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Trading as Entertainment

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Abstract

Among 1,000 German brokerage clients for whom both survey responses and actual trading records are available, investors who report enjoying investing or gambling turn over their portfolio at *twice* the rate of their peers. Including entertainment attributes as additional explanatory variables in cross-sectional regressions of portfolio turnover on objective investor attributes more than *doubles* the fraction of the total variation of portfolio turnover that can be explained. The results are robust to controlling for gender and proxies for overconfidence constructed from survey responses. Non-pecuniary benefits of trading thus appear to offer a straightforward explanation of the “excessive trading puzzle.”

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I Introduction

Trading in financial markets is a costly activity. For a sample of more than 60,000 US discount brokerage clients between 1991 and 1996, Barber and Odean (2000) report that the quintile of the most active traders underperforms the quintile of the least active traders by about 6% per year after trading costs are taken into account; before trading costs, the performance of the two groups is similar.

Traditional economic theory suggests that the benefits of trading individual stocks are limited. No-trade theorems by Milgrom and Stokey (1982) and Tirole (1982) imply that there is little room for speculative trading among rational investors. Moreover, Subrahmanyam (1991) and Gorton and Pennacchi (1993) argue that non-speculative trading should occur in well-diversified portfolios of stocks rather than in individual stocks.

Nevertheless, many individual investors trade individual stocks aggressively. For their sample of US discount brokerage clients, Barber and Odean (2000) report an average annual turnover of 75%; the quintile of the most active traders turns over their portfolio at an annual rate of more than 250%, on average.

Such aggressive trading cannot be explained by standard motives for trading such as savings/dissavings and risk sharing. DeBondt and Thaler (1995) call the observed trading volume in financial markets “perhaps the single most embarrassing fact to the standard finance paradigm.” Shleifer (2000) numbers the question “Why do investors trade so much with each other?” among his top 20 issues for behavioral finance research.

The leading answer of the behavioral approach to the question “Why do people trade?” is overconfidence, prominently advocated by Odean (1998). Essentially, overconfidence allows both parties to a trade to believe that they will win the zero-sum game of trading. For

all its intuitive appeal, the overconfidence hypothesis has received little empirical support. Barber and Odean (2001) report that male discount brokerage clients trade more than their female counterparts and interpret this finding as consistent with the overconfidence hypothesis. Glaser and Weber (2003) use a questionnaire to elicit nine proxies for overconfidence in a sample of 200 German discount brokerage customers and relate the proxies to actual portfolio turnover. None of the proxies help explain cross-sectional variation in the logarithm of average monthly portfolio turnover.¹ In trading experiments with students from different countries, Deaves, Lüders, and Luo (2004) and Biais, Hilton, Mazurier, and Pouget (2005) report little or no relation between proxies for overconfidence and observed trading activity.²

This paper proposes a simple explanation of why people trade, anticipated by Black (1986) in his Presidential Address to the American Finance Association: people trade because they like to do so – the monetary cost of trading is offset by non-pecuniary benefits from researching, executing, or talking about trades.

Two entertainment motives come to mind: leisure and gambling. Leisure-related trading may be motivated by a feeling of accomplishment – similar to a homeowner who decides to do it himself rather than hiring a contractor – or the opportunity to interact with others. In a survey of Dutch individual investors, Hoffmann, Eije, and Jager (2006) report that the respondents rank the enjoyment of investing as a “nice pastime” as the second most important reason why they invest actively – below “the potential for financial gain,” but above “saving for retirement”. A quarter of the investors surveyed in Goetzmann and Dhar (2004) report that they buy stocks as a hobby, or because it was something they enjoy doing; Duflo

¹See their Table 7 for details. For a subsample of investors which excludes the most aggressive traders, Glaser and Weber (2003) report that those who think themselves better-than-average investors trade more. See also the published version of their paper, Glaser and Weber (2007).

²Deaves, Lüders, and Luo (2004) relate trading activity to three proxies for overconfidence derived from responses to a questionnaire administered before the experiment. The pairwise correlations among the proxies is low and only one of them is reliably correlated with trading activity when controlling for other subject attributes.

and Saez (2003), and Hong, Kubik, and Stein (2004), for example, offer evidence that social interaction affects investment decisions.

Besides viewing trading as a leisure activity, investors may also see trading as a form of gambling (see, e.g., Shiller (2000) and Statman (2002)). A trade can be seen as a bet that carries a “dream value,” i.e., the joy of imagining what a handsome payoff will buy. Alternatively, traders may be thrill seekers in the financial domain who enjoy placing bets. These ideas have been used to explain lottery participation, for example by Conlisk (1993), and exploited in advertising by retail brokers as reported by Barber and Odean (2002). Grinblatt and Keloharju (2006) use traffic violations to proxy for thrill seeking behavior; they report that variation in the number of speeding tickets explains variation in trading activity in a large sample of Finnish investors. Kumar (2006) reports that clients at a U.S. discount broker disproportionately hold “lottery-type” stocks – low-priced stocks whose returns are volatile and positively skewed.

This paper tests the entertainment hypothesis by combining survey responses and transaction records for a sample of more than 1,000 clients at one of the top three discount brokers in Germany. Survey responses to statements such as “I enjoy investing” and ”Games are only fun when money is involved” serve as proxies for the entertainment benefits derived from trading.

Clients thus classified as entertainment-driven indeed trade more than their peers. The effect and explanatory power of the entertainment attributes is remarkable. Entertainment-driven investors turn over their portfolio of stocks, bonds, funds, and options at roughly *twice* the rate of their peers. The inclusion of entertainment attributes as additional explanatory variables in a cross-sectional regression of portfolio turnover on objective investor attributes such as gender, age, education, employment, income, and wealth, more than *doubles* the

fraction of the total variation of portfolio turnover that can be explained.

Clearly, investors do not only trade for entertainment purposes. Turnover that is not driven by entertainment motives should not systematically vary across investors as a function of their self-reported enjoyment of investing or gambling. The data allow us to identify such turnover. For example, the transaction records contain a variable that identifies trades as part of an automatic investment plan through which investors can gradually and automatically build or reduce positions in individual stocks and mutual funds at predetermined dates (similar to ShareBuilder in the US). Consistent with the hypothesis, turnover that could be rationalized by savings, dissavings, or liquidity motives varies little across investors as a function of their entertainment attributes.

The results are robust to controlling for additional investor characteristics that have been linked to the propensity to trade such as proxies for overconfidence. Moreover, cross-sectional variation in the proxies for overconfidence largely fails to explain variation in trading activity.

The results are also robust to including past returns which addresses the concern that the relation between self-reported enjoyment of investing or gambling and trading activity is an artifact of past performance (the possibility that investors who have done well in the past trade more and also enjoy investing more).

The results are quantitatively robust to constructing entertainment attributes from investors' responses to differently worded statements that appear in different sections of the survey. Self-professed gamblers in the data set tend to be younger, less educated, and less wealthy. These characteristics have also been linked to participation in legal gambling in the German, UK, and US population (see, e.g., Albers and Hübl (1997), Farrell and Walker (1999), and Clotfelter and Cook (1989)). Consistent with gamblers preferring skewness (see,

e.g., Golec and Tamarkin (1998)), people classified as gamblers in the data set hold more concentrated portfolios that exhibit more positively skewed returns.

