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Trading Is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors

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ABSTRACT

Individual investors who hold common stocks directly pay a tremendous performance penalty for active trading. Of 66,465 households with accounts at a large discount broker during 1991 to 1996, those that trade most earn an annual return of 11.4 percent, while the market returns 17.9 percent. The average household earns an annual return of 16.4 percent, tilts its common stock investment toward high-beta, small, value stocks, and turns over 75 percent of its portfolio annually. Overconfidence can explain high trading levels and the resulting poor performance of individual investors. Our central message is that trading is hazardous to your wealth.

The investor's chief problem—and even his worst enemy—is likely to be himself.
Benjamin Graham

In 1996, approximately 47 percent of equity investments in the United States were held directly by households, 23 percent by pension funds, and 14 percent by mutual funds (*Securities Industry Fact Book*, 1997). Financial economists have extensively analyzed the return performance of equities managed by mutual funds. There is also a fair amount of research on the performance of equities managed by pension funds. Unfortunately, there is little research on the return performance of equities held directly by households, despite their large ownership of equities.

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In this paper, we attempt to shed light on the investment performance of common stocks held directly by households. To do so, we analyze a unique data set that consists of position statements and trading activity for 78,000 households at a large discount brokerage firm over a six-year period ending in January 1997.

Our analyses also allow us to test two competing theories of trading activity. Using a rational expectation framework, Grossman and Stiglitz (1980) argue that investors will trade when the marginal benefit of doing so is equal to or exceeds the marginal cost of the trade. In contrast Odean(1998b), Gervais and Odean (1998), and Caballé and Sákovics (1998) develop theoretical models of financial markets where investors suffer from overconfidence. These overconfidence models predict that investors will trade to their detriment.[1]

Our most dramatic empirical evidence supports the view that overconfidence leads to excessive trading (see Figure 1). On one hand, there is very little difference in the gross performance of households that trade frequently (with monthly turnover in excess of 8.8 percent) and those that trade infrequently. In contrast, households that trade frequently earn a net annualized geometric mean return of 11.4 percent, and those that trade infrequently earn 18.5 percent. These results are consistent with models where trading emanates from investor overconfidence, but are inconsistent with models where trading results from rational expectations. Though liquidity, risk-based rebalancing, and taxes can explain some trading activity, we argue that it belies common sense that these motivations for trade, even in combination, can explain average annual turnover of more than 250 percent for those households that trade most.

We also document that, overall, the households we analyze significantly underperform relevant benchmarks, after a reasonable accounting for transaction costs. These households earn gross returns (before accounting for transaction costs) that are close to those earned by an investment in a value-weighted index of NYSE/AMEX/Nasdaq stocks. During our sample period, an investment in a value-weighted market index earns an annualized geometric mean return of 17.9 percent, the average household earns a gross return of 18.7 percent, and in aggregate households earn a gross return of 18.2 percent. In contrast, the net performance (after accounting for the bid-ask spread and commissions) of these households is below par, with the average household earning 16.4 percent and in aggregate households earning 16.7 percent. The empirical tests supporting these conclusions come from abnormal return calculations that allow each household to self-select its own

[1] In an exception to this finding, Kyle and Wang (1997) argue that when traders compete for duopoly profits, overconfident traders may reap greater profits. This prediction is based on several assumptions that do not apply to individuals trading common stocks. Benos (1998) has a similar result. Daniel, Hirshleifer, and Subrahmanyam (1998) consider the asset price implications of overconfidence but do not directly address investor welfare.

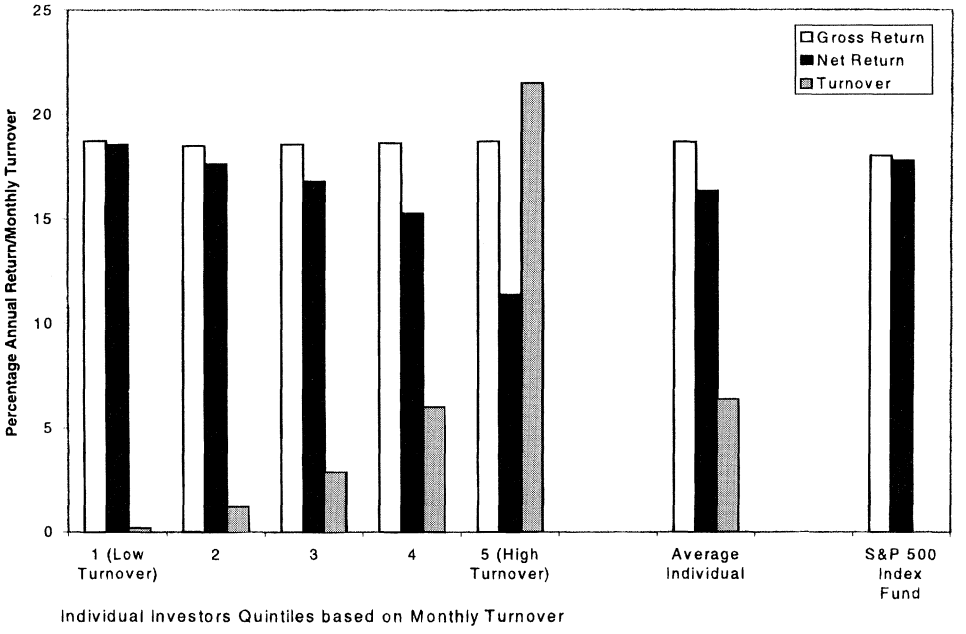

Figure 1. Monthly turnover and annual performance of individual investors. The white bar (black bar) represents the gross (net) annualized geometric mean return for February 1991 through January 1997 for individual investor quintiles based on monthly turnover, the average individual investor, and the S&P 500. The net return on the S&P 500 Index Fund is that earned by the Vanguard Index 500. The gray bar represents the monthly turnover.

investment style and from time-series regressions that employ either the Capital Asset Pricing Model (CAPM) or the three-factor model developed by Fama and French (1993) as our benchmark.

Our descriptive analysis provides several additional conclusions that are noteworthy:

1. Households[2] trade common stocks frequently. The average household turns over more than 75 percent of its common stock portfolio annually.
2. Trading costs are high. The average round-trip trade in excess of $1,000 costs three percent in commissions and one percent in bid-ask spread.
3. Households tilt their investments toward small, high-beta stocks. There is a less obvious tilt toward value (high book-to-market) stocks.

[2] Throughout this paper, "households" and "individual investors" refer to households and investors with discount brokerage accounts. Though we believe that our findings generalize to customers at other discount brokerages, we suspect that the trading practices of retail customers differ. Some of our sample households may have both retail and discount accounts. In these cases, our observations are limited to their discount accounts.

It is the cost of trading and the frequency of trading, not portfolio selections, that explain the poor investment performance of households during our sample period. In fact, the tilt of households toward small stocks and, to a lesser extent, value stocks helps their performance during our sample period (during which small stocks outperform large stocks by 15 basis points per month and value outperforms growth by 20 basis points per month).[3]

The remainder of this paper is organized as follows. We discuss related research in Section I and our data and empirical methods in Section II. Our main descriptive results are presented in Section III. We test the models of investor overconfidence in Section IV. We discuss the impact of price momentum on individual investor performance in Section V and liquidity, risk, and taxes as motivations for trading in Section VI. Concluding remarks are made in Section VII.

I. Related Research

To our knowledge, the current investigation is the first comprehensive study of the aggregate common stock performance of individual investors who manage their own equity investments without the advice of a full-service broker. Schlarbaum, Lewellen, and Lease (1978a) analyze the aggregate common stock performance of investors at a full-service brokerage firm. Odean (1999) and Schlarbaum, Lewellen, and Lease (1978b) analyze the profitability of common stock trades (as distinct from positions held) by individual investors.

Schlarbaum et al. (1978a) calculate monthly gross and net portfolio returns for 2,500 accounts at a retail brokerage firm over a seven-year period ending in December 1970. In a separate paper, Schlarbaum et al. (1978b) analyze the gross and net returns of round-trip trades made by the same 2,500 accounts over the same period. Though they emphasize that their results are conjectural, they conclude that their results "portray an overall picture of quite respectable individual investor security selection acumen." In contrast, we document that individual investors at a discount brokerage firm during the six-year period ending January 1997 perform poorly.

There are at least three reasons why our results might differ from those in Schlarbaum et al. (1978a, 1978b). First, we analyze households that hold their investments at a discount brokerage firm rather than at a retail brokerage firm. A wide variety of investment advice is available to both retail and discount investors from sources such as newsletters, *Value Line*, and the financial press. Retail brokerage firms also provide stock selection advice to their clients. If this advice is valuable and if investors attend to it, it is

[3] These figures are based on the mean return from February 1991 through January 1997 for the size and book-to-market factors constructed by Fama and French (1993). In the remainder of this paper, when we refer to a size or value premium, our inference is based on the returns of these zero-investment portfolios.

plausible that individual investors at these firms earn both better gross returns and net returns. We would welcome the opportunity to test this hypothesis directly by obtaining a data set similar to that employed in our study from a retail brokerage firm. Barber et al. (1998) and Womack (1996) present evidence that the recommendations of brokerage-house analysts have investment value.

Second, the analysis in Schlarbaum et al. (1978b) focuses on the returns from round-trip trades. There is now evidence that investors have a tendency to sell winning investments and hold on to losing investments (Odean (1998a)). Thus, by analyzing trades rather than position statements (as we do in the current study), Schlarbaum et al. may upwardly bias their return estimates. Schlarbaum et al. (1978a) do attempt to reconstruct monthly positions from trading records and partial end-of-period positions. However, as they point out, stocks purchased before 1964 and sold after 1970 may not appear in their study.

Third, although Schlarbaum et al. (1978a, 1978b) evaluate performance using a variety of market indexes, they do not consider the tendency for individual investors to tilt toward small stocks (though of course firm size did not have the same celebrity status in 1978 that it enjoys today). They do not explicitly address whether such a tilt exists among the individual investors they analyze, but we suspect that it does. This small-stock tilt is likely to be extremely important because small stocks outperform large stocks by 67 basis points *per month* during their sample period.

