivated, and if it is followed quickly by a purchase, it is also not likely to be liquidity driven. Filtering out trades more likely to have been made for nonspeculative reasons left me with a subset of trades that were likely speculative. I reran my analysis on these speculative trades, expecting that investors' performance would improve. To my surprise, I found the results were actually worse. The stocks purchased underperformed the stocks sold by 5.07 pps over a one-year horizon and by 8.61 pps over a two-year horizon. As Daniel Kahneman has observed about this study, “It is expensive for these people to have ideas.”

With a second, larger dataset (78,000 investors) from a discount brokerage firm, Barber and I retested the overconfidence hypothesis from a slightly different perspective (Barber and Odean 2000). We calculated whether investors who traded more actively earned less. Using portfolio turnover, we sorted the 66,465 investors in our sample who were trading common stocks into five groups ranging from buy-and-hold investors to the most active traders. We calculated the average net return (after commissions) for each group. **Figure 1** shows the average net return and monthly turnover for each of the five groups. The buy-and-hold investors (Group 1) outperformed the most active investors (Group 5), on average, by about 6 pps a year.

We revisited the overconfidence theory in another study in which we divided a large sample of investors into those likely to be more overconfident and those likely to be less overconfident (Barber and Odean 2001). Lacking a psychological assessment for each of the traders in our sample, we used gender as a proxy for likely overconfidence. Psychologists have found that men and women differ in their average level of overconfidence, particularly so in areas perceived to be in the male domain, such as mathematics, the mathematical sciences, and finance. To the surprise of some, it is men who tend to be more overconfident in these areas.

Figure 1. Monthly Turnover and Annual Performance of Individual Investors

Using the same discount brokerage dataset described earlier, we determined the gender of the person who opened the account for about 30,000 accounts. We then separated the sample into two subsets: accounts opened by males and accounts opened by females. To control for situations where an account was opened by one spouse but possibly traded in by the other spouse, we divided each gender subset into two groups—married and single.

Our first prediction was that men would trade more than women, and in fact, that is what we found. Men traded 45 percent more actively than women, and single men traded 67 percent more actively than single women. Our second prediction was that trading would hurt men's returns more than women's. For every account, we calculated annual buy-and-hold returns—what that account would have earned if the investor had not traded at all—based on portfolio holdings at the beginning of each year. Next, we calculated the actual return, less commissions, earned in each account each year. The difference between the buy-and-hold return and the actual return is what we called an "own benchmark annual net return."

So, if an investor makes a couple of well-informed or just lucky trades, the own benchmark return will be positive. If the investor does not trade at all, it will be zero because the buy-and-hold and the actual returns will be the same. And if the investor makes ill-informed or poor trades, the own benchmark return will be negative. Not surprisingly, on average, both men and women underperform the

buy-and-hold return, so the own benchmark return tends to be negative for both men and women. More significant, in our opinion, is that it is more negative for men than for women. Men underperform the buy-and-hold approach by about 1 pp more a year than do women, and single men underperform by about 1.4 pps more a year than do single women.

Online trading is an environment where investors can easily become overconfident. I recall an advertisement some years back that said, "Online trading is like the Old West. The slow die first." Although the victor in the old western gunfights was the quickest draw, by the time the credits began rolling, the gunslingers were usually lying dead in the street.

Barber and I thus analyzed the trading patterns and returns of 1,607 people who switched from telephone-based trading to computer-based trading between 1991 and 1996 (Barber and Odean 2002). We found that most investors had better results before they began trading online; most accelerated their trading and traded more speculatively after going online. Subsequent to going online, their performance dropped. Our analysis focused on early adopters of online trading. Unfortunately, we have not been able to acquire more recent data with which to replicate this study.

One impetus for individual investors to trade more frequently online is a misperception of trading costs. They focus on the low commission rates and rationalize that at \$8 a trade, how can I lose? In addition to spending the \$8 to trade, individual

investors pay the bid–ask spread and, typically, incur speculative losses; they are basically paying low fees to lose money.

More frequent trading in an online environment can also occur because frictions that once took the place of self-control have been removed. Online trading may simply be too easy to do for some investors. They may trade more impulsively than they otherwise would.