The use of survey responses to elicit entertainment attributes implies a potential self-selection problem; the decision to participate in the survey may be affected by an unobserved trait that is also systematically related to trading activity. Controlling for non-response bias as suggested by Heckman (1979) leaves the results unchanged.

The remainder of the paper proceeds as follows: Section II discusses the construction of the trading and survey variables. Section III presents the baseline result of the paper, namely that entertainment-driven investors trade much more aggressively than their peers. Section IV presents robustness checks and evaluates alternative explanations. Section V concludes.

II Data

A Brokerage records

The analysis in this paper draws on a complete history of daily transaction records obtained for a random sample of 21,500 current and former clients at one of Germany's three largest discount brokers between January 1, 1995 and May 31, 2000. The broker is labeled as a discount broker because no investment advice is given. The transaction records are complete in that they contain all transactions from the account opening date until May 31, 2000 or the account closing date, whichever comes first; this allows us to infer all portfolio positions at the end of each trading day. The typical record consists of a unique identification number, client account number, transaction date, buy/sell indicator, type of asset traded (individual stock, mutual fund, individual bond, or option), security identification code, number of shares traded, gross transaction value, transaction fees, and transaction channel. The channel variable indicates whether the order was placed over the phone, over the internet,

or within an automatic investment or withdrawal plan that exist for dozens of individual stocks and mutual funds. Such plans allow investors to gradually build or reduce positions in individual stocks and mutual funds at four dates each month (similar to ShareBuilder in the US). For return calculations, we focus on the investors' individual stock and mutual fund holdings and trades for which Datastream provides daily asset prices and total returns.

In July 2000, after the sample period, each of the sample investors received an invitation to participate in a survey that elicited a wide range of objective and subjective investor attributes detailed below. Table I summarizes the client portfolios and trading activity during the sample period January 1995 to May 2000, separately for survey respondents and non-respondents.

Average monthly turnover, defined as one half the sum of the absolute values of purchases and sales during a given month divided by the average portfolio value during that month averaged first across time for each investor and then across investors, is 15% for respondents and 14% for non-respondents; the difference is not statistically significant. However, the difference in median turnover across the two groups – 7.4% for respondents versus 6.7% for non-respondents – is statistically significant. In our turnover calculation, we consider purchases and sales of individual stocks, individual bonds, mutual funds, options, and term deposits. Individual stock trades account for 62%, fund trades account for 18%, and option trades account for 15% of the total trading volume during the sample period. The average portfolio size over the entire account life is roughly 90,000 Deutsche Mark [DEM] or 50,000 US dollars [USD] at the average USD/DEM exchange rate of 1.7 during the sample period.

We compute two finer measures of turnover that sum to total turnover and label them normal turnover and excess turnover. Normal turnover consists of trading that can be explained by well-understood motives for trading such as savings, dissavings, liquidity, or

rebalancing considerations; excess turnover is the portion of total turnover that cannot be explained by these motives.

Similar to Barber and Odean (2002), we define an excess sale as a sale of a complete position of an individual stock, mutual fund, or option that is followed by one or more stock, fund, or option purchases within three weeks of the sale. We define excess purchases as all stock, fund, and option purchases made within three weeks of an excess sale. All other trades are classified as normal trades. In particular, all trades in term deposits and automatic investment and withdrawal plans – plans that allow investors to gradually build or reduce positions in dozens of stocks and funds at four predetermined dates per month – are classified as normal as they are likely motivated by liquidity and savings considerations.³

Across the sample respondents, the average monthly total turnover of 15% consists of 5% normal turnover and 10% excess turnover – in other words, only one third of the observed trading volume can be explained by savings, liquidity, and rebalancing motives.

The standard deviation of normal turnover across the sample respondents is 4% as opposed to 29% for excess turnover. Therefore the challenge in explaining the heterogeneity in trading activity across investors in our sample lies in understanding excess turnover; investors appear to be fairly homogenous in their desire to trade due to savings, liquidity, or rebalancing motives.

The median Herfindahl-Hirschmann Index (HHI) of the stock and fund portfolios during the sample period is 31%, i.e., the typical client holds the equivalent of an equally-weighted

³ Barber and Odean (2002) use the terms “non-speculative” and “speculative” trades instead of normal and excess trades. Substantively, our classification differs from theirs in three ways. First, they restrict their analysis to trades in common stocks. Second, they require that sales be for a profit to rule out tax-loss motivated trading (capital gains from sales of financial securities are essentially not taxed in Germany). Third, they do not distinguish between savings plan and non-plan trades.

portfolio of three individual positions.⁴

From the information provided by the client to the broker at account opening, we can infer the gender of all main account holders, the age of those who choose to report their birth date (female account holders are less forthcoming about their age), and the client's zip code. The typical respondent is male, young, and has held the account for three years. Judging from a survey of Germans who hold stocks, either directly or through mutual funds (see Deutsches Aktieninstitut (2000)), our sample investors are more predominantly male and younger than the typical German stock market participant.

Our sample is drawn from the population of discount brokerage clients, i.e., self-directed investors, not from the entire population of German stock market participants. In June 2000, at the end of our sample period, there were almost 1.5 million retail accounts at the five largest German discount brokers (Van Steenis and Ossig (2000)) – a sizable number, given that the total number of German investors with exposure to individual stocks at the end of 2000 was estimated to be 6.2 million (see Deutsches Aktieninstitut (2003)). German discount brokers likely appeal to a wider range of retail investors than their full-service peers. On the one hand, the discount brokers' low commissions attract active stock and option traders. On the other hand, the discount brokers' wide array of mutual funds and automatic savings plans attracts retirement investors and those seeking to diversify their portfolio at low cost. Full-service brokers, mostly divisions of German universal banks, typically limited their mutual fund offering to funds advised by the parent bank's asset management division.

It should be noted that all retail brokerage accounts in Germany are taxable accounts.

⁴The HHI is defined as the sum of squared portfolio weights. A portfolio consisting of n equally-weighted stocks would have an HHI of $n \cdot (\frac{1}{n})^2$. Note that we assume stock mutual funds to consist of one hundred equally-weighted positions that do not overlap with other holdings of the investor. That is, the HHI of portfolio of an investor holding one stock mutual fund is 1% and that of an investor splitting his money equally between two stock mutual funds is 0.5%.

Although it is possible that our sample investors hold individual stocks in one account and mutual funds in another account, there is no mechanical reason for this – in contrast, tax-deferred accounts of US retail investors are likely tilted towards mutual funds because defined contribution plans tend to offer funds rather than individual stocks as investment choices – with the exception of company stock.