As do Schlarbaum et al. (1978b), Odean (1999) focuses on the trades of individual investors. He analyzes the timing of trades made by individual investors at a large discount brokerage firm during the seven years ending in December 1993, a sample period that overlaps with ours. (The data sets employed in Odean (1999) and this study are different.) He documents that the stocks individuals sell subsequently outperform the stocks they buy. Thus, the implications of his study and the current investigation are similar: Individual investors trade too much. However, Odean does not analyze the aggregate performance of all stocks held by individuals. Consequently, he is unable to conclude whether individual investors perform well in aggregate, which is the focus of our investigation.

II. Data and Methods

A. Household Account Data

The primary data set for this research is information from a large discount brokerage firm on the investments of 78,000 households from January 1991 through December 1996.[4] Of the sampled households, 42 percent are in

[4] The month-end position statements for this period allow us to calculate returns for February 1991 through January 1997. Data on trades are from January 1991 through November 1996.

the western part of the United States, 19 percent in the East, 24 percent in the South, and 15 percent in the Midwest. The data set includes all accounts opened by each household at this discount brokerage firm. The sample selection was performed at the household level and was stratified based on whether the discount brokerage firm labeled the household as a general (60,000 households), affluent (12,000 households), or active trader household (6,000 households). The firm labels households that make more than 48 trades in any year as active traders, households with more than $100,000 in equity at any point in time as affluent, and all other households as general. If a household qualifies as either active trader or affluent, it is assigned the active trader label. In 1997, approximately 61 percent of all retail accounts at this brokerage firm were classified as general, 28 percent as affluent, and 11 percent as active. Sampled households were required to have an open account with the discount brokerage firm during 1991. Roughly half of the accounts in our analysis were opened prior to 1987 and half were opened between 1987 and 1991.

In this research, we focus on the common stock investments of households. We exclude from the current analysis investments in mutual funds (both open-end and closed-end), American Depositary Receipts (ADRs), warrants, and options. Of the 78,000 sampled households, 66,465 have positions in common stocks during at least one month; the remaining accounts hold either cash or investments in other than individual common stocks. Households have, on average, two accounts: 48 percent have a single account, 27 percent have two, 14 percent have three, and the remaining 11 percent have more than three. The most common reason for two accounts is the tax-preferred status of retirement accounts (e.g., IRAs and Keoghs). Some households also have different accounts for different household members (e.g., custodial accounts for children). Roughly 60 percent of the market value in the accounts is held in common stocks. In these households, more than 3 million trades are made in all securities during the sample period, with common stocks accounting for slightly more than 60 percent of all trades. On average during our sample period, the mean household holds 4.3 stocks worth $47,334, though each of these figures is positively skewed. The median household holds 2.61 stocks worth $16,210. In December 1996, these households held more than $4.5 billion in common stock.

In Table I, we present descriptive information on the trading activity for our sample. Panels A and B show there are slightly more purchases (1,082,107) than sales (887,594) during our sample period, though the average value of stocks sold ($13,707) is slightly higher than the value of stocks purchased ($11,205). As a result, the aggregate value of purchases and sales is roughly equal ($12.1 and $12.2 billion, respectively). The average trade is transacted at a price of $31 per share. The value of trades and the transaction price of trades are positively skewed; the medians for both purchases and sales are substantially less than the mean values.

Table I

Descriptive Statistics on Trade Size, Trade Price, Transaction Costs, and Turnover

The sample is account records for 66,465 households at a large discount brokerage firm from January 1991 to December 1996. Spread is calculated as the transaction price divided by the closing price on the day of the transaction minus one (and then multiplied by minus one for purchases). Commission is calculated as the commission paid divided by the value of the trade. Monthly turnover is the beginning-of-month market value of shares purchased in month $t - 1$ (or sold in month t) divided by the total beginning-of-month market value of shares held in month t. Trade-weighted spread and commission are averages weighted by trade size. Aggregate turnover is the aggregate value of sales (or purchases) divided by the aggregate value of positions held during our sample period.

	Mean	25th Percentile	Median	75th Percentile	Standard Deviation	No. of Obs.
Panel A: Purchases						
Trade size ($)	11,205	2,513	4,988	10,500	32,179	1,082,107
Price/share	31.06	11.00	23.00	40.00	117.82	1,082,107
Monthly turnover (%)	6.49	0.54	2.67	7.08	11.89	66,465
Commission (%)*	1.58	0.78	1.29	2.10	1.45	966,492
Spread(%)	0.31					1,028,087
Panel B: Sales						
Trade size ($)	13,707	2,688	5,738	13,000	38,275	887,594
Price/share	31.22	12.00	24.00	41.00	113.03	887,594
Monthly turnover (%)	6.23	0.39	2.58	6.95	11.36	66,465
Commission (%)*	1.45	0.70	1.16	1.91	1.06	785,206
Spread (%)	0.69					845,644
Panel C: Trade-Weighted and Aggregate Purchases						
Aggregate monthly turnover (%)	6.05					
Trade-weighted commission (%)	0.77			Not Applicable		
Trade-weighted spread (%)	0.27					
Panel D: Trade-Weighted Sales						
Aggregate monthly turnover (%)	6.06					
Trade-weighted commission (%)	0.66			Not applicable		
Trade-weighted spread (%)	0.61					

*Commissions are calculated based on trades in excess of $1,000. Including smaller trades results in a mean buy (sale) commission of 2.09 (3.07) percent.

For each trade, we estimate the bid-ask spread component of transaction costs for purchases (spr_{d_b}) and sales (spr_{d_s}) as

$$spr_{d_s} = \left(\frac{P^{cl}_{d_s}}{P^{s}_{d_s}} - 1 \right) \quad \text{and} \quad spr_{d_b} = -\left(\frac{P^{cl}_{d_b}}{P^{b}_{d_b}} - 1 \right), \tag{1}$$

where $P^{cl}_{d_s}$ and $P^{cl}_{d_b}$ are the reported closing prices from the Center for Research in Security Prices (CRSP) daily stock return files on the day of a sale and purchase, respectively, and $P^{s}_{d_s}$ and $P^{b}_{d_b}$ are the actual sale price and purchase price from our account database.[5] Our estimate of the bid-ask spread component of transaction costs includes any market impact that might result from a trade. It also includes an intraday return on the day of the trade. (In Appendix A, we provide a detailed reconciliation of our return calculations.) The commission component of transaction costs is estimated as the dollar value of the commission paid scaled by the total principal value of the transaction, both of which are reported in our account data.

The average purchase costs an investor 0.31 percent, and the average sale costs an investor 0.69 percent in bid-ask spread. Our estimate of the bid-ask spread is very close to the trading cost of 0.21 percent for purchases and 0.63 percent for sales paid by open-end mutual funds from 1966 to 1993 (Carhart (1997)).[6] The average purchase in excess of $1,000 costs 1.58 percent in commissions, and the average sale in excess of $1,000 costs 1.45 percent.[7]

In Panels C and D of Table I, we calculate the trade-weighted (weighted by trade size) spreads and commissions. These figures can be thought of as the total cost of conducting the $24 billion in common stock trades ($12 billion each in purchases and sales). Trade size has little effect on spread costs (0.27 percent for purchases and 0.69 percent for sales) but substantially reduces the commission costs (0.77 percent for purchases and 0.66 percent for sales).

In sum, the average trade incurs a round-trip transaction cost of about one percent for the bid-ask spread and about three percent in commissions. In aggregate, round-trip trades cost about one percent for the bid-ask spread and about 1.4 percent in commissions.

[5] Kraus and Stoll (1972), Holthausen, Leftwich, and Mayers (1987), Laplante and Muscarella (1997), and Beebower and Priest (1980) use closing prices either before or following a transaction to estimate effective spreads and market impact. See Keim and Madhavan (1998) for a review of different approaches to calculating transactions costs.

[6] Odean (1999) finds that individual investors are more likely to both buy and sell particular stocks when the prices of those stocks are rising. This tendency can partially explain the asymmetry in buy and sell spreads. Any intraday price rises following transactions subtract from our estimate of the spread for buys and add to our estimate of the spread for sells.

[7] To provide more representative descriptive statistics on percentage commissions, we exclude trades of less than $1,000. The inclusion of these trades results in a round-trip commission cost of five percent on average (2.1 percent for purchases and 3.1 percent for sales).

Finally, we calculate the monthly portfolio turnover for each household. In each month during our sample period, we identify the common stocks held by each household at the beginning of month t from their position statements. To calculate monthly sales turnover, we match these positions to sales during month t. The monthly sales turnover is calculated as the shares sold times the beginning-of-month price per share divided by the total beginning-of-month market value of the household's portfolio. To calculate monthly purchase turnover, we match these positions to purchases during month $t - 1$. The monthly purchase turnover is calculated as the shares purchased times the beginning-of-month price per share divided by the total beginning-of-month market value of the portfolio.[8] In Panels A and B of Table I we report that, on average, households purchase 6.49 percent and sell 6.23 percent of their stock portfolio each month, though the median household trades much less frequently (buying 2.67 percent of their stock portfolio and selling 2.58 percent). In Panels C and D, we calculate aggregate purchase (sales) turnover by summing all purchases (sales) and dividing by the sum of all positions during our sample period. The aggregate purchase turnover is 6.05 percent and the aggregate sales turnover is 6.06 percent.

In sum, these investors trade their common stocks quite frequently. The average household turns over more than 75 percent of its common stock portfolio each year. This result is uncannily close to the average turnover of 77 percent reported by U.S. common stock mutual funds for the period 1966 to 1993 (Carhart (1997)). In aggregate, these investors turn over more than 70 percent of their invested wealth each year.

B. Measuring Return Performance

The focus of our analysis is the return performance of investments in common stocks by households. We analyze both the gross performance and net performance (after a reasonable accounting for commissions, the bid-ask spread, and the market impact of trades).