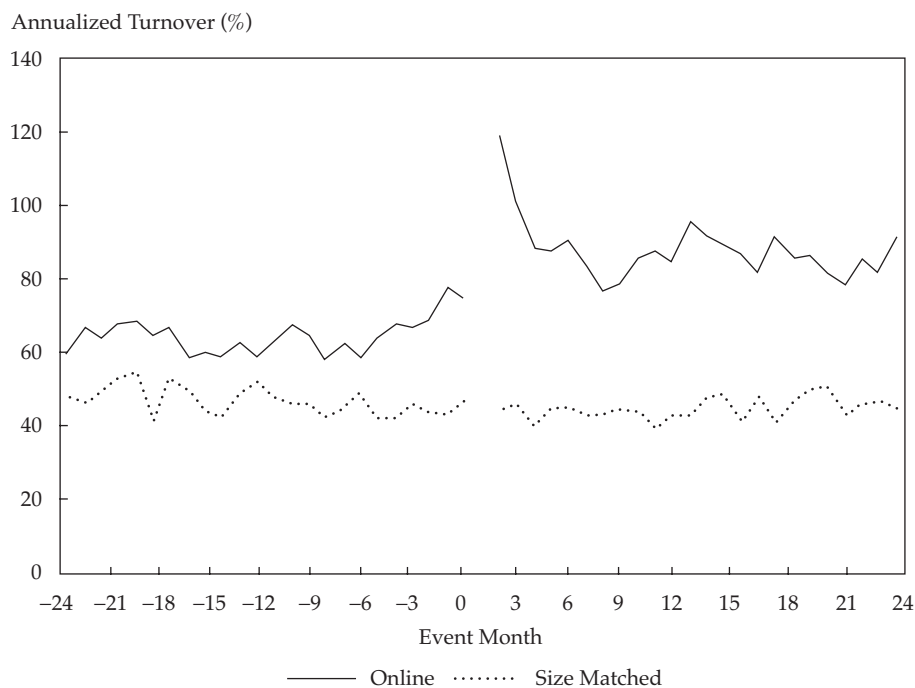
Figure 2 shows the annualized turnover of the accounts in the online trading study before and after the commencement of online trading. The first online trade is in Month 0 of this event study. The accounts that switched to online trading are shown by the top line. For each of these accounts, we identified another account of similar size in the sample that was not switched to online trading. Notice that the online investors tended to be more active investors even before they went online. And immediately after going online, they began to trade very actively, as if they were trying out a new toy. Of more serious concern, however, is that after this initial flurry of trading activity, turnover settled at a higher plateau than before these investors started trading online. They become more active—but not better—investors.

Figure 3 shows the performance results for the accounts that were moved online. The top line is gross returns, and the bottom line is net returns. Both are market adjusted (i.e., reduced by the market return for

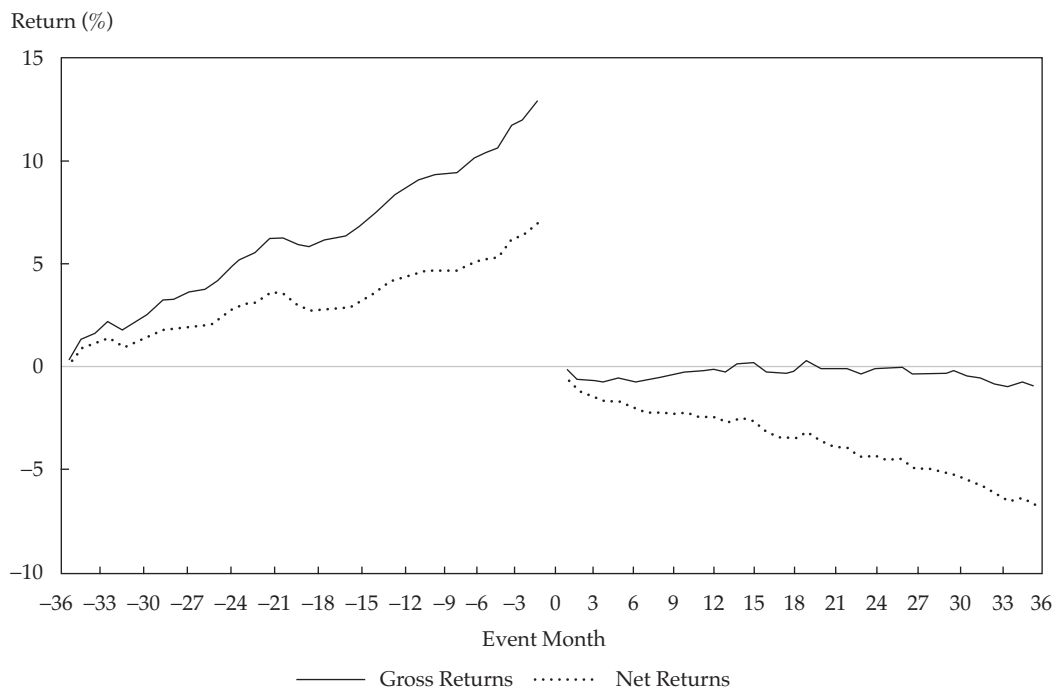
the period). Before going online, these investors were beating the market in terms of both gross and net returns. After going online, their gross returns were more or less equivalent to the market, but their net returns were below that of the market. I doubt that these investors had skill that they suddenly lost when they went online. Rather, I suspect that their preonline performance was caused by luck and that after making the switch, their luck was average but their turnover—and trading costs—was high. In any large group of traders, some are likely to do well for a while. By analogy, imagine that you have 1,000 coins and you flipped each of them 10 times. On average, one of those coins would come up heads all 10 times. Suppose that coin were a person; that person might begin to feel that he or she was remarkably accomplished because he or she could consistently beat the market. In a sample of thousands of investors, some will do well in any period. These investors were the ones most likely to go online to take advantage of the new trading technology. Ironically, the new technology took advantage of them instead.

