

Trading as Entertainment?

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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. Nonpecuniary benefits of trading thus appear to offer a straightforward explanation of the “excessive trading puzzle.”

Key words: investor decision making; trading volume

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1. Introduction

Trading in financial markets is a costly activity. For a sample of more than 60,000 U.S. 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 nonspeculative 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 U.S. 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/dis-savings and risk sharing. DeBondt and Thaler (1995, p. 392) 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 et al. (2004) and Biais et al. (2005) report little or no relation between proxies for overconfidence and observed trading activity.²

This paper proposes a different explanation of why people trade, anticipated by Black (1986, p. 531), who

¹ See Table 7 in Glaser and Weber (2003) for details. For a subsample of investors that 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).

² Deaves et al. (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.

notes that “[w]e may need to introduce direct utility of trading to explain the existence of speculative markets.” For people who trade because they like to do so, the monetary cost of trading is offset by nonpecuniary benefits from researching, executing, talking about, anticipating the outcome of, or experiencing the outcome of a trade.

This paper examines the hypothesis that entertainment motives drive trading 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. The survey offers responses to statements that elicit whether a respondent enjoys investing and statements that have been used to identify compulsive gamblers. The responses to these statements serve as proxies for the entertainment benefits derived from trading.

Clients thus classified as potentially 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 United States). 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 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 U.S. populations (see, for example, Albers and Hübl 1997, Farrell and Walker 1999, Clotfelter and Cook 1989). Consistent with gamblers preferring skewness (see, for example, Golec and Tamarkin 1998), people classified as gamblers in the data set hold more concentrated portfolios that exhibit more positively skewed returns; such investors are also more likely to hold and trade options.

Given that the survey was administered after the period for which transaction records are available, it is possible that respondents used the survey to justify their investment behavior or performance *ex post*. For example, people might be aware of their poor investment performance due to trading and *ex post* justify their record with a desire for gambling. With the data at hand, we cannot definitively rule out such an interpretation. A story based on *ex post* justification, however, fails to account for the observation that the need for justification appears to be felt most keenly among those who resemble gamblers in other studies, for example.

The inverse concern is that entertainment responses proxy for past performance: high performers state that they enjoy investing because they have done well leading up to the survey. This is not the case; if anything, investors classified as entertainment driven underperform their peers before responding to the survey.

The use of survey responses to elicit entertainment attributes also 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 a nonresponse bias, as suggested by Heckman (1979), leaves the results unchanged.

The remainder of this paper proceeds as follows: Section 2 gives a motivation and discusses the construction of the trading and survey variables. Section 3 presents the baseline result of the paper, namely, that entertainment-driven investors trade much more aggressively than their peers. Section 4 presents robustness checks and evaluates alternative explanations. Section 5 concludes.

2. Motivation and Data

2.1. Motivation

In a survey of Dutch investors, Hoffmann (2007) reports 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. Three distinct motives for entertainment trading come to mind: recreation, sensation seeking, and an aspiration for riches.

Recreational trading can be motivated by a feeling of accomplishment (similar to a homeowner who decides to do it himself rather than hiring a contractor) or camaraderie (among members of an investment club, for example), or it can emerge as a by-product of following the financial markets as a hobby. Perceiving investing as a diversion rather than a chore, hobby investors have to overcome less of a psychological hurdle when executing changes to their portfolio, directly lowering their marginal cost of trading. By actively following the financial markets, they also expose themselves to more trading signals and should hence be expected to trade more than their peers. This argument is reminiscent of Merton (1987), who motivates his 1986 Presidential Address to the American Finance Association by the simple observation that an investor needs to know about a stock before he can trade it.

Barberis and Xiong (2008) use nonpecuniary benefits of successful trading, such as a rise in self-esteem and the ability to boast to family and friends, to motivate a model of “realization utility.” In this model of portfolio choice, investors derive extra utility from realized gains and losses. The model does not attach a utility to trading per se, but trading is necessary to reap the utility offered by realizing the gains from an investment that has appreciated sufficiently.