We estimate the gross monthly return on each common stock investment using the beginning-of-month position statements from our household data and the CRSP monthly returns file. In so doing, we make two simplifying assumptions. First, we assume that all securities are bought or sold on the last day of the month. Thus, we ignore the returns earned on stocks purchased from the purchase date to the end of the month and include the returns earned on stocks sold from the sale date to the end of the month.

[8] If more shares are sold than were held at the beginning of the month (e.g., because an investor purchases additional shares after the beginning of the month), we assume the entire beginning-of-month position in that security is sold. Similarly, if more shares were purchased in the preceding month than are held in the position statement, we assume the entire position is purchased in the preceding month. Thus, turnover, as we have calculated it, cannot exceed 100 percent in a month.

Second, we ignore intramonth trading (e.g., a purchase on March 6 and a sale of the same security on March 20), though we do include in our analysis short-term trades that yield a position at the end of a calendar month.

In Appendix A, we document that accounting for the exact timing of trades would reduce the performance of individual investors by about two basis points per month. In Appendix B, we document that accounting for intramonth trades would improve the performance of individual investors reported in our main results by less than one basis point per month. More important, a careful accounting for both the exact timing of trades and the profitability of intramonth trades indicates that the results we report in the main text are slightly high for our full sample and for every sample partition that we analyze.

Consider the common stock portfolio for a particular household. The gross monthly return on the household's portfolio (R_{ht}^{gr}) is calculated as

$$R_{ht}^{\text{gr}} = \sum_{i=1}^{s_{ht}} p_{it} R_{it}^{\text{gr}}, \tag{2}$$

where p_{it} is the beginning-of-month market value for the holding of stock i by household h in month t divided by the beginning-of-month market value of all stocks held by household h, R_{it}^{gr} is the gross monthly return for stock i, and s_{ht} is the number of stocks held by household h in month t.

For security i in month t, we calculate a monthly return net of transaction costs (R_{it}^{net}) *as*

$$(1 + R_{it}^{\text{net}}) = (1 + R_{it}^{\text{gr}}) \frac{(1 - c_{it}^{s})}{(1 + c_{i,t-1}^{b})}, \tag{3}$$

where c_{it}^{s} is the cost of sales scaled by the sales price in month t and $c_{i,t-1}^{b}$ is the cost of purchases scaled by the purchase price in month $t - 1$. The costs of purchases and sales include the commissions and bid-ask spread components, which are estimated individually for each trade as previously described. Thus, for a security purchased in month $t - 1$ and sold in month t, both c_{it}^{s} and $c_{i,t-1}^{b}$ are positive; for a security neither purchased in month $t - 1$ nor sold in month t, both c_{it}^{s} and $c_{i,t-1}^{b}$ are zero. Because the timing and cost of purchases and sales vary across households, the net return for security i in month t varies across households. The net monthly portfolio return for each household is

$$R_{ht}^{\text{net}} = \sum_{i=1}^{s_{ht}} p_{it} R_{it}^{\text{net}}. \tag{4}$$

If only a portion of the beginning-of-month position in stock i is purchased or sold, the transaction cost is applied only to that portion. We estimate the aggregate gross and net monthly return earned by individual investors as

$$RAG_t^{\text{gr}} = \sum_{h=1}^{n_{ht}} x_{ht} R_{ht}^{\text{gr}} \quad \text{and} \quad RAG_t^{\text{net}} = \sum_{h=1}^{n_{ht}} x_{ht} R_{ht}^{\text{net}}, \tag{5}$$

where n_{ht} is the number of households with common stock investment in month t and x_{ht} is the beginning-of-month market value of common stocks held by household h divided by the beginning-of-month market value of common stock held by all households. We estimate the gross and net monthly return earned by the average household as

$$RH_t^{\text{gr}} = \frac{1}{n_{ht}} \sum_{h=1}^{n_{ht}} R_{ht}^{\text{gr}} \quad \text{and} \quad RH_t^{\text{net}} = \frac{1}{n_{ht}} \sum_{h=1}^{n_{ht}} R_{ht}^{\text{net}}. \tag{6}$$

C. Risk-Adjusted Return Performance

We calculate four measures of risk-adjusted performance.[9] First, we calculate an own-benchmark abnormal return for individual investors, which is similar in spirit to that proposed by Grinblatt and Titman (1993) and Lakonishok, Shleifer, and Vishny (1992). In this abnormal return calculation, the benchmark for household h is the month t return of the beginning-of-year portfolio held by household h.[10] It represents the return that the household would have earned had it merely held its beginning-of-year portfolio for the entire year. The own-benchmark abnormal return is the return earned by household h less the own-benchmark return; if the household did not trade during the year, the own-benchmark return is zero for all 12 months during the year. In each month, the abnormal returns across households are averaged, yielding a 72-month time-series of mean monthly own-benchmark abnormal returns. Statistical significance is calculated using t-statistics based on this time-series. The advantage of the own-benchmark abnormal return

[9] A fifth alternative measure of risk-adjusted returns is the Sharpe ratio, the mean excess return divided by its standard deviation. The average Sharpe ratio for the gross (net) return of the average household in our sample is 0.179 (0.134). The Sharpe ratio for the market during our sample period is 0.366 = (1.0578/2.8880). We do not report Sharpe ratios for most partitions of the data because we do not observe the entire portfolios of these households. Unobserved assets such as equities at other brokerage firms and mutual fund holdings are unlikely to greatly change average observed portfolio returns, but they are likely to reduce average observed volatility. Thus we tend to underestimate the total portfolio Sharpe ratios of investors with significant unobserved assets.

[10] When calculating this benchmark, we begin the year on February 1. We do so because our first monthly position statements are from the month end of January 1991. If the stocks held by a household at the beginning of the year are missing CRSP returns data during the year, we assume that stock is invested in the remainder of the household's portfolio.

measure is that it does not adjust returns according to a particular risk model. No model of risk is universally accepted; furthermore, it may be inappropriate to adjust investors' returns for stock characteristics that they do not associate with risk. The own-benchmark measure allows each household to self-select the investment style and risk profile of its benchmark (i.e., the portfolio it held at the beginning of the year), thus emphasizing the effect trading has on performance.

Second, we calculate the mean monthly market-adjusted abnormal return for individual investors by subtracting the return on a value-weighted index of NYSE/AMEX/Nasdaq stocks from the return earned by individual investors.

Third, we employ the theoretical framework of the capital asset pricing model and estimate Jensen's alpha by regressing the monthly excess return earned by individual investors on the market excess return. For example, to evaluate the gross monthly return earned by individual investors in aggregate, we estimate the following monthly time-series regression:

$$(RAG_t^{\text{gr}} - R_{ft}) = \alpha_i + \beta_i(R_{mt} - R_{ft}) + \epsilon_{it}, \tag{7}$$

where R_{ft} = the monthly return on T-bills,[11] R_{mt} = the monthly return on a value-weighted market index, α_i = the CAPM intercept (Jensen's alpha), β_i = the market beta, and ϵ_{it} = the regression error term. The subscript i denotes parameter estimates and error terms from regression i, where we estimate four regressions: one each for the gross and net performance of individual investors in aggregate, and one each for the gross and net performance of the average household.

Fourth, we employ an intercept test using the three-factor model developed by Fama and French (1993). For example, to evaluate the performance of individuals in aggregate, we estimate the following monthly time-series regression:

$$(RAG_t^{\text{gr}} - R_{ft}) = \alpha_j + \beta_j(R_{mt} - R_{ft}) + s_j SMB_t + h_j HML_t + \epsilon_{jt}, \tag{8}$$

where SMB_t is the return on a value-weighted portfolio of small stocks minus the return on a value-weighted portfolio of large stocks and HML_t is the return on a value-weighted portfolio of high book-to-market stocks minus the return on a value-weighted portfolio of low book-to-market stocks.[12] The regression yields parameter estimates of α_j, β_j, s_j, and h_j. The error term in the regression is denoted by ϵ_{jt}. The subscript j denotes parameter estimates and error terms from regression j, where we again estimate four regres-

[11] The return on Treasury bills is from *Stocks, Bonds, Bills, and Inflation, 1997 Yearbook*, Ibbotson Associates, Chicago, Ill.

[12] The construction of these portfolios is discussed in detail in Fama and French (1993). We thank Kenneth French for providing us with these data.

sions. We place particular emphasis on the Fama–French intercept tests, since individual investors tilt their portfolios toward small stocks. The three-factor model provides a reasonable adjustment for this small stock tilt.[13]

Fama and French (1993) argue that the risk of common stock investments can be parsimoniously summarized as risk related to the market, firm size, and a firm's book-to-market ratio. We measure these three risk exposures using the coefficient estimates on the market excess return ($R_{mt} - R_{ft}$), the size zero investment portfolio (SMB_t), and the book-to-market zero-investment portfolio (HML_t) from the three-factor regressions. Portfolios with above-average market risk have betas greater than one, $\beta_j > 1$. Portfolios with a tilt toward small (value) stocks relative to a value-weighted market index have size (book-to-market) coefficients greater than zero, $s_j > 0$ ($h_j > 0$).

We suspect there is little quibble with interpreting the coefficient on the market excess return (β_j) as a risk factor. Interpreting the coefficient estimates on the size and the book-to-market zero-investment portfolios is more controversial. For the purposes of this investigation, we are interested in measuring risk as perceived by individual investors. As such, it is our casual observation that investors view common stock investment in small firms as riskier than that in large firms. Thus, we would willingly accept a stronger tilt toward small stocks as evidence that a particular group of investors is pursuing a strategy that it perceives as riskier. It is less clear to us whether a tilt toward high book-to-market stocks (which tend to be ugly, financially distressed, firms) or toward low book-to-market stocks (which tend to be high-growth firms) is *perceived* as riskier by investors. As such, we interpret the coefficient estimates on the book-to-market zero-investment portfolio with a bit more trepidation.[14]

III. Results

A. *Full Sample Results*

Our main findings for the full sample can be summarized simply. The gross return earned by individual investors in aggregate (RAG_t^{gr}) and the gross return earned by the average household (RH_t^{gr}) are remarkably close to that earned by an investment in a value-weighted index of NYSE/AMEX/Nasdaq stocks.[15] The annualized geometric mean return earned by individ-

[13] Lyon, Barber, and Tsai (1999) document that intercept tests using the three-factor model are well specified in random samples and samples of large or small firms. Thus, the Fama–French intercept tests employed here account well for the small stock tilt of individual investors.