Another study that my colleagues and I conducted was to look at day traders in Taiwan (Barber, Lee, Liu, and Odean, forthcoming). We found, not surprisingly, that most day traders lose money. One slightly surprising finding, however, was that the most active day traders, at least in Taiwan, do make

Figure 2. Annualized Turnover by Event Month



Note: Month 0 represents the first online trade.

Figure 3. Cumulative Market-Adjusted Return by Event Month

Note: Month 0 represents the first online trade.

gross profits. But these profits are more than offset by transaction costs. That is, the stocks that active day traders purchased performed slightly better than the stocks they sold but not by enough to recoup their transaction costs.

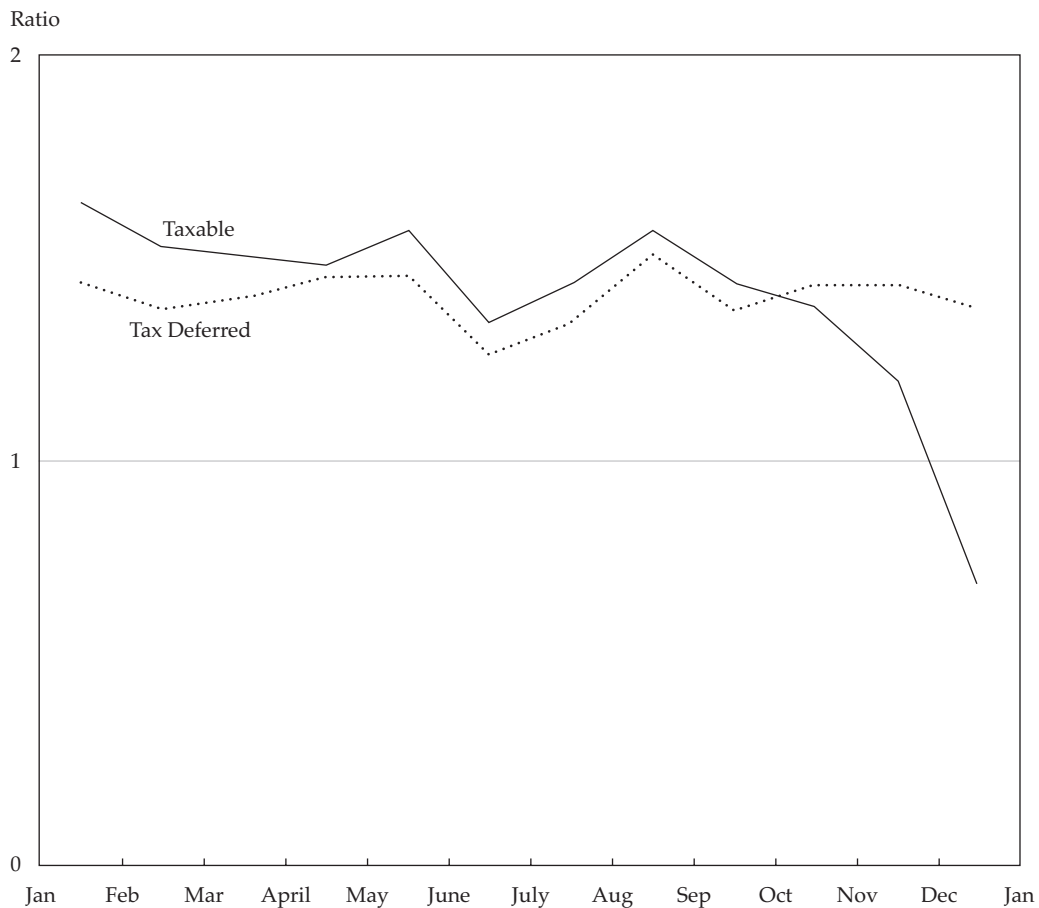
When the Taiwanese day traders were ranked on their past performance, we found that the top-performing day traders in the previous six-month period consistently had positive net performance in the following month. But only 2 percent of the day traders made it into this category; the rest unsuccessfully struggled to make a profit, and many stopped online trading altogether.