Entertainment trading can also be motivated by sensation seeking in the financial domain. According to Zuckerman (1994, p. 27), “sensation seeking is a trait defined by the seeking of varied, novel, complex, and intense sensations and experiences, and the willingness to take . . . financial risks for the sake of such experience.” In a subconscious quest for arousal, sensation seekers look for both intensity and novelty in experience. An undiversified portfolio of volatile stocks exposes its holder to intense stimuli in the form of extreme returns. Exposure to such stimuli by itself may trigger trading as argued by Dorn and Huberman (2007). In addition, as pointed out by Grinblatt and Keloharju (2008), sensation seekers in the financial domain may value the act of trading in and of itself because a trade—a new bet—affords the desired novelty of experience. Grinblatt and Keloharju (2008) 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.

Alternatively, trading can be motivated by an aspiration for riches as suggested by Statman (2002). A trade can be seen as a bet that carries a “dream

value,” that is, the joy of imagining what a handsome payoff will buy. Such aspirations have been used to explain lottery participation (Conlisk 1993) and exploited in advertising by retail brokers (Barber and Odean 2002). Aspiration-driven investors should hold portfolios with volatile and positively skewed returns to increase the chance of reaching an aspiration level far above their current wealth (see Kumar 2008). The exposure to trading stimuli in the form of extreme returns, coupled with an inherent impatience to reach their desired wealth level, may lead aspiration-driven investors to pick up and abandon trading ideas more quickly than their peers.

2.2. Data

2.2.1. 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 United States). 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 investor received an invitation to participate in a survey that elicited a wide range of objective and subjective investor attributes detailed below. Table 1 summarizes the client portfolios and trading activity during the sample period January 1995–May 2000, separately for survey respondents and nonrespondents.

Average monthly turnover, defined as one-half of 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,

Table 1 Summary Statistics

	Survey respondents			Nonrespondents		
	Mean	Std. dev.	Median	Mean	Std. dev.	Median
Portfolio characteristics						
Average monthly portfolio turnover (%)	15	32	7.4***	14	38	6.7
Thereof:						
Normal 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 account holder (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		

Notes. Portfolio characteristics are calculated from the complete daily transaction history available for each client—both for the 1,345 respondents and the 20,183 nonrespondents—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 §2.2.1. The 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, USD 1 corresponds to approximately DEM 1.7. The Herfindahl-Hirschmann index (HHI) is calculated using only stocks and stock mutual funds for which Datastream offers a complete history of nonstale prices and returns. Higher values of the HHI indicate less diversification. 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 nonrespondent sample. Asterisks indicate that the means, proportions, or medians are significantly different at the ***1%, **5%, and *10% levels.

is 15% for respondents and 14% for nonrespondents; the difference is not statistically significant. However, the difference in median turnover across the two groups—7.4% for respondents versus 6.7% for nonrespondents—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 approximately 90,000 Deutsche Mark (DEM) or 50,000 U.S. 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 because 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.

³ Barber and Odean (2002) use the terms “nonspeculative” 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 nonplan trades.

The median Herfindahl-Hirschmann index (HHI) of the stock and fund portfolios during the sample period is 31%, that is, the typical client holds the equivalent of an equally weighted 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, 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. Relative to the population of German stock market participants, the sample investors appear to be more highly educated and earn higher incomes (Dorn and Huberman 2005).

Our sample is drawn from the population of discount brokerage clients, that is, 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 a 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. 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 U.S. retail investors are likely tilted toward mutual funds because defined contribution plans tend to offer funds rather than individual

stocks as investment choices—with the exception of company stock.

2.2.2. Survey Variables. To gauge which investors likely derive nonpecuniary benefits from their trading activities, we use their self-reported attitudes toward investing and gambling gleaned from a survey administered in July and August 2000. 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 socioeconomic 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 a 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 out of a total of 21,500 clients invited to participate. 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, and 7% in Glaser and Weber 2007).

To pin down the importance of entertainment motives 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. 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 between (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").

The statements all appear in a survey section titled "Your attitude towards money and risk." Respondents are specifically asked to "evaluate the statements as they apply to your personal situation." Statements 1 and 2 appear in different subsections, but on the same page of the questionnaire. Statements 3 and 4 appear in a different subsection and on a different page of the questionnaire.