[14] Some authors have also identified price momentum effects in stock returns. We discuss momentum in Section V.

[15] We use the NYSE/AMEX/Nasdaq value-weighted market index constructed by Fama and French (1993). Firms comprising the index must have data for firm size and book-to-market ratio. The correlation between this market index and the NYSE/AMEX/Nasdaq value-weighted index from CRSP is 99.9 percent.

ual investors in aggregate, the average household, and the value-weighted market index are 18.2, 18.7, and 17.9 percent, respectively. In contrast, the net returns earned by individual investors in aggregate (RAG_t^{net}) and the net return earned by the average household (RH_t^{net}) underperform the value-weighted index by more than 100 basis points annually. The net annualized geometric mean return earned by individual investors in aggregate and by the average household are 16.7 and 16.4 percent, respectively.

The results of this analysis are presented in Table II. Panel A presents results for the gross performance of individual investors in aggregate, Panel B presents results for the average household. Three of the four performance measures indicate that the gross performance of individual investors is unremarkable; neither the market-adjusted return, Jensen's alpha, nor the intercept test from the Fama–French three-factor model is reliably different from zero. The fourth performance measure, the own-benchmark abnormal return, is reliably negative. This result indicates that the investors would have earned higher returns from following a buy-and-hold strategy; they hurt their *gross* performance by trading.

Also noteworthy in these results are the coefficient estimates on the market, size, and book-to-market factors. Individual investors tilt toward small stocks with high market risk. The market beta for stocks held by individual investors is reliably greater than one and the coefficient estimate on SMB_t is reliably positive. Though in aggregate individual investors have no tilt toward value or growth, the average household has a slight tilt toward value stocks (those with high book-to-market ratios) and a more pronounced tilt toward small stocks.[16] These tilts serve individual investors well during our period of analysis; the mean monthly returns on SMB_t and HML_t during our 72-month sample period are 0.15 and 0.20 percent, respectively. This observation can account for the fact that the market-adjusted return performance of individual investors is positive (albeit unreliably so), while Jensen's alpha (CAPM intercept) and the intercept test from the Fama–French three-factor model are negative.

The style preferences of individual investors complement those of institutions. Institutional investors have a clear preference for large stocks. Gompers and Metrick (1998) document this preference for large institutions; Carhart (1997) and Falkenstein (1996) document a similar bias for mutual funds. As is the case for individual investors, the growth or value preference of institutions is less obvious. Gompers and Metrick (1998) document that large institutions prefer value stocks, but Carhart (1997, Table III) documents that mutual fund holdings tilt toward growth stocks.[17]

[16] Aggregate measures weight each household by the value of that household's common stocks. Average household measures weight each household equally.

[17] Kang and Stulz (1997) document that foreign investors in Japanese equity markets prefer large growth stocks. It is likely that these foreign investors are predominantly institutions.

Table II

Summary of the Percentage Monthly Abnormal Return Measures for the Average Household and Aggregate Household

Returns are based on month-end position statements for 66,465 households at a large discount brokerage firm from January 1991 to December 1996. Panel A (Panel C) presents results for the gross (net) return on a portfolio that mimics the aggregate investment of all households. Panel B (Panel D) presents results for the gross (net) return on a portfolio that mimics the investment of the average household. Own-benchmark abnormal return is the return on the household portfolio minus the return on the portfolio the household held at the end of the previous January. Market-adjusted return is the return on the household portfolio less the return on a value-weighted NYSE/AMEX/Nasdaq index. CAPM is the results from a time-series regression of the household excess return on the market excess return ($R_{mt} - R_{ft}$). Fama–French three-factor is the results from time-series regression of household excess return on the market excess return, a zero-investment book-to-market portfolio (HML_t), and a zero-investment size portfolio (SMB_t). p-values are presented in parentheses.

	Excess Return	Coefficient Estimate on:			Adjusted R^2
		$(R_{mt} - R_{ft})$	HML_t	SMB_t	
Panel A: Gross Percentage Monthly Returns in Aggregate					
Own-benchmark abnormal return	−0.049**				
	(0.013)				
Market-adjusted return	0.038				
	(0.723)				
CAPM	−0.067	1.100***			92.9
	(0.543)	(0.007)			
Fama–French three-factor	−0.076	1.082***	−0.035	0.231***	96.3
	(0.357)	(0.005)	(0.324)	(0.000)	
Panel B: Gross Percentage Monthly Returns for the Average Household					
Own-benchmark abnormal return	−0.048**				
	(0.010)				
Market-adjusted return	0.078				
	(0.672)				
CAPM	−0.014	1.087			80.3
	(0.944)	(0.177)			
Fama–French three-factor	−0.154	1.120***	0.140***	0.516***	93.0
	(0.205)	(0.005)	(0.008)	(0.000)	
Panel C: Net Percentage Monthly Returns in Aggregate					
Own-benchmark abnormal return	−0.155***				
	(0.000)				
Market-adjusted return	−0.073				
	(0.496)				
CAPM	−0.175	1.096***			93.0
	(0.113)	(0.009)			
Fama–French three-factor	−0.180**	1.077***	−0.040	0.225***	96.3
	(0.031)	(0.009)	(0.251)	(0.000)	
Panel D: Net Percentage Monthly Returns for the Average Household					
Own-benchmark abnormal return	−0.194***				
	(0.000)				
Market-adjusted return	−0.090				
	(0.621)				
CAPM	−0.177	1.082			80.7
	(0.360)	(0.194)			
Fama–French three-factor	−0.311**	1.113***	0.131**	0.506***	93.0
	(0.011)	(0.008)	(0.012)	(0.000)	

***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively (two-tailed). The null hypothesis for beta (the coefficient estimate on the market excess return) is H_o: $\beta = 1$.

Table III

Descriptive Statistics, Gross Returns, and Net Returns for Household Quintiles formed on Beginning Position Value

The sample is account records for 66,465 households at a large discount brokerage firm from January 1991 to December 1996. Households are sorted into quintiles based on the market value of common stocks in the first month that a household appears during our sample period. Quintile 1 contains households with the smallest market value of common stock holdings, quintile 5 contains households with the largest value. Beginning position value is the market value of common stocks held in the first month that the household appears during our sample period. Mean monthly turnover is the average of sales and purchase turnover. Coefficient estimates are those from a time-series regression of the gross average household excess return on the market excess return ($R_{mt} - R_{ft}$), a zero-investment book-to-market portfolio (HML_t), and a zero-investment size portfolio (SMB_t). Raw return is the average monthly return for the average household. Own-benchmark abnormal return is the return on the household portfolio minus the return on the portfolio the household held at the end of the previous January. Market-adjusted return is the return on the household portfolio less the return on a value-weighted NYSE/AMEX/Nasdaq index. CAPM intercept is the estimated intercept from a time-series regression of the household excess return on the market excess return ($R_{mt} - R_{ft}$). Fama–French intercept is the estimated intercept from time-series regressions of household excess return on the market excess return, a zero-investment book-to-market portfolio (HML_t), and a zero-investment size portfolio (SMB_t). p-values are presented in parentheses.

	Quintile					
	1 (Small)	2	3	4	5 (Large)	Difference: Lrg − Sml
Panel A: Descriptive Statistics						
Mean beginning position value	1,581	4,653	8,599	16,725	149,710	N.A.
Mean monthly turnover (%)	6.68	6.35	6.31	6.13	6.33	−0.35*** (0.000)
Coefficient estimate on:						
$(R_{mt} - R_{ft})$	1.21*** (0.004)	1.13*** (0.005)	1.11*** (0.009)	1.11*** (0.005)	1.06** (0.035)	−0.15*** (0.006)
HML_t	0.36*** (0.000)	0.12** (0.022)	0.09* (0.067)	0.09* (0.053)	0.06* (0.079)	−0.30*** (0.000)
SMB_t	0.97*** (0.000)	0.56*** (0.000)	0.45*** (0.000)	0.39*** (0.000)	0.27*** (0.000)	−0.70*** (0.000)
Adjusted R^2	86.1	92.8	93.2	94.3	95.8	68.4
Panel B: Gross Average Household Percentage Monthly Return						
Raw return	1.722	1.511	1.473	1.424	1.400	−0.322
Own-benchmark abnormal return	−0.071 (0.101)	−0.051** (0.022)	−0.038* (0.070)	−0.038* (0.061)	−0.037* (0.077)	0.034 (0.487)
Market-adjusted return	0.302 (0.370)	0.091 (0.648)	0.053 (0.755)	0.004 (0.980)	−0.020 (0.857)	−0.322 (0.185)
CAPM intercept	0.182 (0.612)	−0.015 (0.942)	−0.043 (0.811)	−0.089 (0.570)	−0.072 (0.541)	−0.253 (0.328)
Fama–French intercept	−0.137 (0.510)	−0.152 (0.227)	−0.149 (0.206)	−0.186* (0.082)	−0.140 (0.101)	0.003 (0.983)
Panel C: Net Average Household Percentage Monthly Return						
Raw return	1.478	1.328	1.313	1.280	1.279	−0.199
Own-benchmark abnormal return	−0.270*** (0.000)	−0.206*** (0.000)	−0.178*** (0.000)	−0.169*** (0.000)	−0.150*** (0.000)	0.120** (0.023)
Market-adjusted return	0.059 (0.860)	−0.092 (0.635)	−0.107 (0.521)	−0.140 (0.339)	−0.141 (0.200)	−0.199 (0.404)
CAPM intercept	−0.056 (0.875)	−0.193 (0.350)	−0.198 (0.264)	−0.229 (0.140)	−0.189 (0.105)	−0.133 (0.602)
Fama–French intercept	−0.366* (0.079)	−0.323** (0.011)	−0.298** (0.013)	−0.319*** (0.003)	−0.254*** (0.004)	0.112 (0.450)

***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively (two-tailed). The null hypothesis for beta (the coefficient estimate on the market excess return) is H_o: $\beta = 1$ except in the difference column, where the null hypothesis is H_o: $\beta = 0$.