■ *Trading to reduce regret.* Individual investors try to manage the emotions of investing. They buy a stock and want to hold onto it until it makes money. Consequently, they tend to hold on to losers and sell winners, essentially postponing their regret over taking a loss. Holding on to a poorly performing stock keeps alive the prospect that the paper loss will be erased. If sold, the loss becomes real, as does the investor's regret—an excellent emotional incentive to postpone the sale for as long as possible. Shefrin and Statman (1985) coined the term "disposition effect" to describe this tendency to sell winners and hold on to losers.

An analysis of U.S. individual investors at both a large discount brokerage firm and a large full-service brokerage firm confirms the prevalence of the dispo-

sition effect (Barber and Odean 2004). **Figure 4** graphs the rate at which the discount brokerage firm's clients sold winners versus losers over a calendar-year period compared with their respective opportunities to do so. Any point above the middle line (1) indicates that winners are being sold at a faster rate than losers. The solid line represents the selling activity in taxable accounts, and the dotted line is tax-deferred accounts. Note that in late November and December, the solid line dips below the middle line as taxable investors deviate from the prevailing pattern and sell losers for tax purposes. Relegating tax-loss harvesting to year-end is unnecessary and puzzling because, although the outperformance of a certain stock is unpredictable, its tax benefit is transparent and easily captured—at any time of year. Hence, selling losers should be an easier trigger to pull than selling winners. But this is not the case. Investors opt throughout most of the year to manage their regret rather than to manage their taxes. Similar results were found for individual investor clients of the large full-service brokerage firm.

In Taiwan, we observed the same behavior, only it was more extreme (Barber, Lee, Liu, and Odean, forthcoming). In the United States, individual investors were 1.5–2.0 times as likely to sell a winner as to sell a loser (relative to their opportunities to do so). But in Taiwan, this figure jumped to about 4.0 times. Corporate investors and dealers also conformed to

Figure 4. Ratio of the Proportion of Gains Realized to the Proportion of Losses Realized for Individual Stock Trades by Month, 1991–1996

Note: Data grouped by month for each year included in the study.

this pattern of trading behavior. Mutual funds exhibited no significant tendency in either direction. Only foreign investors in Taiwan were more likely to sell a loser and retain a winner. As a whole, they were quite profitable, but they account for only 2 percent of the country's trading activity.

■ *Limited attention.* The investing universe encompasses thousands of stocks. It is an enormous task for an investor to consider all these choices when buying a stock. Human beings are constrained by what Herbert Simon termed "bounded rationality." There are limits to how much information people can mentally process and store, so facing many choices can be an uncomfortable situation.

Many investors appear to solve the problem of having too many choices to consider by simply considering only those stocks that catch their attention. These investors do not buy all the stocks that catch their attention; but for the most part, they buy only from the subset of attention-grabbing stocks. Of course, preferences still matter. For example,

although a momentum investor and a value investor may consider the same attention-grabbing set of stocks, they are likely to make different choices from that set. Thus, individual investors tend to be on the buy side of stocks that catch their eye. Attention is not a big factor when choosing what to sell because most investors own fairly small portfolios of common stocks and do not sell short. Investors in the sample of discount brokerage accounts that we studied owned, on average, only four stocks. Thus, when these investors want to sell, they have, on average, only four options to consider.

We were not able to directly measure which stocks caught investors' attention on which days. So, we used three proxies for attention-grabbing events: high abnormal-trading volume, extreme price moves, and news stories. Each day we sorted stocks into 10 bins on the basis of the day's abnormal-trading volume, 10 bins on the basis of the previous day's return, and 2 bins determined by whether or not there were any stories about that stock in the Dow Jones News

feed. We reasoned that high abnormal-trading volume is indicative of investors paying attention to a stock, that investors are likely to be paying attention to stocks that have experienced extreme price moves, and that investors are more likely to pay attention to stocks that are in the news.

Analyzing data from the two brokerage firms mentioned above (a large discount brokerage firm with roughly 66,000 investors and a large retail brokerage firm with about 670,000 investors) and a third firm (a small discount brokerage firm with around 14,500 investors), we calculated the average daily imbalance in purchases and sales for each bin. The imbalance was calculated as the number of purchases minus the number of sales divided by the number of purchases plus the number of sales. The higher this ratio, the greater the number of individual investors on the buy side of the market. Of course, the market as a whole has an adding-up constraint in dollar terms; for every dollar bought, a dollar must be sold. Therefore, when individual investors are on the buy side of the market, other investors—institutional investors of some sort—must be on the sell side of the market. We found dramatic evidence that individual investors tend to be on the buy side of the market for attention-grabbing stocks.

■ *Chasing trends.* Although overconfidence, limited attention, and the disposition effect are pervasive among individual investors and lead to lower net returns, the strongest trading bias of all is trend chasing. In our large discount brokerage data sample, we found that 39 percent of new money invested in mutual funds went into the 10 percent of funds that had the best performance in the prior year, and more than half the new money went into the top-performing 20 percent of funds (Barber, Odean, and Zheng 2000). Individual investors thus chase the trend, hiring money managers who performed well in the prior year despite the fact that academic studies have repeatedly shown that one year's performance is not a good predictor of a manager's ability.