⁴The HHI is defined as the sum of squared portfolio weights. A portfolio consisting of n equally weighted stocks would have an HHI of $n \cdot (1/n)^2$. Note that we assume stock mutual funds to consist of 100 equally weighted positions that do not overlap with other holdings of the investor. That is, the HHI of the 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%.

Table 2 Characteristics of Entertainment-Driven Investors and Their Portfolios

	Nobs	Male (%)	Age	College (%)	Self-employed (%)	Income	Wealth	HHI (%)	ACV (%)	Realized skewness	Options (%)
Panel A—Statement 1: “I enjoy investing.”											
Disagree	84	76	40	73	15	90	262	30	42	0.92	18
Tend to agree	403	87	41	72	17	94	358	30	42	0.50	29
Strongly agree	822	91***	41	69	16	94	396***	31	45	0.74	41***
Panel B—Statement 2: “I enjoy risky propositions.”											
Strongly disagree	148	82	48	69	13	85	421	26	39	0.45	22
Tend to disagree	571	88	41	70	16	93	385	28	41	0.45	29
Tend to agree	492	90	39	70	17	97	357	33	48	0.91	46
Strongly agree	87	95***	37***	75	21	102**	330*	39***	52***	1.32***	51***
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	30
Tend to disagree	487	89	41	66	17	94	381	30	43	0.52	34
Tend to agree	277	92	40	67	19	97	351	34	48	0.87	46
Strongly agree	71	87	38*	62**	22	84	282**	38***	53***	1.07	52***
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	31
Tend to disagree	396	88	41	68	18	90	364	32	45	0.77	42
Agree	199	90	39**	65*	18	94	329**	37***	50***	0.96**	47***

Notes. Panels A–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, or (4) strongly agree. In panel A, we have combined the categories (1) and (2) to “disagree” because only four respondents choose to “strongly disagree.” In panel D, we have combined the categories (3) and (4) to “agree” because 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 thousands) in DEM. “Wealth” is the self-reported total net worth—including all financial assets and real estate—in DEM (in thousands). HHI is the average Herfindahl-Hirschmann index across the portfolios in the group; higher values indicate less diversification. The 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 et al. (2001). “Options” is the fraction of respondents in a group that have traded options at some point during the sample period. 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. Asterisks indicate that the means or proportions of the top and bottom groups are significantly different at the ***1%, **5%, and *10% levels.

Agreement with statement 1 defines a hobby investor. Agreement with statements 2–4 identifies respondents who enjoy risky propositions, in general, and gambling, in particular. Statements 3 and 4 are essentially translations of two statements that were among the most successful in identifying compulsive gamblers in a prevalence study of pathological gambling conducted by the University of Michigan (Nadler 1985). The pairwise correlation between the responses to statements 2–4 is quite high; it reaches 0.46 between statements 3 and 4. In contrast, the response to the first statement is only weakly correlated with the responses to the other statements.

Table 2 summarizes objective demographic and socioeconomic attributes as well as portfolio attributes 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 3) to 15 (for statement 1), and the

number of respondents who respond with “don’t know” ranges from 11 (for statement 1) to 56 (for statement 4). To be able to make meaningful statistical comparisons across groups, we group investors who “strongly disagree” with statement 1 together with those who “tend to disagree,” because there are only four investors who “strongly disagree.” For the same reason, we combine the “strongly agree” and “tend to agree” categories for statement 4, because 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 Albers and Hübl 1997), the United Kingdom (see Farrell and Walker 1999), and the United States (see 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.

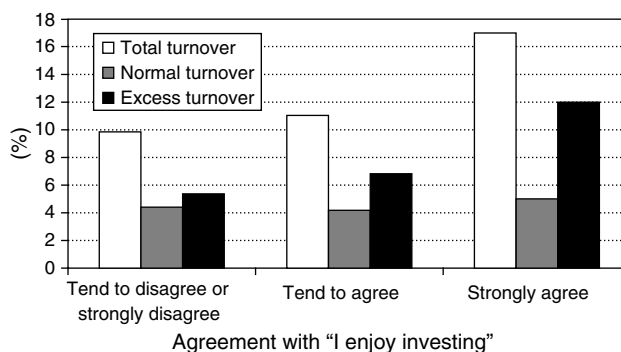
Consistent with gamblers preferring skewness (see Golec and Tamarkin 1998), people classified as gamblers in our data set hold portfolios of stocks and mutual funds that exhibit more positively skewed returns. Note that we exclude holdings of individual bonds and options when calculating portfolio statistics, 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 disagree with this statement also trade options.