The more interesting findings of our analysis are contained in Panels C and D of Table II. Net of transaction costs, individual investors perform poorly. Both the market-adjusted return and the CAPM intercepts are negative, though unreliably so. The own-benchmark abnormal return and the Fama–French intercept provide the most compelling evidence of underperformance. These performance measures indicate significant underperformance of 15 to 31 basis points per month (1.8 percent to 3.7 percent per year, with t-statistics ranging from -2.20 to -10.21). These two performance measures are most appropriate in our setting because they control for the style preference of individual investors: small stocks with above-average market risk. In particular, the own-benchmark abnormal returns indicate individual investors would have increased their annual return by about two percent had they merely held their beginning-of-year portfolio. In combination, these results indicate that the net return performance of individual investors is reliably negative.

One might wonder whether our results are driven by a short sample period coinciding with an unusual stock market. Though the market returned about 18 percent per year during our sample period, the market return was negative in 20 of the 72 months. When we compare the performance of individual investors during the 20 months when the market was down to the 52 months in which the market was up, the performance measures presented in Table II are virtually identical.

B. Sorting on Portfolio Size

We test the robustness of our results across different position sizes by partitioning the households into quintiles on the basis of portfolio size. We define portfolio size as the market value of common stocks held in the first month for which there is a position statement.[18] Each quintile represents the common stock investments of more than 12,000 households.

Descriptive statistics on the partition by portfolio size are presented in Table III, Panel A. The largest portfolios have a mean beginning position market value of $149,750, the smallest portfolios average $1,581. Small portfolios have slightly higher monthly turnover (6.68 percent) than large portfolios (6.33 percent). As before, we estimate the parameters of the Fama–French three-factor model, where the dependent variable is the monthly mean gross household excess return for each quintile.[19] The coefficient estimates on the market, size, and book-to-market factors reveal that small portfolios tilt more heavily toward high-beta, small, value stocks than do large portfolios.

[18] If the first position statement appears after January 1991, we do not discount the market value of the common stocks to January 1991 in our rankings. Our results are virtually identical if we discount the market value of these common stocks using the return on the value-weighted market index.

[19] In the interest of parsimony, here and in the remainder of the paper we do not report results for the aggregate performance of each partition. We note when conclusions are different using the aggregate performance.

The gross and net returns for each quintile are presented in Table III, Panels B and C. Focusing first on the gross performance (Panel B), we find that small portfolios (quintile 1) earn higher average returns than large portfolios (quintile 5), though the difference is not reliably different from zero. This difference is likely attributable to the fact that small portfolios tilt more heavily toward small value stocks, which performed well during our sample period. The net performance results are presented in Panel C. The market-adjusted return and Jensen's alpha are similar to those reported for the full sample for each quintile. Though the point estimates are consistently negative, they are not reliably so. Of course, these risk-adjustments ignore the fact that investors are tilting toward small value stocks. In contrast, the own-benchmark abnormal returns and the intercept tests from the Fama–French three-factor model indicate significant underperformance, ranging from 15 to 37 basis points per month, in each of the quintiles. In sum, after a reasonable accounting for the size and value tilts of small investors, we document that both small and large portfolios underperform.

C. Cross-Sectional Variation in Performance

We should emphasize that the aggregate performance and average household performance, though germane and interesting, mask considerable cross-sectional variation in the performance across households. For each household, we calculate the mean monthly market-adjusted abnormal return. We present the distribution of these means in Table IV.[20] Consistent with the results presented in Table II, the median household earns a gross monthly market-adjusted return of −0.01 percent and a net return of −0.14 percent. Though 49.3 percent of households outperform a value-weighted market index before transaction costs, only 43.4 percent outperform the index after costs. Nonetheless, many households perform very well: 25 percent of all households beat the market, after accounting for transaction costs, by more than 0.50 percent per month (more than six percent annually). Conversely, many households perform very poorly: 25 percent of all households underperform the market, after accounting for transaction costs, by more than 0.73 percent per month (more than eight percent annually).

IV. Overconfidence and Performance

It is well documented that people tend to be overconfident (e.g., Alpert and Raiffa (1982), Griffin and Tversky (1992); see Odean (1998b) for a more detailed review). Odean (1998b), Gervais and Odean (1998), and Caballé and Sákovics (1998) develop theoretical models of financial markets where in-

[20] We omit from this analysis accounts that held common stocks for fewer than 12 months during our 72-month sample period.

Table IV

Cross-Sectional Distribution of Percentage Monthly Gross and Net Market-Adjusted Household Returns

The sample is account records for 66,465 households at a large discount brokerage firm from January 1991 to December 1996. Households with position statements in 12 or fewer months are omitted from this analysis. Though the median values are virtually identical when these households are included, more extreme values are observed.

	Gross Monthly Market-Adjusted Return (%)	Net Monthly Market-Adjusted Return (%)
Minimum	−19.46	−20.85
1st percentile	−4.32	−4.86
5th percentile	−2.12	−2.45
10th percentile	−1.34	−1.60
25th percentile	−0.57	−0.73
Median	−0.01	−0.14
75th percentile	0.66	0.50
90th percentile	1.62	1.40
95th percentile	2.41	2.15
99th percentile	4.86	4.44
Maximum	48.53	48.35
Total households	62,439	62,439
Percentage > 0	49.3%***	43.4%***
Binomial *Z*-statistic	−3.38	−33.13

*** indicates significant difference from 50 percent at the 1% level.

vestors suffering from overconfidence trade too much (i.e., trading, at the margin, reduces their expected utility). In contrast, in a rational expectation framework, Grossman and Stiglitz (1980) argue that investors will trade when the marginal benefit of doing so is equal to or exceeds the marginal cost of the trade (including the cost of acquiring information). Odean (1998b) analyzes a variation of Grossman and Stiglitz's model in which investors are overconfident. The two models yield different predictions about the gains of trading. The rational expectations model predicts that investors who trade more (i.e., those whose expected trading is greater) will have the same expected utility as those who trade less. The overconfidence model predicts that investors who trade more will have lower expected utility.

Consider the implications of these two models in our empirical setting. The overconfidence model predicts that the net return performance of households with high turnover will be lower than that of households with low turnover, while making no prediction about the differences in gross returns. In Grossman–Stiglitz, active and passive investors have equivalent expected utilities. Active traders must earn higher expected gross returns in order to

offset their greater trading costs.[21] The Grossman–Stiglitz model therefore predicts that the gross risk-adjusted return performance of households with high turnover will be higher than that of households with low turnover, but there will be little difference in the net risk-adjusted returns.

To test these competing models, we partition our sample of households into quintiles on the basis of mean monthly turnover (defined as the average of purchase and sale turnover). Each quintile represents the common stock investments of more than 12,000 households. Descriptive statistics for each of the quintiles are presented in Table V, Panel A. The households with low turnover average 0.19 percent turnover per month, those with high turnover average 21.49 percent. To qualify as a high turnover portfolio, a household would need to turn over at least 8.7 percent of its portfolio in an average month. Households with low turnover also tend to have larger accounts.

As before, we estimate the parameters of the Fama–French three-factor model, where the dependent variable is the monthly mean gross household excess return for each turnover quintile. The coefficient estimates on the market, size, and book-to-market factors reveal that the high turnover households tilt more heavily toward high-beta, small, growth stocks than do the low turnover households.

The gross and net returns for each turnover quintile are presented in Table V, Panels B and C. Focusing first on the gross performance (Panel B), we find that high turnover households (quintile 5) do not significantly outperform low turnover households (quintile 1). In fact, the intercept test based on the Fama–French three-factor model, which accounts for the tendency of the high turnover portfolio to tilt more heavily toward high-beta, small, growth stocks, indicates that the two high turnover quintiles (quintiles 4 and 5) underperform by 24 and 36 basis points per month. Though marginally statistically significant (p-values of 0.143 and 0.104, respectively), we believe these figures to be economically large (approximately three to four percent annually). Regardless of whether one accepts these results as statistically significant, the prediction of the Grossman and Stiglitz model is not supported; those who trade most do not earn higher gross returns.

The analysis of net returns (Panel C) is quite interesting. Regardless of the method used to measure performance, the high turnover households (quintile 5) underperform the low turnover households (quintile 1). The underperformance ranges from 46 basis points per month (5.5 percent per year, $t = -1.56$) using market-adjusted returns to an astoundingly high 80 basis points per month (9.6 percent per year, $t = -4.59$) based on the Fama–French intercept. The own-benchmark abnormal returns indicate that the

[21] Rather than increasing their gross returns, active traders could alternatively achieve the same expected utility as less active traders by lowering their volatility through trading. We find no evidence of this however. For example, the average (net) Sharpe ratio of the quintile that trades most actively (0.092) is one-half that of the quintile that trades least actively (0.180). Though these Sharpe ratios do not consider investors' total portfolios of assets (see footnote 9), they indicate that active traders do not have higher volatility adjusted returns within the observed equity portfolios.

Table V

Descriptive Statistics, Gross Returns, and Net Returns for Household Quintiles Formed on Mean Turnover

The sample is account records for 66,465 households at a large discount brokerage firm from January 1991 to December 1996. Households are sorted into quintiles based on monthly turnover (the average of sales and purchase turnover) during our sample period. Quintile 1 contains households with the lowest turnover, quintile 5 contains households with the highest. Beginning position value is the market value of common stocks held in the first month that the household appears during our sample period. Mean monthly turnover is the average of sales and purchase turnover. Coefficient estimates are those from a time-series regression of the gross average household excess return on the market excess return ($R_{mt} - R_{ft}$), (HML_t), and a zero-investment size portfolio (SMB_t). Raw return is the average monthly return for the average household. Own-benchmark abnormal return is the return on the household portfolio minus the return on the portfolio the household held at the end of the previous January. Market-adjusted return is the return on the household portfolio less the return on a value-weighted NYSE/AMEX/Nasdaq index. CAPM intercept is the estimated intercept from a time-series regression of the household excess return on the market excess return ($R_{mt} - R_{ft}$). Fama–French intercept is the estimated intercept from time-series regressions of household excess return on the market excess return, a zero-investment book-to-market portfolio (HML_t), and a zero-investment size portfolio (SMB_t). p-values are presented in parentheses.