Not only do investors hire money managers they wish they had hired the previous year, but they also tend to buy the stocks they wish they had owned the previous year. I believe that most investors think the market is more deterministic than it actually is. Although the market is not completely random, it is more random than many investors acknowledge. Relying on their deterministic interpretations of the market, investors expect past patterns to repeat and doggedly chase these patterns. Human beings have an innate ability to quickly see patterns, both true patterns and illusory ones. Although this ability undoubtedly served us well in terms of evolutionary survival, it can be costly to the average investor. The

investor who constantly perceives patterns in the market and trades on the assumption that these patterns will persist is, on average, a poorer investor.

Correlation of Purchases and Sales. The third behavioral finance tenet mentioned before is that the purchases and sales of individual investors are highly correlated. My colleagues Brad Barber and Ning Zhu and I (Barber, Odean, and Zhu 2006b) have tested this hypothesis using several analyses and different datasets. We obtained consistent results using different methods and different data: The purchases and sales of individual investors are highly correlated both across stocks and over time. For example, we arbitrarily divided the 670,000 investors with accounts at a large retail brokerage into two groups. We calculated for each group the proportion of trades in each stock that were purchased each month. We found that the correlation of these proportions between the two groups was quite high—75 percent. Furthermore, the proportion of these investors' trades in a stock that was purchased one month was highly correlated with the proportion purchased the next month. In other words, individual investors tend to buy, or sell, the same stocks as each other during the same month and tend to buy, or sell, the same stocks that they bought, or sold, the previous month. Because individual investors all jump in on the same side of the market for a stock at the same time, they have the potential to move a stock's price in a significant way.

Noise Traders' and Informed Traders' Effects on Prices. To test the fourth and fifth behavioral finance tenets, that uninformed investors push prices away from fundamental value and that informed traders push them back, Brad Barber, Ning Zhu, and I (Barber, Odean, and Zhu 2006a) analyzed 18 years of transactional data on the NYSE, Amex, and NASDAQ. We used small trades as a proxy for trades by individual investors and used an algorithm developed by Charles Lee and Mark Ready (Lee and Ready 1991) to determine whether a trade was initiated by the buyer or the seller. We measured the proportion of small trades that were buyer initiated for each stock on a weekly and an annual basis and evaluated how these proportions forecasted future returns. Using a weekly analysis, we found that the prices of stocks that were bought heavily by individual investors tended to rise during the week that individuals were buying and during the subsequent two weeks. A month later, this pattern reversed and these stocks underperformed. Thus, it appears that individual investors create price pressures that push a stock's price up for a couple of weeks before it begins to drift back down.

For our annual-horizon analysis, we constructed portfolios that were long stocks heavily bought by small traders during the previous year and short stocks heavily sold. We calculated the buy-and-hold performance of those long–short portfolios over the subsequent year. We found that our long–short portfolio had an average annual return of –4.4 pps. When we restricted our analysis to the 30 percent of stocks most actively traded by small traders, the long–short portfolio had an average annual return of –13.2 pps. This finding suggests that during the year when individuals were mostly buying (selling) stocks, they drove the prices too high (low); during the subsequent year, stocks previously bought by individuals underperformed those previously sold as the mispricing of the previous year reversed itself.

When we sorted stocks on both small and large trades, we found that the stocks sold by individual investors and bought by institutional investors had a positive alpha the next year of about 20 bps a month. In contrast, the stocks bought by individuals and sold by institutions had a negative alpha the next year of about 28 bps a month. We also found that stocks with mostly buyer-initiated trades for both large and small trade sizes (i.e., individual and institutional investors) tended to subsequently underperform stocks with mostly seller-initiated trades for both large and small trade sizes. Thus, it appears that when both institutions and individuals get excited about the same stocks, they drive the price too high and suffer the consequences of a significant downward drift the following year.

Investor Welfare

To protect their own welfare, individual investors would do well to recognize that by trading actively, they not only pay high transaction costs but also run the risk of trading with better informed institutional investors.

Brad Barber, Yi-Tsung Lee, Yu-Jane Liu, and I assessed the welfare implications of trading in “Just How Much Do Investors Lose by Trading?” (Barber, Lee, Liu, and Odean 2006). We analyzed a database that included every trade and every order placed by every investor on the Taiwan Stock Exchange from 1995 through 1999. We calculated the gains and losses, or gross trading profits, from trades between individual investors and institutional investors in Taiwan as well as the gains and losses from market timing, or gross market-timing profits; the commissions that both groups paid; and the 30 bp transaction tax levied on all sellers. The daily trading profits, net of transaction costs, can thus be measured in millions

of New Taiwan (NT) dollars.¹ Institutional investors, even on a net-cost basis, came out well ahead, chalking up mean daily net profits of NT\$171.8 million. Individual investors, in contrast, lost money on their trading even before deducting commissions and transaction taxes. Net losses of individual investors in aggregate averaged a sizable NT\$669.7 million each day. This result leads to the question: Are institutional investors profiting from superior information or from the mistakes of individual investors?