B Survey variables

To gauge whether investors enjoy gambling with money or otherwise derive non-pecuniary benefits from their trading activities, we use their self-reported attitudes towards investing and gambling gleaned from a questionnaire mailed by the broker to a stratified random sample of 2,300 clients who had opened their account after January 1, 1995, and a random sample of 120 former clients who had closed their account sometime between January 1995 and May 2000. The sample of active clients was stratified based on the number of transactions and the average portfolio size during 1999 – the most recent period for which data were available – to ensure a balanced sample of invited participants that corresponded to the brokerage population. At the same time, an online version of the questionnaire was made available to a random sample of 19,000 clients for whom an email address was on file at the time. Dorn and Huberman (2005) describe the questionnaire in detail.

The survey elicited information on the investors' investment objectives, risk attitudes and perceptions, investment experience and knowledge, portfolio structure, and demographic and socio-economic status; the time to fill out the questionnaire was estimated to be 20-25 minutes. Brokerage clients who responded to the questionnaire could enroll in a raffle to win a cash prize of DEM 6,000 (about USD 3,500) or trip to New York City valued at a similar amount. By the end of August 2000, the firm had collected 577 responses to the paper survey and 768 responses to the online survey. The resulting response rate of 6% appears to be in line with response rates reported for other large-scale surveys (between 5% and 8% in

Graham and Harvey (2003); 7% in Glaser and Weber (2007)).

To pin down the importance of the entertainment motive for different investors, we focus on the survey items that make an explicit reference to whether or not respondents *enjoy* dealing with their investments or *enjoy* gambling with money. This focus yields responses to a total of four statements. The investors are asked to indicate their agreement with the four statements on a five-point ordinal Likert scale ranging from (1) strongly disagree, (2) tend to disagree, (3) tend to agree, (4) strongly agree, and (5) don't know:

1. I enjoy investing. (translated from the German “Es macht mir Spaß, mich mit Geldanlagen zu befassen.”)
2. I enjoy risky propositions. (translated from the German “Ich habe Spaß an riskanten Unternehmungen.”)
3. Games are only fun when money is involved. (translated from the German “Spiele machen erst dann richtig Spaß, wenn es um Geld geht.”)
4. In gambling, the fascination increases with the size of the bet. (translated from the German “Bei Glücksspielen steigt die Faszination mit dem Wetteinsatz.”)

Statements one and two appear in different sections, but on the same page of the questionnaire. Statements three and four appear in a different section and on a different page of the questionnaire.

The first statement best captures the pastime aspect of investing – a respondent who truthfully agrees with the statement likely enjoys spending time on figuring out what to do with his money. Agreement with statements two to four identifies respondents who enjoy risky propositions, in general, and gambling, in particular.

Table II summarizes objective demographic and socio-economic attributes as well as certain portfolio characteristics of investors grouped by their responses to the above statements. Note that we exclude the few investors with missing responses and investors who respond with “don’t know” – out of a total of 1,345 respondents, the number of missing responses ranges from 10 (for statement three) to 15 (for statement one); the number of respondents who respond with “don’t know” ranges from 11 (for statement one) to 56 (for statement four). To be able to make meaningful statistical comparisons across groups, we group investors who “strongly disagree” with statement one together with those who “tend to disagree” as there are only four investors who “strongly disagree.” For the same reason, we combine the “strongly agree” and “tend to agree” categories for statement four as only 38 investors “strongly agree.”

Male investors and wealthier investors appear to enjoy dealing with investments more than their female and less wealthy counterparts. Those who enjoy games only when money is involved, in particular, tend to be younger, less well educated, and less wealthy. Although we have no direct information about whether our sample investors engage in gambling outside the stock market, it is interesting to note that younger age, a lower level of education, and less wealth have been linked to a higher propensity to participate in legal forms of gambling in Germany (see, e.g., Albers and Hübl (1997)), the UK (see, e.g., Farrell and Walker (1999)), and the US (see, e.g., Clotfelter and Cook (1989)).

Self-professed gamblers in our sample hold more concentrated equity portfolios. For example, those who strongly agree with the statement “I enjoy risky propositions” hold equity portfolios with an average HHI of 0.39 which corresponds to an equally weighted position in two to three individual stocks; by contrast, their peers who strongly disagree with this statement hold the equivalent of an equally weighted portfolio of four stocks.

Not only are the portfolios of gamblers more concentrated, but they also consist of individually riskier securities. For example, the average component volatility – the value-weighted average of the annualized volatility of the stock portfolio components – of investors who strongly agree with the statement “I enjoy risky propositions” averages 52% relative to 39% for investors who strongly disagree with this statement.

Consistent with gamblers preferring skewness (see, e.g., Golec and Tamarkin (1998)), people classified as gamblers in our data set hold portfolios of stocks and mutual funds that exhibit more positively skewed returns. Note that we exclude holdings of individual bonds and options when calculating portfolio statistics, in part because of a lack of high-frequency price data. However, options holdings and trades also point to entertainment-motivated investors preferring securities with positively skewed payoffs. For example, half of the investors who strongly agree with the statement “I enjoy risky propositions” trade options during our sample period; in contrast, only one out of five investors who strongly disagrees with this statement also trade options.

III Baseline results

Trading is costly. The typical respondent spends 0.5% of his self-reported gross annual income on trading commissions. The main hypothesis entertained in this paper is that for investors who enjoy investing – either because it affords them a sense of accomplishment or because they enjoy gambling with money – the non-pecuniary benefits of trading help offset the costs; hence, they will trade more.

As a first step, we group the survey respondents by their responses to each of the four entertainment statements. Figures 1-4 illustrate the equally-weighted average monthly turnover rates for the members of each group. Investors who report enjoying investing also trade more

aggressively than their peers. Figure 1 shows that investors who strongly agree with “I enjoy investing” exhibit average monthly turnover of 17% – significantly higher than the average turnover rate of 10% for the investors who disagree with the statement. Similar turnover patterns obtain for investors grouped by their responses to statements that elicit the investor’s affinity to gambling (see Figures 2-4). For example, investors who strongly agree with “Games are only fun when money is involved” turn over their portfolios at an average monthly rate of 24% – twice the rate of those who strongly disagree with the statement (see Figure 3).

If differences in trading activity were indeed driven by entertainment, one would expect such differences to manifest themselves in terms of excess turnover, i.e., turnover unlikely due to savings, liquidity, or rebalancing considerations. Indeed, Figures 1-4 also show that virtually the entire difference in total turnover between those who enjoy investing or gambling and their peers is due to the higher excess turnover of the entertainment-driven investors. For example, investors who strongly agree with “Games are only fun when money is involved” exhibit normal turnover rates averaging 5% – similar to the average normal turnover of 4.5% of their peers who strongly disagree with the statement. However, the average excess turnover rate of the self-professed gamblers, 19%, is almost thrice the corresponding rate of their peers (see Figure 3).

Next, we examine the relation between turnover and entertainment attributes in a multi-variate context. Table III reports the results of OLS regressions of the logarithm of different turnover measures on the entertainment attributes as well as objective demographic and socio-economic attributes elicited by the survey – gender, age, education, employment status, income, and wealth. Educational attainment is coded as a college dummy; more than two thirds of the survey participants report to attend or have attended college, more than three times the population average. Employment status is coded as a self-employment dummy;

most of the respondents are white-collar employees, but the fraction of self-employed respondents is twice as high as in the population.