	Quintile					
	1 (Low)	2	3	4	5 (High)	Difference: High − Low
Panel A: Descriptive Statistics						
Mean monthly turnover (%)	0.19	1.24	2.89	5.98	21.49	N.A.
Mean beginning position value	34,169	26,046	22,945	19,102	21,560	−12,609***
						(0.000)
Coefficient estimate on						
$(R_{mt} - R_{ft})$	1.03	1.06*	1.11**	1.18***	1.29***	0.26***
	(0.199)	(0.090)	(0.015)	(0.002)	(0.000)	(0.000)
HML_t	0.20***	0.10***	0.13**	0.13*	0.12	−0.08
	(0.000)	(0.012)	(0.020)	(0.065)	(0.195)	(0.333)
SMB_t	0.24***	0.29***	0.51***	0.72***	1.02***	0.78***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Adjusted R^2	96.1	94.7	92.2	90.4	87.6	71.8
Panel B: Gross Average Household Percentage Monthly Return						
Raw return	1.483	1.472	1.489	1.511	1.548	0.065
Own-benchmark	−0.009	−0.026*	−0.052**	−0.079***	−0.096*	−0.087
abnormal return	(0.156)	(0.064)	(0.014)	(0.007)	(0.093)	(0.116)
Market-adjusted return	0.063	0.052	0.069	0.091	0.128	0.065
	(0.534)	(0.660)	(0.710)	(0.726)	(0.728)	(0.832)
CAPM intercept	0.090	0.022	−0.015	−0.078	−0.167	−0.257
	(0.409)	(0.865)	(0.936)	(0.774)	(0.663)	(0.407)
Fama–French intercept	−0.048	−0.072	−0.149	−0.237	−0.359	−0.311*
	(0.526)	(0.448)	(0.242)	(0.143)	(0.104)	(0.086)
Panel C: Net Average Household Percentage Monthly Return						
Raw return	1.470	1.411	1.361	1.267	1.009	−0.460
Own-benchmark	−0.021***	−0.079***	−0.167***	−0.300***	−0.587***	−0.566***
abnormal return	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market-adjusted return	0.050	−0.009	−0.059	−0.153	−0.411	−0.460
	(0.625)	(0.937)	(0.749)	(0.547)	(0.253)	(0.124)
CAPM intercept	0.077	−0.038	−0.140	−0.314	−0.692*	−0.768**
	(0.480)	(0.764)	(0.474)	(0.242)	(0.066)	(0.012)
Fama–French intercept	−0.061	−0.130	−0.269**	−0.464***	−0.864***	−0.803***
	(0.422)	(0.172)	(0.037)	(0.005)	(0.000)	(0.000)

***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively (two-tailed). The null hypothesis for beta (the coefficient estimate on the market excess return) is H_o: $\beta = 1$ except in the difference column, where the null hypothesis is H_o: $\beta = 0$.

trading of high turnover households costs them 57 basis points per month (6.8 percent per year) relative to the returns earned by low turnover households. Again, these differences are not consistent with the Grossman and Stiglitz model, but are consistent with the predictions of the overconfidence models.

In sum, differences in gross returns across the turnover quintiles are small. An investment mimicking that of the average household in each quintile would have earned a gross annualized mean geometric return that ranged from 18.5 percent (for quintile 2) to 18.7 percent (for quintile 1). However, there are dramatic differences in the net returns across the turnover quintiles. An investment mimicking the average household of the high turnover quintile would have earned a net annualized mean geometric return of 11.4 percent, while an investment that mimicked the low turnover quintile would have earned 18.5 percent. These returns are graphed in Figure 1.

V. Price Momentum

Some authors have identified price momentum effects in stock returns—that is, stocks that have performed well recently tend to earn higher returns than those that have not (Jegadeesh and Titman (1993)). It is unlikely, however, that individual investors view momentum as a risk factor. Thus, we do not include momentum when calculating risk-adjusted returns.

Nonetheless, it is interesting to consider how momentum affects the performance of individual investors. In general, the sampled investors are antimomentum investors; that is, on average they tend to hold stocks that have recently underperformed the market. This is consistent with the evidence that individual investors tend to hold their losers and sell their winning investments (Odean (1998a)).

To investigate the effect of price momentum on the performance of individual investors, we add a zero-investment price-momentum portfolio to the Fama–French three-factor regressions described in Section II.C.[22] This portfolio is long stocks that have performed well recently and short those that have performed poorly. We then estimate time-series regressions for each of the sample partitions described in the main text. In all sample partitions, the estimated coefficient estimate on the zero-investment price-momentum portfolio is negative; individuals tend to tilt their investments toward stocks that have performed poorly recently.

The net performance of individual investors in aggregate (on average) is -0.053 (-0.041) percent per month when price momentum is included as an additional characteristic. Though still negative, these intercepts are smaller in magnitude than those from the Fama–French three-factor regressions and are not statistically significant.

[22] The construction of the zero-investment price-momentum portfolio is described in Carhart (1997). We thank Mark Carhart for providing us with the returns data.

Our principal finding—that those investors who trade most actively realize, on average, the lowest net returns—is unaffected by the inclusion of a momentum characteristic in the regressions. These time-series regressions result in an intercept of −0.398 percent per month for those who trade most actively (quintile 5) and 0.070 percent per month for those who trade least (quintile 1). Thus, when one controls for their tendency to hold poorly performing stocks, those investors who trade least actively achieve reasonable performance. More important, however, is the finding that active investors continue to underperform less active investors. The differences in the intercepts remains large and statistically significant: −0.468 percent per month.

VI. Liquidity, Rebalancing, and Tax-Motivated Trading

To this point, we have focused on information-motivated versus overconfidence-motivated trading. The empirical evidence we have presented solidly favors overconfidence as the major motivation for trading, since trading unambiguously hurts investor performance; however, there are other motivations for trading, which we consider in this section.

A. Liquidity

Investors who face liquidity shocks over time will trade as a rational response to those shocks. Thus, liquidity shocks can explain some trading activity. But, they seem implausible as an explanation of the 75 percent annual turnover that we document for the average individual investor and belie common sense as an explanation of the more than 250 percent annual turnover of the households who trade most. Investors facing rapidly fluctuating liquidity needs can, in most cases, find less expensive means to finance these than rapid trading in and out of stocks.

Moreover, the trading that results from liquidity shocks can be accomplished at a much lower cost by investing in mutual funds than by investing in individual common stocks. To illustrate this point, we analyze the returns on the Vanguard Index 500 mutual fund, a large passive mutual fund that claims to match the performance of the Standard and Poor's 500. Investors can move in and out of this fund at no cost. In contrast to the performance of the average or aggregate household, this index fund does not underperform when compared to any of the standard performance benchmarks. During our sample period, this fund earned an annualized geometric mean return of 17.8 percent while the value-weighted market index earned 17.9 percent. The market-adjusted return, the CAPM intercept, and the Fama–French intercept for the Vanguard Index 500 were −0.002, −0.004, and 0.009 percent, respectively. A passively managed mutual fund clearly provides a lower cost means of managing liquidity shocks than does investment in individual common stocks.

B. Rebalancing

Investors who desire a portfolio with certain risk characteristics will rationally rebalance their portfolio to maintain this risk profile. With an average holding of four common stocks, we believe that risk-based rebalancing is not a significant motivation for trading in the households that we study. Risk-based rebalancing as an explanation of the 75 percent annual turnover that we document for the average household belies common sense. Investors can manage the risk composition of their portfolio at much lower cost by carefully selecting a portfolio of mutual funds.

C. Taxes

The single most compelling reason for investors to hold individual common stocks in lieu of mutual funds is taxes. Investors who hold stocks that have lost value since their purchase can realize those losses. These losses can be used to shelter gains and thereby reduce the investor's tax liability.[23]

Tax-loss selling cannot completely explain the results that we document here for three reasons. First, it is implausible that tax-motivated trading would yield an annual turnover rate of 75 percent. A simple example illustrates this point: Consider an investor who buys the value-weighted market index on January 1 of each year 1991 to 1996. In December of the average year, this investor would be able to sell 24 percent of her portfolio for a loss. Of course, this example assumes a holding period of 12 months. The turnover resulting from tax-loss selling will decline as this holding period increases.

Second, we find high turnover and significant underperformance in both taxable and tax-deferred accounts. If tax-loss selling is the major motivation for trading we would expect to find little trading in tax-deferred accounts. On the other hand, if overconfidence is the major motivation for trading, we would expect to find, as we do, active trading and significant underperformance in both taxable and tax-deferred accounts. We partition the accounts in our sample into taxable and tax-deferred accounts (i.e., Individual Retirement Accounts and Keogh Accounts). In Table VI, Panel A, we present descriptive statistics for the taxable and tax-deferred accounts. Turnover in tax-deferred accounts is high: 67.6 percent annually (monthly turnover of 5.63 percent times 12), though not as high as in taxable accounts: 89.4 percent annually (monthly turnover of 7.45 percent times 12). The difference in turnover may result from tax-motivated trading or it may be that investors associate their retirement accounts with future safety and therefore trade less speculatively in these accounts.

In Table VI, Panels B and C, we present the gross and net return performances of taxable and tax-deferred accounts. The gross returns earned by taxable and tax-deferred accounts are quite similar (see Panel B). The net

[23] Though losses on mutual funds can also be used to reduce an investor's tax liability, the probability of having a loss on a mutual fund is less than the probability of observing at least one losing investment in a well-diversified portfolio of common stocks.