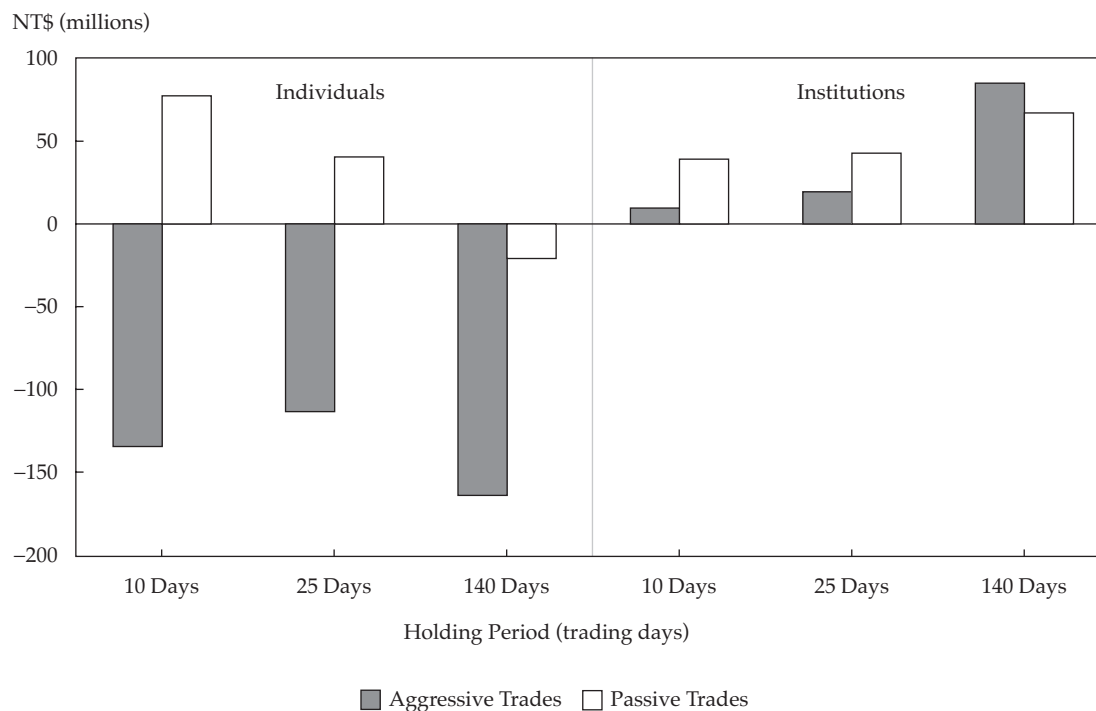
To answer this question, we classified the trades as either aggressive (demanding liquidity) or passive (supplying liquidity). For example, if an investor placed a limit order at \$10.50 to buy a stock that last traded at \$10.00, we classified it as an aggressive trade; if another investor placed a limit order at \$9.50 to buy a stock that last traded at \$10.00, we classified it as a passive trade. The graph in **Figure 5** shows that both institutions and individuals make money supplying liquidity to the market (i.e., through passive trading). Passive trading is most profitable over short horizons. Institutions also make money through their aggressive—liquidity demanding—trades. This is especially true over longer horizons, suggesting that institutional investors have superior information. Individual investors lose dramatically through aggressive trading at both short and long horizons, which indicates that although they trade with enthusiasm, they trade without superior information.

Economic Impact of Individual Investor Trading.

The net annual cost of all individual investor trading, including taxes, commissions, trading losses, and market-timing losses, is equivalent to 2.2 percent of Taiwan’s GDP. And the losses of individual investors reduce their portfolio return, on average, by 3.8 pps a year. The following example illustrates the potential severity of these losses. Suppose that an investor could reasonably expect to earn 10 percent a year for 30 years on a \$1,000 investment. Her initial investment would grow to approximately \$17,500 at the end of the period. If her return were reduced by 3.8 pps a year, the value of her investment at the end of 30 years would be approximately \$6,000. This difference is tremendous and is especially detrimental to people who are investing for retirement; these investors are doing themselves a big disservice.

Meanwhile, institutional investors are earning a net alpha of 1.5 pps a year. The largest beneficiaries of individual investors’ losses are foreign institutional investors, who account for only 2 percent of the trading in the market but who earn a disproportionate amount of the profits—\$3.5 million a day, equivalent to 46 percent of individuals’ gross daily losses.