The results of the baseline regression of the logarithm of average monthly turnover on the demographic and socio-economic attributes, reported in Column (1) of Table III, show that male and younger investors trade significantly more than their peers, other things equal – this is consistent with the evidence reported by Barber and Odean (2001) for a sample of US discount brokerage investors. That self-employed investors trade more than their otherwise employed peers could be due to the fact that the self-employed do not have to make mandatory payments within the German pension system – one would thus expect them to invest more actively on their own to save for retirement.

Column (2) of Table III reports the results of a regression similar to that in Column (1), but with the investors' response to the statement “I enjoy investing” as an additional regressor. The response is coded as the two dummy variables “Strongly agree” and “Tend to agree.” The dummy variables indicating disagreement are omitted.⁵ The coefficients are increasing in the strength of the agreement and both highly significant. Other things equal, those who thoroughly enjoy investing trade more than twice as those who do not. The introduction of the entertainment attribute reduces the effects of gender and age, but does not render them insignificant.

Columns (3)-(5) of Table III show that investors who enjoy risky propositions in general, and gambling in particular, trade more aggressively than their peers – controlling for objective investor attributes. In other words, the explanatory power of the subjective entertainment attributes is not limited to a particular wording or statement. The quantitative effects of the different attributes are of the same order of magnitude. For example, those

⁵We omit both the dummy variable indicating slight disagreement and the dummy variable indicating strong disagreement as only four respondents strongly disagree with the statement.

who strongly agree with “I enjoy risky propositions” exhibit more than twice the turnover of those who strongly disagree with that statement; those who strongly agree with “games are only fun when money is involved” exhibit 75% higher turnover than those who strongly disagree with that statement. Column (6) of Table III reports a regression that includes all entertainment attributes as regressors. Other things equal, both investors who enjoy dealing with their personal finances *and* investors who enjoy risky propositions trade more aggressively than their peers. Investors appear to derive pleasure from trading both as a pastime and as a form of gambling.

Columns (7) and (8) of Table III report the results of similar regressions as in Column (6), but with the logarithm of one plus normal turnover and the log of one plus excess turnover as dependent variables. We add one to the excess turnover measure before taking the logarithm because some investors exhibit zero excess turnover. These results confirm the inferences drawn from the univariate relations between the turnover measures and the entertainment attributes. Other things equal, entertainment-driven investors exhibit similar normal turnover when compared with their peers, but substantially higher excess turnover. In the following tests, we will use excess turnover as the dependent variable; all results reported below are qualitatively robust to using the measure of total turnover instead.

IV Robustness checks and alternative explanations

A Non-response bias

Given that only a minority of clients invited to participate in the survey chooses to do so, perhaps motivated by the prize raffle for respondents, one might be concerned that our analysis suffers from a non-response bias. In particular, it is conceivable that an unobserved personal trait drives both the clients’ decision to participate and their trading activity. To formally examine this possibility, we re-run the regression reported in Column (8) of Table

III with an additional regressor – the inverted Mills ratio obtained from a first-stage probit model of survey participation – as suggested by Heckman (1979). In unreported results, the coefficient of the inverted Mills ratio is found to be indistinguishable from zero. It thus appears that the results are not driven by a non-response bias. An appendix detailing the specification and results of the two-stage Heckman regression is available from the authors upon request.

B Unimportant accounts

Another possibility is that the responses to the entertainment statements proxy for the existence of other brokerage accounts. Specifically, investors classified as entertainment driven may be more likely to hold financial assets outside the observed account, e.g., in a full-service brokerage account. Because of the lower trading costs, they will likely concentrate their trading activity in the observed account – overall, however, their trading activity need not be higher than that of non-entertainment investors.

Survey respondents provide an estimate of their net worth as well as the allocation of their net worth across different asset classes. We use these responses to construct two proxies for the importance of the observed accounts. First, we divide the value of the investor’s observed portfolio at the end of the sample period by the net worth estimate. Second, we divide the value of the observed portfolio by the estimated value of the investor’s brokerage assets; brokerage assets are the part of net worth that could, in principle, be held in a brokerage account – e.g., stocks, funds, options, but not real estate or cash value life insurance – though not necessarily in the observed account. The typical account represents about one third of self-reported wealth and one half of self-reported brokerage assets.

Columns (1) and (2) of Table IV report the results of regressions with the two proxies for account importance as additional control variables. Both proxies are significantly negatively

related with excess turnover, but the explanatory power of the entertainment attributes is unchanged.

Survey respondents also indicate whether they hold any brokerage accounts other than the observed account. In another robustness check, reported in Column (3) of Table IV, we focus on roughly the one third of the sample for whom the observed account is the only brokerage account. Again, the explanatory power of the entertainment attributes is similar to that in the baseline regression.

C Past performance

Given that the survey is administered ex post and that past performance leads trading activity (see, e.g., Statman, Thorley, and Vorkink (2006)) and Glaser and Weber (2005)), one concern is that the survey responses are an artifact of past performance. Investors who report enjoying investing or gambling may feel good about investing or placing bets in the stock market because their investments have done well; it is their past returns rather than entertainment motives that fuel their trading activity. If strong past performance drove our results, then one would expect at a minimum that respondents classified as entertainment investors outperform their peers during the sample period.

For a given investor and month, we compute monthly portfolio returns based on the beginning-of-the-month holdings of individual stocks and stock funds, assuming that the positions are held throughout the month. To calculate monthly benchmark returns for a given investor portfolio of individual stocks and stock funds, we create a value-weighted benchmark based on the investor's beginning-of-the-month holdings as follows. To each German stock, we assign an equally-weighted portfolio of German stocks with the same Datastream industry designation and in the same market capitalization tercile based on the beginning-of-the-month market cap (the size terciles are calculated separately for every month-industry

combination of German stocks). To each foreign stock, we assign an equally-weighted portfolio of foreign stocks that have the same Datastream industry designation and are in the same market cap tercile. To each stock fund, we assign an equally-weighted portfolio of stock funds that have the same investment objective (e.g., large-cap US stocks). The investor's monthly excess return is the difference between the actual portfolio return during the month and the return of the benchmark portfolio.

To assess the effects of trading cost on performance, we consider trading commissions, bid-ask spreads, intra-day returns, and mutual fund loads as follows. If an investor bought 200 shares of an individual stock at a price of DEM 50 per share (this is the actual transaction price, i.e., it reflects the bid-ask spread and any price impact), paid a commission of DEM 90, and the Datastream closing price for the stock on the trading date were 49, then the associated trading costs would be DEM 290 ($90 + 200 * (50 - 49)$). When trading stock funds, the sample investors do not pay any commissions. However, they often face front loads which may be discounted by the broker. If an investor bought 200 shares of a fund with a net asset value per share of DEM 50, a front load of 5%, and a load rebate of 50% offered by the broker, the trading costs would be DEM 250 ($50 * 200 * 0.025$). Across all transactions, trading costs average 1.2% of transaction value; by themselves, trading commissions average 0.9% of transaction value. To calculate monthly excess returns after trading costs, we sum the trading costs across all transactions of a given investor and month, divide this sum by the average actual portfolio value during the month, and subtract this ratio from monthly excess returns.