The relationships between the responses to the four statements, as well as the profiles of investors grouped by their responses, suggest that there are two types of investors who potentially derive entertainment benefits from trading: hobby investors (those who report to enjoy investing) and gamblers (those who report to enjoy risky propositions, in general, and gambling, in particular). Gamblers are motivated by a quest for arousal or an aspiration for riches; relative to hobby investors, they tend to be younger, less wealthy, and hold more concentrated portfolios of more volatile securities to provide the necessary stimuli or to increase the chance of reaching a desired wealth level.

3. Baseline Results

Trading is costly. The typical respondent in this paper’s sample spends 0.5% of his self-reported gross annual income on trading commissions. The main

Figure 1 Turnover as a Function of Enjoyment of Investing



hypothesis entertained in this paper is that some investors derive nonpecuniary benefits from researching, executing, talking about, anticipating, or experiencing the outcome of a trade. These benefits help offset the cost of trading. Other things equal, such entertainment-driven investors will trade more than their peers.

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 an 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 are obtained 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,

Figure 2 Turnover as a Function of Enjoyment of Risky Propositions

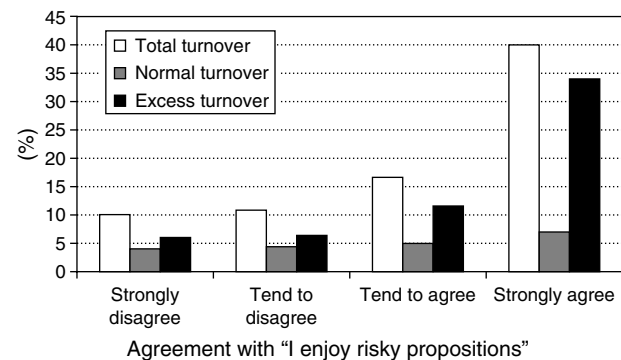
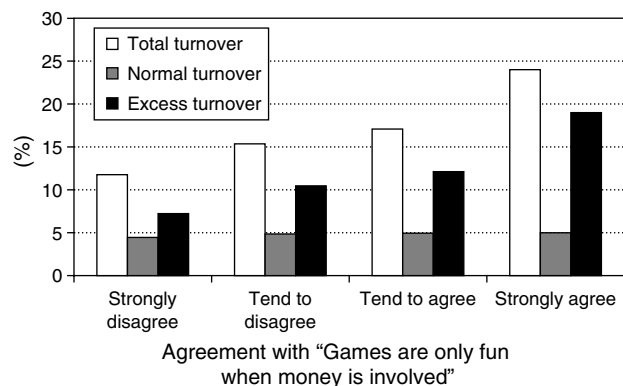
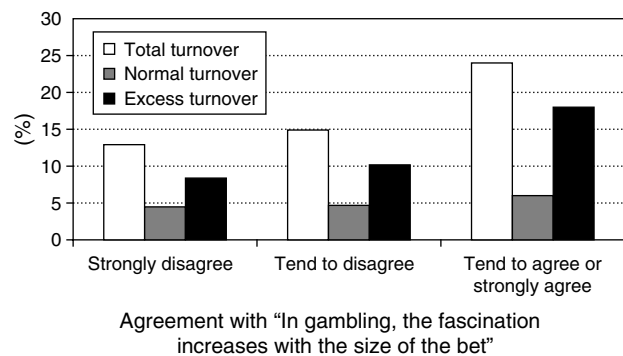


Figure 3 Turnover as a Function of Affinity for Gambling (I)

that is, 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 relationship between turnover and entertainment attributes in a multivariate context. Table 3 reports the results of ordinary least squares (OLS) regressions of the logarithm of different turnover measures on the entertainment attributes as well as objective demographic and socioeconomic 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

Figure 4 Turnover as a Function of Affinity for Gambling (II)

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 socioeconomic attributes, reported in column (1) of Table 3, 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 U.S. 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 3 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 are 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 3 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 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 a 75% higher turnover than those who strongly disagree with that statement. Column (6) of Table 3 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.