Table VI

Descriptive Statistics, Gross Return, and Net Return for Taxable and Tax-Deferred Accounts

The sample is account records for 66,465 households at a large discount brokerage firm from January 1991 to December 1996. Accounts are partitioned as either taxable or tax deferred (IRA, Keogh, SEP-IRA). Beginning position value is the market value of common stocks held in the first month that the household appears during our sample period. Mean monthly turnover is the average of sales and purchase turnover. Coefficient estimates are those from a time-series regression of the gross average household excess return on the market excess return ($R_{mt} - R_{ft}$), a zero-investment book-to-market portfolio (HML_t), and a zero-investment size portfolio (SMB_t). Raw return is the average monthly return for the average household. Own-benchmark abnormal return is the return on the household portfolio minus the return on the portfolio the household held at the end of the previous January. Market-adjusted return is the return on the household portfolio less the return on a value-weighted NYSE/AMEX/Nasdaq index. CAPM intercept is the estimated intercept from a time-series regression of the household excess return on the market excess return ($R_{mt} - R_{ft}$). Fama–French intercept is the estimated intercept from time-series regressions of household excess return on the market excess return, a zero-investment book-to-market portfolio (HML_t), and a zero-investment size portfolio (SMB_t). p-values are presented in parentheses.

	Taxable	Tax Deferred	Difference
Panel A: Descriptive Statistics			
Number of households	54,434	30,554	N/A.
Mean beginning position value	26,303	14,042	12,261***
			(0.000)
Mean monthly turnover (%)	7.45	5.63	1.82***
			(0.000)
Coefficient estimate on:			
$(R_{mt} - R_{ft})$	1.13***	1.12***	0.01
	(0.004)	(0.007)	(0.346)
HML_t	0.14***	0.18***	−0.04***
	(0.010)	(0.001)	(0.000)
SMB_t	0.56***	0.52***	0.04***
	(0.000)	(0.000)	(0.000)
Adjusted R^2	92.6	92.2	46.7
Panel B: Gross Average Household Percentage Monthly Return			
Raw return	1.496	1.532	−0.036
Own-benchmark abnormal return	−0.048***	−0.037*	−0.010
	(0.009)	(0.055)	(0.107)
Market-adjusted return	0.076	0.112	−0.036
	(0.702)	(0.555)	(0.185)
CAPM intercept	−0.027	0.031	−0.058**
	(0.899)	(0.156)	(0.039)
Fama–French intercept	−0.174	−0.133	−0.041*
	(0.174)	(0.298)	(0.059)
Panel C: Net Average Household Percentage Monthly Return			
Raw return	1.313	1.379	−0.066**
Own-benchmark abnormal return	−0.203***	−0.166***	−0.036***
	(0.000)	(0.000)	(0.000)
Market-adjusted return	−0.107	−0.042	−0.066**
	(0.583)	(0.823)	(0.012)
CAPM intercept	−0.204	−0.119	−0.085***
	(0.326)	(0.547)	(0.002)
Fama–French intercept	−0.344***	−0.278**	−0.066***
	(0.008)	(0.030)	(0.002)

***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively (two-tailed). The null hypothesis for beta (the coefficient estimate on the market excess return) is H_o: $\beta = 1$ except in the difference column, where the null hypothesis is H_o: $\beta = 0$.

returns earned by taxable and tax-deferred accounts are both poor, after a reasonable accounting for the small stock tilt of these individuals (see Panel C). The tax-deferred accounts outperform the taxable accounts by about six basis points per month. In short, the general tenor of our results is similar for the taxable and tax-deferred accounts.

Third, Odean (1998a, 1999) documents that most investor trading activity is inconsistent with tax-motivated trading. He observes that investors at a discount brokerage sell profitable investments twice as often as unprofitable investments (during the period 1987 to 1993) and that, relative to their opportunities to do so, these investors are about one and one-half times more likely to realize any gain than any loss. They do engage in tax-loss selling late in the year, but December is the only month in which they realize losses at as fast a rate as they do gains.

Finally, we should emphasize that trading not associated with tax-loss selling will further hurt the after-tax returns of individual investors. Not only does this trading incur trading costs, when done in a taxable account it also accelerates the payment of capital gain taxes that could be otherwise deferred.

D. Gambling

To what extent may a desire to gamble account for the excessive trading we observe? Many people appear to enjoy gambling. Some buy lottery tickets. Others gamble at casinos. We consider two distinct aspects of gambling: risk-seeking and entertainment. Risk-seeking is when one demonstrates a preference for outcomes with greater variance but equal or lower expected return. In equity markets the simplest way to increase variance without increasing expected return is to underdiversify. Excessive trading has a related, but decidedly different, effect; it decreases expected returns without decreasing variance. Thus risk-seeking may account for underdiversification (though underdiversification could also result from simple ignorance of its benefits), but it does not explain excessive trading.

A second aspect of gambling is the entertainment derived from placing and realizing bets. When coupled with the overconfident belief that these bets are expected-wealth enhancing, it is easy to see that the entertainment utility of gambling will fuel greater trading. There is also the possibility that people may trade for entertainment while fully realizing that each trade is more likely than not to reduce their personal future wealth. (Note that this is different from realizing that the trades of others are wealth reducing.) We favor the hypothesis that most investors trade excessively because they are overconfident, or because they are overconfident and they enjoy trading, over the hypothesis that they trade purely for entertainment and expect thereby to lower their wealth. Many studies have established that people are overconfident. We know of no study demonstrating that ordinary investors expect to lower their wealth through trading.

It is possible that some investors set aside a small portion of their wealth with which they trade for entertainment, while investing the majority more prudently. If "entertainment accounts" are driving our findings, we would expect turnover and underperformance to decline as the common stocks in the accounts we observe represent a larger proportion of a household's total wealth. We are able to test this hypothesis directly and find no support for it. For approximately one-third of our sample, the households reported their net worth at the time they opened their accounts. We calculate the proportion of net worth invested at the discount broker as the beginning value of a household's common stock investments scaled by its self-reported net worth.[24] We then analyze the turnover and investment performance of 2,333 households with at least 50 percent of their net worth in common stock investments at this discount broker. These households have similar turnover (6.25 percent per month, 75 percent annually) to our full sample (see Table I). Furthermore, these households earn gross and net returns that are very similar to the full sample. The monthly net return, own-benchmark abnormal return, market-adjusted return, CAPM intercept, and Fama–French intercept for these households are 1.285, −0.173, −0.135, −0.221, and −0.285 percent, respectively.

Finally, it is worth noting that the negative relation between turnover and net returns that we document for individual investors also exists in mutual funds (Carhart (1997)). It is unlikely that mutual fund managers buy and sell stocks for the pure joys of trading despite the fact that this trading lowers the expected returns of their shareholders.[25]

VII. Conclusion

We analyze the returns earned on common stock investments by 66,465 households at a large discount brokerage firm for the six years ending in January 1997. We document that the gross returns (before accounting for transaction costs) earned by these households are quite ordinary, on average. Unfortunately, the net returns (after accounting for the bid-ask spread and commissions paid by these investors) earned by these households are poor. The average household underperforms a value-weighted market index by about 9 basis points per month (or 1.1 percent annually). After accounting for the fact that the average household tilts its common stock investments toward small value stocks with high market risk, the underperformance averages 31 basis points per month (or 3.7 percent annually). The average household turns over approximately 75 percent of its common stock portfolio annually. The poor performance of the average household can be traced to the costs associated with this high level of trading.

[24] This estimate is upwardly biased because the account opening date generally precedes our first portfolio position observation and net worth is likely to have increased in the interim.

[25] Lakonishok et al. (1992) report a positive relation between turnover and performance for 769 all-equity pension funds, though this finding puzzles the authors.

Our most dramatic empirical evidence is provided by the 20 percent of households that trade most often. With average monthly turnover of in excess of 20 percent, these households turn their common stock portfolios over more than twice annually. The gross returns earned by these high-turnover households are unremarkable, and their net returns are anemic. The net returns lag a value-weighted market index by 46 basis points per month (or 5.5 percent annually). After a reasonable accounting for the fact that the average high-turnover household tilts its common stock investments toward small value stocks with high market risk, the underperformance averages 86 basis points per month (or 10.3 percent annually).

The investment experience of individual investors is remarkably similar to the investment experience of mutual funds. As do individual investors, the average mutual fund underperforms a simple market index (Jensen (1969) and Malkiel (1995)). Mutual funds trade often and their trading hurts performance (Carhart (1997)). But trading by individual investors is even more deleterious to performance because individuals execute small trades and face higher proportional commission costs than mutual funds.

Our main point is simple: Trading is hazardous to your wealth. Why then do investors trade so often? The aggregate turnover of the individual investor portfolios we analyze is about 70 percent; the average turnover is about 75 percent. The New York Stock Exchange reports that the annual turnover of stocks listed on the exchange hovered around 50 percent during our sample period. Mutual funds average an annual turnover of 77 percent (Carhart (1997)). We believe that these high levels of trading can be at least partly explained by a simple behavioral bias: People are overconfident, and overconfidence leads to too much trading.

Based on rational agents free from such behavioral biases, the efficient markets hypothesis has been central to both the theory and practice of investment management. The efficiency research posits that private information is rare. Thus, active investment strategies will not outperform passive investment strategies. Both the theoretical and empirical work on efficiency supporting this view have led to a rise of passive investment strategies that simply buy and hold diversified portfolios (Fama (1991)).

Behavioral finance models that incorporate investor overconfidence (e.g., Odean (1998b)) provide an even stronger prediction: Active investment strategies will underperform passive investment strategies. Overconfident investors will overestimate the value of their private information, causing them to trade too actively and, consequently, to earn below-average returns. Consistent with these behavioral models of investor overconfidence, we provide empirical evidence that households, which hold about half of U.S. equities, trade too much, on average. Those who trade the most are hurt the most.

Appendix A. The Analysis of Trade Timing

In this appendix, we analyze the timing of purchases and sales within a month. The timing of trades within a month is ignored in our main analysis where we assume all purchases and sales are made at month end.