¹At the time of the study, 1 U.S. dollar equaled 30 NT dollars.

Figure 5. Mean Daily Dollar Profits from Aggressive and Passive Trades by Individuals and Institutions in Taiwan

Individual investors in the United States tend to trade less aggressively than their Taiwanese counterparts. But because institutions account for a higher proportion of trading in the United States than in Taiwan, U.S. individual investors are more likely than Taiwanese individuals to be trading with institutions rather than with other individuals. Thus, individual investors in the United States may face more asymmetric information risk. Although we were unable to calculate aggregate trading losses for all U.S. individual investors, we estimated the losses of investors at a large U.S. discount brokerage firm to be about 2 pps a year.

Trading Volume in a Bear Market. Trading volume tends to rise in bull markets and fall in bear markets. Although traditional finance has difficulty explaining this pattern, several behavioral biases may contribute to it.

■ *Self-attribution bias.* The old Wall Street adage “don’t confuse brains with a bull market” warns of the overconfidence exhibited by investors when the market is rising. When the bottom falls out of the market, so does investor confidence, and trading slows markedly.

■ *Disposition effect.* Investors tend to hold on to losing stocks and sell winning stocks. In a bull market, because most stocks are rising in price, investors have no difficulty finding stocks to sell. But in a bear

market, when investors have more losers than winners, they are hesitant to sell and realize a loss.

■ *Attention.* Investors tend to buy stocks that attract their attention. In general, investors pay more attention to the market when it is rising than when it is in the doldrums. Thus, investors are more likely to be inspired to buy in a bull market.

■ *House-money effect.* People treat unexpected windfalls with less than their usual restraint. For example, the Las Vegas tourist who suddenly turns \$200 into \$600 is likely to gamble more aggressively than usual. These unexpected winnings are sometimes referred to as the house’s money (referring to the casino).

In late 1999, when the NASDAQ had run up about 80 percent, investors had a lot of house money in their pockets. Investors began to trade more aggressively and speculatively than usual. By the end of 2001, investors were once again trading their own money and in a much more conservative manner.

■ *Representativeness.* Most people like to buy stocks that have been going up. In a bull market, there are more such stocks to choose from. In a bear market, fewer stocks appeal to the average investor.

■ *Entertainment.* Some people clearly trade for entertainment. As it turns out, most of them find it more entertaining when they are making money than losing it and, therefore, more entertaining to trade in a bull market than a bear market.

Inexperienced Investors. From 1995 to 1998, the number of U.S. households investing directly in stocks grew by 30 percent. What advice should such investors be given? Instead of focusing on beating the market—a goal that the majority of individuals fail at—individual investors should pay attention to the things they can control. They should invest for the long run, buy and hold, diversify, control trading costs and management fees, and pay attention to taxes—not focus on trying to beat the market. Most financial advisers are not great stock pickers. But good advisers will steer their clients toward sound investment practices and restrain a client from shooting himself or herself in the financial foot.

Advertising by the brokerage industry often encourages investors to trade actively. The advertising industry knows which behavioral buttons to push. Advertisements by U.S. financial firms that encourage do-it-yourself investing (trading) preach several lessons:

- “You are in control.”
- “Data equal expertise.”
- “Trading is easy; anybody can do it.”
- “Trading is fun and exciting.”
- “Opportunities may arise at any moment, so always be ready to trade.”

One advertisement titled “Prefers to Do It Alone” depicts a sweet young woman. The ad reads, “Independent, confident, you are ready to trade futures on the Internet. You do not need a broker’s help. You want it all. Speed, convenience, control.” If this young woman walked into an investment adviser’s office and asked if she should be trading futures on the internet, how many would say, “Good idea”?

About six years ago at a friend’s dinner party, a fellow guest, a doctor, started discussing commodity markets with me. I asked why she was so interested in commodities, and she explained that she had just taken a weekend course in how to trade futures on the internet. When I responded that trading commodities is rather risky, she said, “Oh, no, no. They taught us how to do this.” She actually said (remember, she is a doctor), “If things go well enough, I think I might quit my job and start doing this seriously.” She had, at the time, invested only \$5,000 in commod-

ity trading. Somewhat to her annoyance, I said that I hoped—for her sake—that she lost most of that \$5,000 quickly. The real tragedy, as I saw it, would be that short-term gains would motivate her to invest more money and, inevitably, incur larger losses.

Many discount brokerage advertisements tout that a firm will put the investor in control. Control of what? The average investor wants control over retirement wealth, over the returns in his or her portfolio. But the brokerage firm can only give the investor control over which stocks he or she buys and sells, not control over returns. This is like a casino advertising that gamblers are in control of the roulette wheel because the gamblers get to choose the numbers that they bet on. Such control does not amount to very much.