These results suggest that investors appear to derive pleasure from trading both as a pastime and as a

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

Table 3 Cross-Sectional Regressions—Baseline Results

	Logarithm of average total turnover						Log(1 + normal turnover)	Log(1 + excess turnover)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
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)
log(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)
log(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	1,151	1,131	1,125	1,127	1,096	1,054	1,054	1,054
R ² (%)	7.3	10.9	11.5	8.7	8.9	14.9	9.0	12.4

Notes. Columns (1)–(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. Standard errors, corrected for heteroskedasticity as suggested by White (1980), are in parentheses. Asterisks indicate that the coefficient estimates are significantly different from zero at the ***1%, **5%, and *10% levels.

form of gambling. Consistent with this interpretation, the online supplement to this paper (provided in the e-companion)⁶ reports that respondents who enjoy

investing (that is, they agree with the statement “I enjoy investing”) but not gambling (that is, they disagree with the statement “games are only fun when money is involved”) and those who enjoy gambling but not investing trade more than their peers who enjoy neither investing nor gambling; those who enjoy both investing and gambling trade the most.

⁶ An electronic companion to this paper is available as part of the online version that can be found at <http://mansci.journal.informs.org/>.

Columns (7) and (8) of Table 3 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 tests that follow, we use excess turnover as the dependent variable; all results reported below are qualitatively robust to using the measure of total turnover instead.

4. Robustness Checks and Alternative Explanations

4.1. Nonresponse 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 the analysis suffers from a nonresponse bias. In particular, it is conceivable that an unobserved personal trait drives both the clients' decision to participate and their trading activity.⁷ To formally examine this possibility, we rerun the regression reported in column (8) of Table 3 with an additional regressor—the inverted Mills ratio obtained from a first-stage probit model of survey participation—as suggested by Heckman (1979). This analysis is possible because certain attributes of investors and their portfolios are available regardless of survey participation. The online supplement details the specification and results of the first- and second-stage regressions. The coefficient of the inverted Mills ratio in the second-stage regression is indistinguishable from zero, and the other coefficients are little changed. It thus appears that the results are not merely driven by a nonresponse bias.

4.2. 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, for

example, 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 nonentertainment 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—for example, 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.

The online supplement reports 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 the online supplement, 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.

4.3. Past Performance

Given that the survey is administered ex post and that market performance leads trading activity (see, for example, Statman et al. 2006, Glaser and Weber 2008), 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. This is not the case. If anything, investors who report that they enjoy investing or gambling at the end of the sample period underperform their peers during the sample period. Detailed results are reported in the online supplement.

⁷ As pointed out by an anonymous referee, the overrepresentation of active traders in the respondent sample—noted in §2.2.1—is consistent with this paper's thesis. If active trading is driven by an affinity for gambling, active traders should be more likely to participate in what is essentially a gamble for \$3,000 at decent odds.

4.4. Overconfidence

Overconfidence might explain this paper's results if overconfident investors report to enjoy trading because they enjoy doing what they wrongly perceive themselves to be good at. Alternatively, entertainment might amplify the effects of overconfidence or vice versa.

The combination of transaction records and survey responses offers different attributes that have been argued to capture different aspects of overconfidence: the tendency to overestimate one's knowledge, the tendency to overly attribute successes to skill in conjunction with past returns (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 et al. (1998), 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.