Table V reports monthly raw returns, excess returns, and excess returns after trading costs for investors grouped by their responses to the four entertainment statements, assuming that each group's returns are independent across time; the group return for a given month is the equally-weighted average return across the members of the group.⁶ If anything, the

⁶The average returns reported for investors grouped by their responses to the statement "I enjoy investing" are higher than the returns averages for the other statements because there is no investor who disagrees with

raw returns of investors classified as entertainment-driven are below those of their peers. The pattern is clearer still for excess returns net of costs, reflecting the higher turnover of entertainment-driven investors. However, return differences between entertainment-driven investors and their peers are not significantly different from zero at conventional levels of significance – owing in part to the small number of respondents that form a particular group at the beginning of the sample period.

In related additional robustness tests, we check whether the results hold in subperiods and whether past performance affects the explanatory power of the entertainment attributes. To this end, we split the sample period into the subperiod before January 1999 and the subperiod January 1999 - May 2000. We also use the portfolio return before commissions during the first period as an additional explanatory variable in a regression with second-period turnover as dependent variable. We choose January 1999 as the breakpoint because most of the sample investors have open accounts by then. Variations in the setup, such as regressing turnover between January 2000 and May 2000 on average portfolio returns during 1999, yield similar results and are thus not reported.

Column (1) of Table VI reports the regression results with the log of one plus average monthly excess turnover until December 1998 as the dependent variable. Column (2) shows the corresponding results for a regression with turnover between January 1999 and May 2000 as the dependent variable. We find a significant relation between entertainment attributes and turnover in both subperiods. The coefficient of lagged portfolio returns is positive, but not significantly different from zero; the inclusion of lagged portfolio returns does not affect the entertainment results (see Column (3) of Table VI).

“I enjoy investing” during the first eight months of the sample. The missing returns and the fact that returns are relatively low at the beginning of the sample period explain the differences in averages.

D Overconfidence

Overconfident investors may enjoy trading because they wrongly think themselves good traders and enjoy doing what they perceive themselves to be good at – or they enjoy trading and think that they must be good at what they enjoy.

The survey offers three attributes that capture different aspects of overconfidence: the tendency to overestimate one’s knowledge, the tendency to overly attribute successes to skill (known as the self-enhancing attribution bias), and the erroneous expectation to be able to affect chance outcomes (known as the illusion of control); see also Barber and Odean (2002), Daniel, Hirshleifer, and Subrahmanyam (1998), and Gervais and Odean (2001)). We use the investor’s agreement with the statement “I’m much better informed than the average investor” as a proxy for the tendency to overestimate one’s knowledge, or relative knowledge. To estimate the self-enhancing attribution bias, we consider the extent to which survey participants agree with the statement “My past investment successes were, above all, due to my specific skills.” To construct a proxy for the illusion of control, we compute an aggregate score using the investors’ responses to four statements: 1. “When I make plans, I am certain that they will work out,” 2. “I always know the status of my personal finances,” 3. “I am in control of my personal finances,” and 4. “I control and am fully responsible for the results of my investment decisions.” The score ranges from 1 to 4 with higher numbers indicating a greater perception of control. Alternative specifications of the score – for example, using fewer statements or modeling the response as dummy variables – yield similar results and are thus not reported.

Table VII reports the results of regressing the log of one plus average excess turnover on objective investor attributes, entertainment attributes, and the three proxies for overconfidence. Of the three proxies, only relative knowledge is significantly positively related with trading activity – as in Glaser and Weber (2007), those who think themselves better

than average investors tend to trade more. Controlling for the proxies of overconfidence in addition to other investor attributes, investors who enjoy investing and those who enjoy risky propositions continue to trade significantly more than their counterparts.

It is possible that entertainment magnifies the effect of overconfidence or vice versa. In unreported results, however, the interaction effects between entertainment attributes and overconfidence are generally not related to trading activity.

V Conclusion

This paper suggests that some investors derive non-pecuniary benefits from trading which offset the costs of churning; similar to lottery players who buy tickets with negative expected values, entertainment-driven investors trade even though this diminishes the expected monetary payoff of their portfolio. Consistent with this interpretation, variation in the self-reported enjoyment of investing and gambling explains variation in trading intensity after controlling for competing explanations such as overconfidence.

Entertainment trading appears to be quantitatively important; other things equal, entertainment driven investors trade about twice as much as those who fail to take pleasure in gambling or investing. The magnitude of the results do not hinge on a particular survey item used to elicit the entertainment value of trading.

Aggressive trading may be “hazardous to the investor’s wealth,” but our results counsel some caution in jumping to the conclusion that active trading also reduces investor welfare.