Table AI

The Gross Abnormal Returns for Stocks Bought and Sold from the Trade Date to the End of the Month

The sample is account records for 66,465 households at a large discount brokerage firm from January 1991 to December 1996. Purchase turnover is the average value of stocks purchased divided by the average value of stocks held in each month. The purchase abnormal return is calculated by compounding the daily returns on the purchased security from the day following the purchase to the end of the month less the compound return on the value-weighted NYSE/AMEX/Nasdaq market index. Sales turnover and sales abnormal return are analogously calculated. The estimated effect on the monthly abnormal return is the purchase turnover times the purchase abnormal return minus the sale turnover times the sale abnormal return.

Sample	Monthly Purchase Turnover (%)	Purchase Abnormal Return (%)	Monthly Sale Turnover (%)	Sale Abnormal Return (%)	Estimated Effect on Monthly Abnormal Return (%)
			Panel A: Aggregate		
All households	4.92	−0.472	4.93	0.021	−0.0242
			Panel B: Households Partitioned by Beginning Position Value		
1 (Small)	6.85	−0.650	6.06	−0.116	−0.0375
2	5.83	−0.381	5.16	−0.019	−0.0213
3	5.82	−0.386	5.25	0.437	−0.0454
4	5.55	−0.445	5.25	0.030	−0.0263
5 (Large)	4.41	−0.486	4.23	−0.035	−0.0199
			Panel C: Households Partitioned by Turnover		
1 (Low)	0.26	−0.184	0.23	0.068	−0.0006
2	1.37	−0.176	1.14	−0.089	−0.0014
3	3.07	−0.126	2.57	0.041	−0.0049
4	6.46	−0.234	6.13	0.102	−0.0214
5 (High)	21.81	−0.674	20.75	−0.003	−0.1464

Consistent with the results reported in Odean (1999), we document that the stocks investors buy subsequently underperform the stocks they sell. In aggregate, we estimate that an exact accounting for the timing of purchases and sales would reduce the performance of individual investors by more than two basis points per month (or approximately 0.29 percent annually).

For each account with a beginning-of-month position statement in month t, we identify all purchases in month $t - 1$ and sales in month t. For both purchases and sales, we calculate the compound return on the stock from the day following the trade to the last day of the month. For purchases this return is excluded from our main results; for sales this return is included. Note that in our main results, we account for the intraday return on the trade day in our estimate of the bid-ask spread.

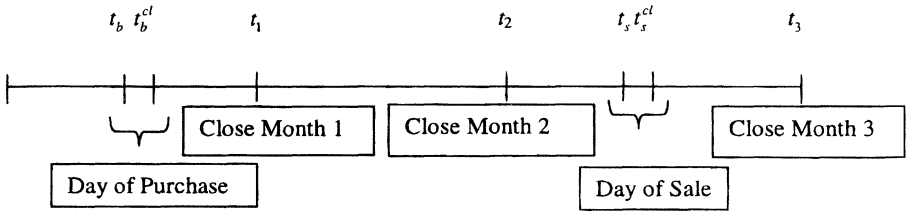

Figure A1. Time line of returns calculations. The time of purchase (sale) is t_b (t_s). The close on the purchase (sale) day is t_b^{cl} (t_s^{cl}). The close on the last day of the purchase (sale) month is t_1 (t_3).

The results of our analysis are presented in Table AI. The second (fourth) columns of this table present aggregate purchase (sale) turnover calculated as the aggregate dollar value of purchases (sales) divided by the aggregate dollar value of positions held. (This turnover measure is slightly different from that used in the main text, where turnover is calculated based on market values contained in position statements and is thus capped at 100 percent per month for each household.) Abnormal returns are calculated for purchases and sales by subtracting the compound return on the CRSP NYSE/AMEX/Nasdaq value-weighted index. The trade-weighted mean abnormal returns are presented in columns 3 (for purchases) and 5 (for sales) of Table AI. In aggregate (Panel A), from the day following the trade to the end of the month, the stocks that investors buy underperform the value-weighted market index by 47 basis points, and those they sell outperform the index by two basis points. Based on these abnormal returns and our estimates of aggregate turnover, we calculate that the results we present in the main text overestimate the performance of individual investors by 2.42 basis points per month.

We also analyze the timing of trades by partitioning households on the basis of account size (Panel B) and turnover (Panel C). In each of the sample partitions, the timing of their trades hurts investors. In short, the results in the main text overestimate the performance of individual investors by ignoring the exact timing of purchases and sales.

Consider how the accounting for the exact timing of trades relates to the return calculations contained in the main text. In Figure A1, we present an example of a security that is purchased in month 1 and sold in month 3. A time line for these transactions is depicted in Figure A1.

In the main text, we calculate the return for this security from t_1 to t_3. In this appendix, we calculate the return from timing as the return from t_b^{cl} to t_1 minus the return from t_s^{cl} to t_s. Our estimate of the bid-ask spread is the return from t_s to t_s^{cl} minus the return from t_b to t_b^{cl}. When the return from timing is added to the main calculation and the spread is subtracted, one gets the (approximate) return from t_b to t_s, the period in which the investor held the stock.

Appendix B. The Analysis of Intramonth Trades

In this appendix, we analyze the performance of stocks that are bought and then sold within a calendar month (e.g., purchased on January 3 and sold on January 10). These intramonth trades are excluded from our main analyses, since those analyses are based on monthly position statements. In aggregate, we estimate that intramonth trades would improve the performance of individual investors by less than one basis point per month (or approximately 0.06 percent annually). Though profitable, the aggregate value of intramonth trades accounts for less than one percent of the aggregate value of positions held.

For each account, we identify all purchases followed by a sale within the same month. In accounting for multiple purchases and sales, we assume that the first securities purchased are the first sold. Over our 72-month sample period, we identify 87,095 round-trip intramonth trades worth approximately $27 million per month, on average. In contrast, the average beginning-of-month value of positions held, which we analyze in the main text, is over $2.7 billion.

We calculate the gross returns on these round-trip transactions using the CRSP daily return files assuming the security is purchased and sold at the close of trading on the purchase and sale dates, respectively. We calculate the net returns on these round-trip transactions by subtracting estimates of the bid-ask spread and commissions as is done in the main text for the case of monthly returns. The average round-trip trade involves a purchase of $22,275, is held for 6.16 days, and costs 2.08 percent in commissions and 0.30 percent for the bid-ask spread. (In aggregate, these round-trip trades cost 0.87 percent in commissions and 0.27 percent for the bid-ask spread.) Note that the bid-ask spread is lower than that documented for trades that we analyze in the main text, which have an average round-trip bid-ask spread of one percent (see Table I). This lower spread is likely a result of the intraday return earned by investors from the transaction price through the end of the trading day (which is included in our estimate of the spread) rather than a smaller bid-ask spread for these intramonth trades.

In Table BI, we summarize our analysis of the gross and net returns earned on intramonth trades. In this table, we calculate market-adjusted abnormal returns by subtracting the daily value-weighted NYSE/AMEX/Nasdaq CRSP market index from the return earned on each intramonth trade. Both the gross and net abnormal returns in this table are weighted by the size of each trade, so that we can estimate the aggregate impact of these intramonth trades on the performance of individual investors.

Panel A presents results for all households. In aggregate, the intramonth trades earn impressive gross abnormal returns of 1.64 percent. The net abnormal returns are 0.50 percent. Since these intramonth trades average 0.99 percent of the average value of positions held, we estimate that these intramonth trades would improve the performance of individual investors by 0.49 basis points per month (0.0050 times 0.0099) in aggregate. This small improvement in performance does not affect any of the conclusions that we present in the main text.

Table BI

The Gross and Net Abnormal Returns earned on Intramonth Trades

The sample is account records for 66,465 households at a large discount brokerage firm from January 1991 to December 1996. The gross abnormal return on intramonth trades is calculated as the compound return from the day following the purchase to the day of the sale less the compound return on a value-weighted NYSE/AMEX/Nasdaq index. The net abnormal return is the gross abnormal return adjusted for the return earned on the day of the purchase or sale, the bid-ask spread, and the commission cost. The intramonth trades as a percentage of total position value are the average monthly value of intramonth purchases divided by the average monthly value of all stocks held. The estimated effect on monthly abnormal return is the net abnormal return times the intramonth trades as a percentage of total position value.

Sample	Mean Trade Size	Gross Abnormal Return (%)	Net Abnormal Return (%)	Intramonth Trades as a Percentage of Total Position Value	Estimated Change in Monthly Abnormal Return (%)
			Panel A: Aggregate		
All households	$22,275	1.636	0.496	0.99	0.0049
			Panel B: Households Partitioned by Beginning Position Value		
1 (Small)	17,459	2.376	0.904	1.42	0.0128
2	12,579	2.082	0.248	0.92	0.0023
3	17,173	1.757	0.486	1.17	0.0057
4	20,255	1.363	0.351	1.33	0.0046
5 (Large)	28,387	1.563	0.526	0.86	0.0045
			Panel C: Households Partitioned by Turnover		
1 (Low)	10,638	−0.003	−0.026	0.00	0.0000
2	12,876	3.006	0.200	0.02	0.0000
3	11,886	1.843	0.220	0.08	0.0002
4	13,838	2.925	1.378	0.36	0.0050
5 (High)	23,702	1.545	0.451	6.92	0.0312

We also analyze the profitability of intramonth trades by partitioning households on the basis of account size (Panel B) and turnover (Panel C). In short, none of these results are so dramatic that they would lead us to qualify any of the results that we present in our main text. Those who benefit most from intramonth trades are those who trade most. Their intramonth trades improve their performance by 3.12 basis points per month (last row and last column of Panel C). Yet, we estimate that these investors underperform by a whopping 86 basis points per month (last row, Table V).

In conclusion, we emphasize that the positive net returns earned on intramonth trades do not necessarily imply that individual investors have superior short-term trading ability. If investors have a disposition to sell winning investments and ride losing investments (as proposed by Shefrin and Statman (1985)), we would expect to observe positive abnormal returns on short-term round-trip trades.

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