Column (1) of Table 4 reports the results of regressing the logarithm of one plus average excess turnover during the period January 2000–May 2000 on objective investor attributes, entertainment attributes, and past portfolio returns during the period January 1999–December 1999. We choose the end of the sample period because of its proximity to the survey, because the sample grows over time as more people sign up for accounts, and because we want to examine the effect of past returns on speculative trading. In contrast to other studies that report returns to lead trading activity, past returns are significantly negatively related to trading activity. This is likely an artifact of the sample period coupled with the disposition effect. The stocks that gained the most during 1999 were the hardest hit by the crash in early 2000. Sample investors with large returns in 1999 thus likely

Table 4 Past Returns and Overconfidence

	Logarithm of (1 + excess turnover (2000))		
	(1)	(2)	(3)
Constant	0.183** (0.090)	0.222 (0.156)	0.274* (0.164)
Past one-year return (1999)	−0.428* (0.245)	−0.421* (0.245)	−1.555* (0.899)
"I enjoy investing."			
Tend to agree	0.029 (0.034)	0.029 (0.034)	0.039 (0.034)
Strongly agree	0.074** (0.032)	0.069* (0.041)	0.079* (0.041)
"I enjoy risky propositions."			
Tend to disagree	−0.036 (0.030)	−0.035 (0.030)	−0.034 (0.030)
Tend to agree	0.023 (0.035)	0.025 (0.033)	0.024 (0.033)
Strongly agree	0.134* (0.073)	0.137* (0.075)	0.133* (0.075)
"Games are only fun when money is involved."			
Tend to disagree	0.043* (0.025)	0.042* (0.025)	0.042* (0.025)
Tend to agree	0.092*** (0.035)	0.093*** (0.035)	0.089*** (0.034)
Strongly agree	0.079 (0.073)	0.079 (0.071)	0.072 (0.072)
"In gambling, the fascination increases with the size of the bet."			
Tend to disagree	−0.010 (0.025)	−0.013 (0.025)	−0.013 (0.025)
Tend to agree or strongly agree	0.067 (0.044)	0.064 (0.041)	0.064 (0.041)
Overconfidence			
Better-than-average effect		0.019 (0.021)	0.018 (0.021)
Illusion of control		−0.022 (0.042)	−0.024 (0.042)
Self-attribution bias		−0.005 (0.017)	−0.025 (0.022)
Interaction: positive past one-year return (1999)/self-attribution bias			0.451 (0.310)
Ancillary information			
Number of observations		885	
Control variables		Investor attributes as in Table 3	
R ² (%)	9.0	9.2	9.4

Notes. The logarithm of one plus average monthly excess turnover from January 2000 to May 2000 is regressed on the objective demographic and socioeconomic investor attributes and the entertainment attributes as defined in Table 2, as well as past returns and proxies for overconfidence. For brevity's sake, the coefficients for the objective attributes are not reported in this table. Past one-year return (1999) is the average monthly return of the investor's portfolio of stocks and mutual funds during 1999 before trading costs. Positive past one-year return (1999) is equal to the past return if positive and zero otherwise. "Better-than-average effect" indicates the investor's agreement with the statement "I'm much better informed about financial securities than the average investor." Because only seven respondents strongly disagreed with the statement, we omitted both disagreement dummies. For the construction of the "illusion of control" variable, please refer to §4.4. "Self-attribution bias" is the investor's agreement with the statement "My past successes were, above all, due to my specific skills." Standard errors, corrected for heteroskedasticity as suggested by White (1980), are in parentheses. Asterisks indicate that the coefficient estimates are significantly different from zero at the ***1%, **5%, and *10% levels.

sat on substantial losers after the crash at the beginning of March 2000, which may have dampened their appetite for trading.⁸ The magnitude and statistical significance of the entertainment coefficients is similar to that in the baseline regressions.

Column (2) of Table 4 reports the results of a similar regression, but with the three proxies for overconfidence as additional control variables. None of the overconfidence proxies is significantly related to excess turnover. Moreover, controlling for the proxies of overconfidence in addition to other investor attributes, hobby investors and gamblers continue to trade significantly more than their counterparts.

The effect of the overconfidence proxies may depend on the precise regression specification. In the regression reported in column (2), for example, we assume that the self-attribution bias will affect the propensity to trade controlling for past returns. Alternatively, it may be the interaction of past successes and the self-attribution bias that explains variation in trading activity. However, column (3) of Table 4 shows that the association between excess turnover and the interaction of positive returns and the self-attribution is positive but insignificant.