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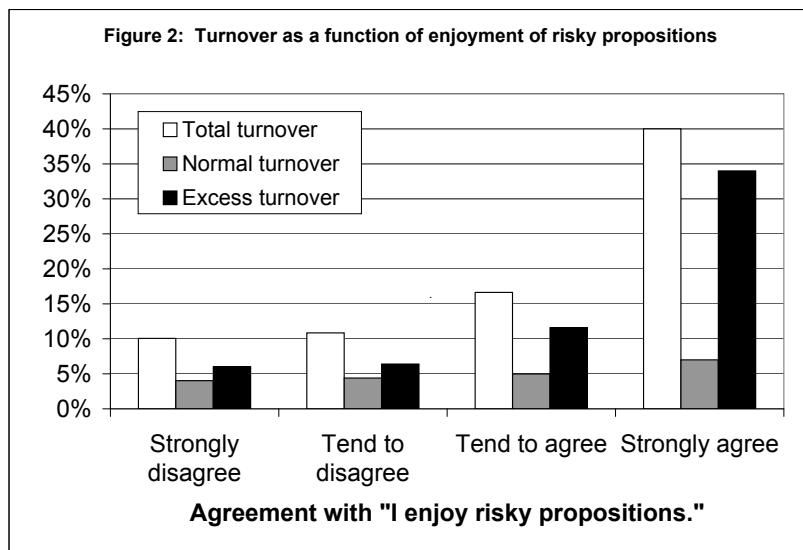
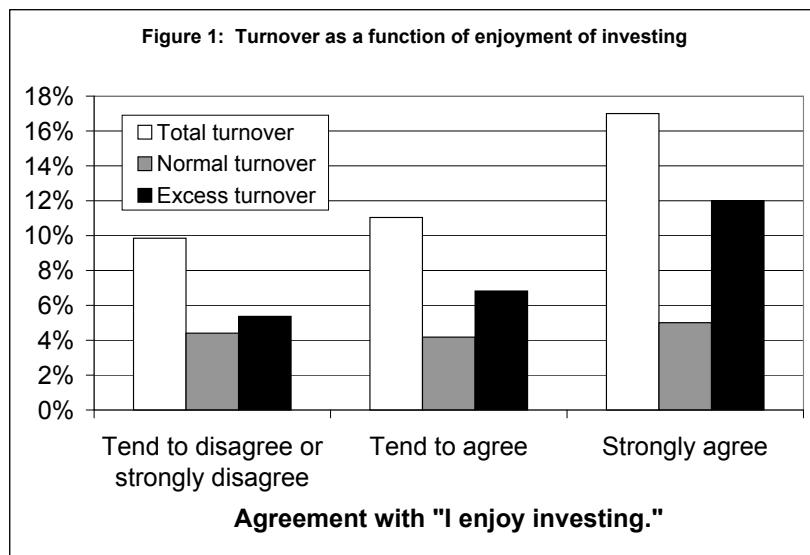
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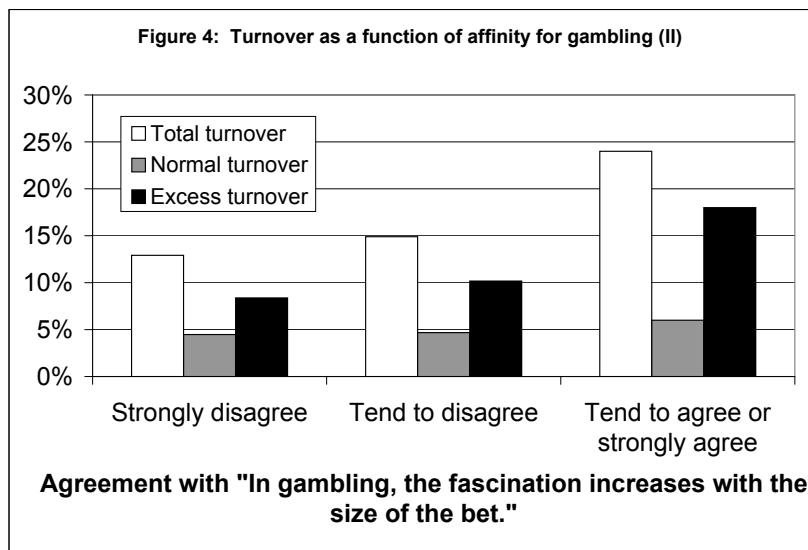
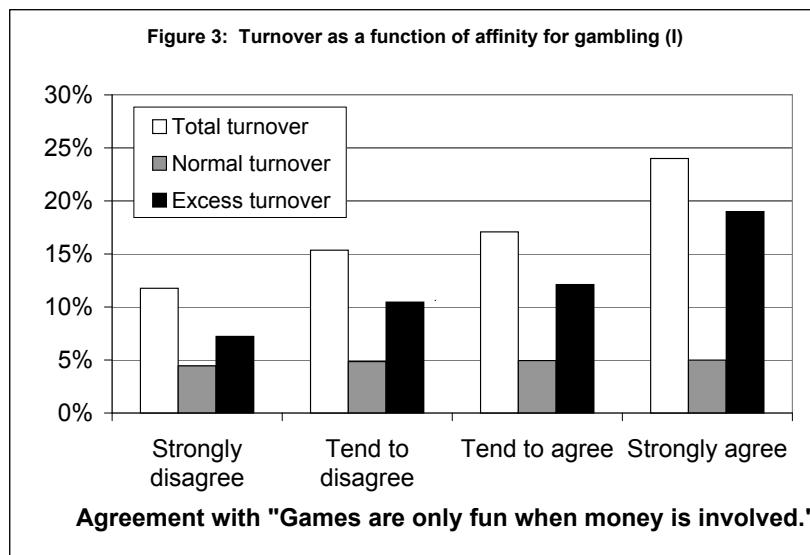


Table I: Summary statistics

Portfolio characteristics are calculated from the complete daily transaction history available for each client – both for the 1,345 respondents and the 20,183 non-respondents – from the day when the account was opened until May 31, 2000 or the day when the account was closed, whichever comes first. Turnover in a given month is the sum of the absolute value of purchases and sales of stocks, bonds, mutual funds, and options divided by twice the higher of the portfolio value at the beginning or at the end of the month (to avoid extreme values). Normal and excess turnover are defined as in Section II.A. Average portfolio value is calculated at the end of every month across all individual stocks, funds, options, bonds, and term deposits in the client's portfolio. During the sample period, one US Dollar [USD] corresponds to roughly Deutsche Mark [DEM] 1.7. The Herfindahl-Hirschmann Index is calculated using only stocks and stock mutual funds for which Datastream offers a complete history of non-stale prices and returns. All investor characteristics are gleaned from information recorded by the broker upon account opening. If there is a statistically significant difference between attribute means, proportions, or medians reported for the two samples, it is noted by asterisks in the mean and median columns of the non-respondent sample. ***/**/* indicate that the means, proportions, or medians are significantly different at the 1%/5%/10% level.

Portfolio characteristics	Survey respondents			Non-respondents		
	Mean	Std	Median	Mean	Std	Median
Average monthly portfolio turnover thereof:						
normal turnover	15%	32%	7.4%***	14%	38%	6.7%
excess turnover	5%	4%	3.9%**	5%	5%	3.7%
excess turnover	10%	29%	2.9%***	10%	37%	2.5%
Average portfolio value [DEM]	86,000	148,000	38,000	95,000	285,000	38,000
Average Herfindahl-Hirschmann Index	31%***	25%	25%**	34%	29%	27%
Investor characteristics						
Fraction male	88%***			83%		
Age of accountholder [years]	39**	11	36***	40	13	38
Account tenure [years]	3.3	1.3	2.9	3.2	1.3	2.9
Distance to broker [km]	321	215	314	327	215	318
Account closed	0.5%***			0.7%		
Online survey	46%***			91%		

Table II: Characteristics of entertainment-driven investors and their portfolios

Panels A through D characterize investors grouped by their responses to four survey statements designed to elicit whether the respondents enjoy investing or gambling with money. The investors are asked to indicate their agreement with the four statements on an ordinal scale of (1) strongly disagree, (2) tend to disagree, (3) tend to agree, (4) strongly agree. In Panel A, we have combined the categories (1) and (2) to “disagree” since only four respondents choose to “strongly disagree.” In Panel D, we have combined the categories (3) and (4) to “agree” since only thirty-eight respondents choose to “strongly agree.” “Nobs” is the number of respondents in each category. “Male” is a dummy variable that is one if the respondent reports to be male and zero otherwise (if missing, we replace the missing value with the gender recorded for the main account holder in the brokerage database). “Age” is the age of the respondent (if missing, we replace the missing value with the age recorded for the main account holder in the brokerage database). “College degree” is a dummy that is one if a respondent has a college degree and zero otherwise. “Self-employed” is a dummy that is one if the respondent reports to be self-employed and zero otherwise. “Income” is the self-reported gross annual income in DEM ’000s. “Wealth” is the self-reported total net worth – including all financial assets and real estate – in DEM ’000s. HHI is the average Herfindahl-Hirschmann Index across the portfolios in the group. Average component volatility (ACV) is the value-weighted average volatility of the portfolio components in an investor’s portfolio. Realized skewness is calculated from daily portfolio returns as in Chen, Hong, and Stein (2001) Note that HHI, ACV, and skewness are calculated using only the individual stocks and stock mutual funds for which Datastream provides daily total return data. Note: ***/**/* indicate that the means or proportions of the top and bottom groups are significantly different at the 1%/5%/10% level.