Advertisements bombard investors from all angles—television, magazines, radio, online—encouraging spontaneous, frequent trading; assuring us that “anybody” can do it; championing the common man’s, even the stay-at-home mom’s, ability to trade. But we do not live in a world where truck drivers routinely buy islands with their trading profits. In our world, active, speculative trading results in lower returns for most investors.

Conclusion

Behavioral finance offers insights into how the trading biases of individual investors influence stock returns and lower investor welfare. The trading behavior of individual investors reflects their overconfidence, a limited ability to assimilate large amounts of data, the desire to postpone regret, and a penchant for chasing trends. Individual investor trading influences stock returns. Stocks heavily bought by individuals tend to outperform those heavily sold during the week in which trading is measured and during the following two weeks; subsequently, these stocks underperform. Active, speculative trading by individual investors leads to substantially lower portfolio performance.

This article qualifies for 0.5 PD credits.

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Question and Answer Session

Terrance Odean

Question: Compared with your Taiwanese research, is there equivalent research on more mature markets where the investor might be more educated or sophisticated?

Odean: Such research would require a time-series observation. Some psychological research suggests that cultural differences do influence such biases as overconfidence. The research suggests, for example, that the Chinese people, on average, tend to be more overconfident than those in the United States or Japan. This is consistent with the trading behavior we've observed. The data from Taiwan show extremely high turnover rates. Taiwanese investors are doing so poorly largely because they trade so much and run their trading costs up.

In Taiwan, because 89 percent of trades are made by individuals, there is about a 90 percent chance that the counterparty to an individual's trade is another individual who is no better informed than the first; there is not a big asymmetric information problem on the average trade. In the United States, there is a higher chance that the individual investor is placing a trade for which the counterparty is an institutional investor, and hence, a greater asymmetric information risk exists for individual investors.

Another difference between the two countries is that Taiwanese investors are trading too much, triggering unnecessarily high transaction costs that offset the potential benefit of a more symmetric information environment. In contrast, U.S. investors are trading less actively, which keeps their costs down and lowers the performance drag of a more asymmetrical market in terms of information.

Question: Is your research being used by industry organizations or regulators to deal with the issue of misleading advice?

Odean: The American Association of Retired Persons (AARP) asked me if I would evaluate the trend in investment ads over the 1990s. We hired independent evaluators to watch about 500 ads, and we found a definite trend toward more irresponsible ads—ads that pushed the psychological buttons of an illusion of control and overconfidence, encouraging underdiversification and active trading. I agree that some of these ads push the boundary of reasonableness. In particular, the suggestion that buying mutual funds is for losers is bad advice. The United States places a high premium on freedom of speech, even the freedom to say something that is not so clever or even correct.

Question: Can your findings be generalized to institutional investors?

Odean: I don't think it is possible to extrapolate institutional investor behavior from individual investor behavior. Institutional investors begin with the same human biases of individual investors but are more likely to operate with developed rules learned from experience and assimilated theory. I am sure there are institutional investors who trade too much for their own good, but others have very active, successful strategies.

We do observe that institutional investors, like their individual counterparts, indulge the tendency to hold on to losers and to sell winners. There are exceptions, but in general, the disposition effect holds for both institutional and individual invest-

tors; no one likes to accept that they make mistakes.

Question: What would be the most important, or the biggest, biases among institutional investors from a behavioral finance point of view?

Odean: The most serious institutional behavioral bias is to have too much faith in your model. If you put too much faith in your model, you may start to believe that the world follows your model, rather than that your model, more or less, attempts to track the world.

There are different ways to frame what went wrong at Long-Term Capital Management, but one way of framing it is that the principals placed too much faith in their model. They developed a model based on historical returns and began to believe it explained "the way the world works." In the institutional environment, the overconfidence that causes individuals to trade can morph into too much faith in the model, too much leverage behind the strategy.

Question: Is there an area where individual investors are particularly vulnerable to their own often misguided trading behaviors?

Odean: Yes. One of my biggest concerns is retirement savings in the United States. Traditionally, most workers had pension plans through which they were guaranteed a certain level of income in their retirement years. Now, companies are quickly shifting to 401(k) and 403(b) plans, which are defined-contribution plans. With these plans, investors get to make the investment decisions about the money they are saving for their retirement.

This worries me because U.S. investors are not very sophisticated. The average 401(k) participant has never been given any formal education in how markets work and is susceptible to making a lot of mistakes. No one wants to learn from mistakes that they can't

recover from. Retirement savings is not a good arena for learning the ins and outs of investing. No one gets a second chance.

One of the biggest, and most prevalent, mistakes from an economic and risk perspective is for a worker to put all of his or her retire-

ment savings in the stock of the company he or she works for. Take, for example, Enron Corporation. When Enron went bankrupt, some employees in their late 50s and early 60s lost not only their jobs but also all of their retirement savings.