In unreported results, we verify that the relationship between turnover at the end of the sample and the overconfidence proxies does not depend on whether the proxies are modeled as a set of dummy variables or as cardinal scores. It does not depend on the definition of turnover (total versus excess) either, with one exception: agreement with “I’m much better informed than the average investor” is significantly positively related to turnover if turnover is defined as the average excess turnover across the entire sample period.

The online supplement explores differences in excess turnover during the entire sample period across investors sorted on both entertainment and overconfidence attributes. Conditional on entertainment attributes, variation in overconfidence is generally unrelated to excess turnover, with one exception: respondents who dislike gambling and appear overconfident (because they consider themselves much better informed than the average investor) trade more than those who dislike gambling and do not appear overconfident.

5. Conclusion

This paper suggests that some investors derive nonpecuniary benefits from trading that offset the

costs of churning; similar to lottery players who buy tickets with negative expected values, entertainment-driven investors trade even though trading 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, even after controlling for competing explanations such as overconfidence.

The most entertainment-driven investors trade about twice as much as those who fail to take pleasure in gambling or investing, controlling for a wide range of investor attributes. Relying solely on transaction records (that is, independently of the survey responses), we estimate that more than half of the observed portfolio turnover is excess turnover—turnover in excess of what can be justified by standard trading motives such as savings/dissavings, liquidity, and rebalancing. Most of the variation in trading activity across individuals is variation in excess turnover. Variation in excess turnover is highly correlated with our proxies for nonpecuniary benefits derived from trading. In sum, entertainment trading appears to be quantitatively important—at least for this sample of discount brokerage customers during the late 1990s.

An obvious drawback of using survey responses to elicit underlying psychological traits is that the interpretation of survey questions may vary across respondents (and across researchers who pour over the responses). Although our results suggest that two distinct groups of investors—hobby investors and gamblers (sensation seekers or those with an aspiration for riches)—derive enjoyment from trading, it is difficult to assess the relative importance of leisure-versus gambling-motivated trading with the data at hand.

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

6. Electronic Companion

An electronic companion to this paper is available as part of the online version that can be found at <http://mansci.journal.informs.org/>.

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⁸ We repeat the regressions for different sample periods and find that past returns indeed lead trading activity across the sample during other subperiods. However, the significance of investors’ own portfolio returns is weak at best. Because analyses for different subperiods yield qualitatively similar results regarding the effect of the overconfidence and entertainment attributes, detailed results are not reported.