Entertainment attributes	Nobs	Male	Age	College	Self-employed	Income	Wealth	HHI	ACV	Realized Skewness
Panel A - Statement 1: “I enjoy investing.”										
Disagree	84	76%	40	73%	15%	90	262	30%	42%	0.92
Tend to agree	403	87%	41	72%	17%	94	358	30%	42%	0.50
Strongly agree	822	91%***	41	69%	16%	94	396***	31%	45%	0.74
Panel B - Statement 2: “I enjoy risky propositions.”										
Strongly disagree	148	82%	48	69%	13%	85	421	26%	39%	0.45
Tend to disagree	571	88%	41	70%	16%	93	385	28%	41%	0.45
Tend to agree	492	90%	39	70%	17%	97	357	33%	48%	0.91
Strongly agree	87	95%***	37***	75%	21%	102**	330*	39%***	52%***	1.32***
Panel C - Statement 3: “Games are only fun when money is involved.”										
Strongly disagree	470	87%	41	76%	14%	91	387	28%	42%	0.63
Tend to disagree	487	89%	41	66%	17%	94	381	30%	43%	0.52
Tend to agree	277	92%	40	67%	19%	97	351	34%	48%	0.87
Strongly agree	71	87%	38*	62%**	22%	84	282**	38%***	53%***	1.07
Panel D - Statement 4: “In gambling, the fascination increases with the size of the bet.”										
Strongly disagree	674	89%	41	72%	16%	95	392	28%	42%	0.53
Tend to disagree	396	88%	41	68%	18%	90	364	32%	45%	0.77
Agree	199	90%	39**	65%*	18%	94	329**	37%***	50%***	0.96**

Table III: Cross-sectional regressions – baseline results

Columns (1) through (8) report the results of OLS regressions of the logarithm of average monthly turnover (1-6), the log of one plus normal turnover (7), and the log of one plus excess turnover (8), on objective investor attributes and on the four entertainment attributes. Note: Standard errors, corrected for heteroskedasticity as suggested by White (1980), are in parentheses. ***/**/* indicate that the coefficient estimates are significantly different from zero at the 1%/5%/10% level.

	(1)	(2)	(3) Logarithm of Average total Turnover	(4)	(5)	(6)	(7) Log (1+Normal Turnover)	(8) Log (1+Excess Turnover)
Constant	-0.914*** (0.289)	-1.358*** (0.314)	-1.059*** (0.303)	-1.104*** (0.295)	-0.930*** (0.289)	-1.391*** (0.336)	0.096*** (0.019)	0.268*** (0.063)
Statement: "I enjoy investing."								
Tend to agree		0.402** (0.158)				0.311* (0.175)	-0.008 (0.009)	0.028 (0.022)
Strongly agree		0.716*** (0.155)				0.591*** (0.172)	0.007 (0.010)	0.077*** (0.022)
Statement: "I enjoy risky propositions."								
Tend to disagree			-0.039 (0.099)			-0.076 (0.104)	0.002 (0.005)	-0.017 (0.019)
Tend to agree			0.326*** (0.100)			0.188* (0.109)	0.005 (0.006)	0.035 (0.023)
Strongly agree			0.691*** (0.158)			0.512*** (0.166)	0.023 (0.015)	0.161*** (0.061)
Statement: "Games are only fun when money is involved."								
Tend to disagree			0.039 (0.076)			-0.009 (0.081)	0.006 (0.005)	0.016 (0.016)
Tend to agree			0.282*** (0.079)			0.096 (0.091)	-0.001 (0.006)	0.020 (0.021)
Strongly agree			0.561*** (0.141)			0.167 (0.159)	-0.012 (0.011)	0.055 (0.049)
Statement: "In gambling, the fascination increases with the size of the bet."								
Tend to disagree					0.095 (0.071)	0.010 (0.078)	0.001 (0.004)	0.002 (0.016)
Tend to agree or strongly agree					0.447*** (0.094)	0.255** (0.102)	0.028*** (0.009)	0.051* (0.030)
Other Attributes								
Gender	0.464*** (0.106)	0.371*** (0.103)	0.420*** (0.109)	0.443*** (0.107)	0.438*** (0.108)	0.318*** (0.107)	0.017*** (0.006)	0.050*** (0.017)
Age	-0.010*** (0.004)	-0.009*** (0.004)	-0.008** (0.004)	-0.009** (0.004)	-0.010*** (0.004)	-0.006* (0.004)	0.000 (0.000)	0.000 (0.001)
College	-0.060 (0.069)	-0.039 (0.067)	-0.077 (0.069)	-0.033 (0.069)	-0.042 (0.069)	-0.035 (0.069)	0.008** (0.004)	-0.007 (0.016)
Self-employed	0.327*** (0.090)	0.353*** (0.089)	0.319*** (0.089)	0.294*** (0.089)	0.310*** (0.091)	0.316*** (0.1)	0.019** (0.0)	0.092*** (0.0)
ln(Income)	-0.047 (0.066)	-0.047 (0.064)	-0.062 (0.065)	-0.055 (0.066)	-0.081 (0.067)	-0.078 (0.065)	0.000 (0.004)	-0.025 (0.016)
ln(Wealth)	-0.136*** (0.031)	-0.157*** (0.030)	-0.133*** (0.030)	-0.120*** (0.031)	-0.122*** (0.031)	-0.141*** (0.031)	-0.006*** (0.002)	-0.028*** (0.007)
Ancillary statistics								
Nobs	1151	1131	1125	1127	1096	1054	1054	1054
R ²	7.3%	10.9%	11.5%	8.7%	8.9%	14.9%	9.0%	12.4%

Table IV: Robustness checks

All regressors are defined as in Table III. “Account as a fraction of wealth” is the portfolio value at the end of the sample period divided by the investor’s net worth as reported in the questionnaire. “Account as a fraction of brokerage wealth” is the portfolio value at the end of the sample period divided by the portion of the investor’s net worth that could be held at a broker, in principle. The regression reported in Column (3) is estimated only for survey respondents who report that the observed account is their only brokerage account. The standard errors reported in parentheses in Columns (2)-(3) are corrected for heteroskedasticity as suggested by White (1980). Note: ***/**/* indicate that the coefficient estimates are significantly different from zero at the 1%/5%/10% level.

	(1)	(2)	(3)
	Logarithm of (1+Excess Turnover)		
Constant	0.349*** (0.065)	0.340*** (0.063)	0.296*** (0.113)
Account as a fraction of wealth	-0.088*** (0.024)		
Account as a fraction of brokerage wealth		-0.090*** (0.025)	
“I enjoy investing.”			
Tend to agree	0.030 (0.023)	0.030 (0.023)	0.047* (0.026)
Strongly agree	0.081*** (0.023)	0.080*** (0.023)	0.095*** (0.029)
“I enjoy risky propositions.”			
Tend to disagree	-0.022 (0.019)	-0.021 (0.019)	-0.020 (0.033)
Tend to agree	0.032 (0.024)	0.031 (0.024)	0.013 (0.039)
Strongly agree	0.162*** (0.062)	0.162*** (0.062)	0.117 (0.105)
“Games are only fun when money is involved.”			
Tend to disagree	0.013 (0.016)	0.014 (0.016)	0.033 (0.025)
Tend to agree	0.015 (0.021)	0.015 (0.021)	-0.003 (0.037)
Strongly agree	0.050 (0.049)	0.054 (0.048)	0.035 (0.071)
“In gambling, the fascination increases with the size of the bet.”			
Tend to disagree	0.003 (0.017)	0.002 (0.017)	-0.001 (0.022)
Tend to agree or strongly agree	0.048 (0.029)	0.048 (0.029)	0.132** (0.062)
Ancillary information			
Number of observations	1031	1031	378
Control variables	Investor attributes as in Table III		
R ²	14.4%	14.7%	19.2%

Table V: Past performance of investors grouped by entertainment attributes

Groups of investors are formed based on the investors' entertainment attributes. The panels report time-series averages of the groups' returns where the group return for a given month is the equally-weighted average return across the group's member returns that month. Excess returns are measured relative to an investor-specific benchmark that is based on the investor's holdings at the beginning of a given month. The benchmark matches each stock in the investor's portfolio at the beginning of a month with an equally-weighted portfolio of stocks with the same Datastream industry designation and with a similar market capitalization; the benchmark matches each stock fund with an equally-weighted portfolio of stock funds with the same investment objective. To obtain excess returns after fees, we subtract the ratio of trading costs incurred during a given month to average portfolio value from an investor's excess return that month; the trading costs include trading commissions, spreads, price impact, and fund loads where applicable (as described in Section IV). ***/**/* indicate that the time-series averages of excess returns are significantly different from zero at the 1%/5%/10% level.

	(1) Raw returns	(2) Excess returns	(3) Excess returns net of costs
"I enjoy investing."			
Tend to disagree or strongly disagree	3.3%	0.2%	-0.1%
Tend to agree	2.6%	-0.3%	-0.5%**
Strongly agree	2.8%	-0.1%	-0.4%**
"I enjoy risky propositions."			
Strongly disagree	2.5%	0.0%	-0.2%
Tend to disagree	2.5%	-0.1%	-0.3%**
Tend to agree	2.5%	-0.1%	-0.4%*
Strongly agree	2.2%	-0.3%	-0.6%**
"Games are only fun when money is involved."			
Strongly disagree	2.6%	0.0%	-0.2%
Tend to disagree	2.4%	-0.2%	-0.4%**
Tend to agree	2.2%	-0.4%**	-0.6%***
Strongly agree	2.4%	-0.1%	-0.3%
"In gambling, the fascination increases with the size of the bet."			
Strongly disagree	2.6%	0.0%	-0.3%*
Tend to disagree	2.2%	-0.2%	-0.4%**
Tend to agree or strongly agree	2.4%	-0.3%	-0.6%**

Table VI: Past performance and sub-period results

The dependent variable in Column (1) is the log of one plus average excess turnover computed for each investor from account opening until December 1998. The dependent variable in Columns (2)-(3) is the log of one plus average excess turnover computed for each investor from January 1999 to May 2000. Average past return is the geometric average monthly portfolio return from account opening until December 1998. The standard errors reported in parentheses in Columns (1)-(3) are corrected for heteroskedasticity as suggested by White (1980). Note: ***/**/* indicate that the coefficient estimates are significantly different from zero at the 1%/5%/10% level.

Dependent variable	(1) Logarithm of (1+excess turnover) until 12/1998	(2) 1/1999-5/2000	(3) 1/1999-5/2000
Constant	0.155*** (0.049)	0.257*** (0.074)	0.250*** (0.076)
Average past return			0.469 (0.309)
“I enjoy investing.”			
Tend to agree	0.035* (0.018)	0.016 (0.025)	0.009 (0.027)
Strongly agree	0.063*** (0.018)	0.081*** (0.025)	0.074*** (0.026)
“I enjoy risky propositions.”			
Tend to disagree	0.008 (0.013)	-0.029 (0.023)	-0.029 (0.024)
Tend to agree	0.042** (0.016)	0.037 (0.028)	0.037 (0.029)
Strongly agree	0.121*** (0.043)	0.172** (0.069)	0.148** (0.067)
“Games are only fun when money is involved.”			
Tend to disagree	0.013 (0.013)	0.028 (0.019)	0.035* (0.019)
Tend to agree	0.007 (0.017)	0.039 (0.026)	0.042 (0.027)
Strongly agree	0.073 (0.044)	0.052 (0.055)	0.053 (0.059)
“In gambling, the fascination increases with the size of the bet.”			
Tend to disagree	-0.007 (0.013)	0.002 (0.020)	-0.003 (0.021)
Tend to agree or strongly agree	0.020 (0.027)	0.062* (0.034)	0.058* (0.035)
Ancillary statistics			
Objective attributes	Yes	Yes	Yes
Nobs	1007	1054	1007
R ²	8.2%	12.0%	11.3%

Table VII: Overconfidence

The logarithm of one plus average monthly excess turnover is regressed on the objective demographic and socio-economic investor attributes and the entertainment attributes as defined in Table II, as well as proxies for overconfidence. For brevity's sake, the coefficients for the objective attributes are not reported in this table. The two entertainment attributes considered in the regressions are constructed from the respondents' agreement with the statement "I enjoy investing" and "I enjoy risky propositions" (see Table II). "Relative knowledge" is the investor's agreement with the statement "I'm much better informed about financial securities than the average investor." Since only seven respondents strongly disagree with the statement, we omit both disagreement dummies. "Self-enhancing attribution bias" is the investor's agreement with the statement "My past successes were, above all, due to my specific skills." For the construction of the "Illusion of control" variable, please refer to Section IV.D. Note: Standard errors, corrected for heteroskedasticity as suggested by White (1980), are in parentheses. ***/**/* indicate that the coefficient estimates are significantly different from zero at the 1%/5%/10% level.

Dependent variable	ln(1+avg excess turnover)
Constant	0.307*** (0.110)
Entertainment: "I enjoy investing."	
Tend to agree	0.023 (0.023)
Strongly agree	0.060** (0.028)
Entertainment: "I enjoy risky propositions."	
Tend to disagree	0.001 (0.017)
Tend to agree	0.052** (0.021)
Strongly agree	0.188*** (0.064)
Overconfidence (better than average)	
Tend to disagree	0.026 (0.023)
Tend to agree or strongly agree	0.062** (0.031)
Overconfidence (self-enhancing attribution bias)	
Tend to disagree	-0.021 (0.031)
Tend to agree	-0.019 (0.029)
Strongly agree	-0.011 (0.037)
Overconfidence (illusion of control)	-0.023 (0.031)
Ancillary statistics	
Objective investor attributes	Included as regressors
Nobs	931
R ²	11.7%