References

- Albers, N., L. Hübl. 1997. Gambling market and individual patterns of gambling in Germany. *J. Gambling Stud.* **13**(2) 125–144.
- Barber, B., T. Odean. 2000. Trading is hazardous to your wealth: The common stock investment performance of individual investors. *J. Finance* **55**(2) 773–806.
- Barber, B., T. Odean. 2001. Boys will be boys: Gender, overconfidence, and common stock investment. *Quart. J. Econom.* **116**(1) 261–292.
- Barber, B., T. Odean. 2002. Online investors: Do the slow die first? *Rev. Financial Stud.* **15**(2) 455–487.
- Barberis, N., W. Xiong. 2008. Realization utility. Working paper, School of Management, Yale University, New Haven, CT.
- Biais, B., D. Hilton, K. Mazurier, S. Pouget. 2005. Judgmental overconfidence, self-monitoring and trading performance in an experimental financial market. *Rev. Econom. Stud.* **72**(2) 287–312.
- Black, F. 1986. Noise. *J. Finance* **41**(3) 529–543.
- Chen, J., H. Hong, J. C. Stein. 2001. Forecasting crashes: Trading volume, past returns and conditional skewness in stock prices. *J. Financial Econom.* **61** 345–381.
- Clotfelter, C. T., P. J. Cook. 1989. *Selling Hope: State Lotteries in America*. Harvard University Press, Cambridge, MA.
- Conlisk, J. 1993. The utility of gambling. *J. Risk Uncertainty* **6** 255–275.
- Daniel, K. D., D. Hirshleifer, A. Subrahmanyam. 1998. Investor psychology and security market under- and over-reactions. *J. Finance* **53**(6) 1839–1886.
- Deaves, R., E. Lüders, G. Y. Luo. 2004. An experimental test of the impact of overconfidence and gender on trading activity. Working paper, Michael G. DeGroote School of Business, McMaster University, Hamilton, Ontario, Canada.
- DeBondt, W. F. M., R. H. Thaler. 1995. Financial decision-making in markets and firms: A behavioral perspective. R. A. Jarrow, V. Maksimovic, W. T. Ziemba, eds. *Finance, Handbooks in Operations Research and Management Science*, Vol. 9, Chap. 13. North Holland, Amsterdam, 385–410.
- Deutsches Aktieninstitut. 2000. Factbook 1999. Deutsches Aktieninstitut, Frankfurt am Main, Germany.
- Deutsches Aktieninstitut. 2003. Factbook 2002. Deutsches Aktieninstitut, Frankfurt am Main, Germany.
- Dorn, D., G. Huberman. 2005. Talk and action: What individual investors say and what they do. *Rev. Finance* **9**(4) 437–481.
- Dorn, D., G. Huberman. 2007. Turnover and volatility. Working paper, LeBow School of Business, Drexel University, Philadelphia.
- Farrell, L., I. Walker. 1999. The welfare effects of lotto: Evidence from the UK. *J. Public Econom.* **72** 99–120.
- Gervais, S., T. Odean. 2001. Learning to be overconfident. *Rev. Financial Stud.* **14**(1) 1–27.
- Glaser, M., M. Weber. 2003. Overconfidence and trading volume. Working paper, University of Mannheim, Mannheim, Germany.
- Glaser, M., M. Weber. 2007. Overconfidence and trading volume. *Geneva Risk Insurance Rev.* **32**(1) 1–36.
- Glaser, M., M. Weber. 2008. Which past returns affect trading volume? *J. Financial Markets*. Forthcoming.
- Goetzmann, W. N., R. Dhar. 2004. Bubble investors: What were they thinking? Working paper, School of Management, Yale University, New Haven, CT.
- Golec, J., M. Tamarkin. 1998. Bettors love skewness, not risk, at the horse track. *J. Political Econom.* **106**(1) 205–225.
- Gorton, G. B., G. G. Pennacchi. 1993. Security baskets and index-linked securities. *J. Bus.* **66**(1) 1–27.
- Graham, J. R., C. R. Harvey. 2003. Expectations of equity risk premia, volatility and asymmetry. Working paper, Duke University, Durham, NC.
- Grinblatt, M., M. Keloharju. 2008. Sensation seeking, overconfidence, and trading activity. *J. Finance*. Forthcoming.
- Heckman, J. J. 1979. Sample selection bias as a specification error. *Econometrica* **47**(1) 153–162.
- Hoffmann, A. O. I. 2007. Individual investors' needs and the investment professional. *J. Investment Consulting* **8**(2) 80–91.
- Kumar, A. 2008. Who gambles in the stock market? *J. Finance*. Forthcoming.
- Merton, R. C. 1987. A simple model of capital market equilibrium with incomplete information. *J. Finance* **42**(3) 483–510.
- Milgrom, P., N. Stokey. 1982. Information, trade and common knowledge. *J. Econom. Theory* **26**(1) 17–27.
- Nadler, L. 1985. The epidemiology of pathological gambling: Critique of existing research and alternative strategies. *J. Gambling Behav.* **1**(1) 35–50.
- Odean, T. 1998. Volume, volatility, price and profit when all traders are above average. *J. Finance* **53**(6) 1887–1934.
- Shleifer, A. 2000. *Inefficient Markets*. Oxford University Press, Oxford, UK.
- Statman, M. 2002. Lottery players/stock traders. *Financial Analysts J.* **58**(1) 14–21.
- Statman, M., S. Thorley, K. Vorkink. 2006. Investor overconfidence and trading volume. *Rev. Financial Stud.* **19**(4) 1531–1565.
- Subrahmanyam, A. 1991. A theory of trading in stock index futures. *Rev. Financial Stud.* **4**(1) 17–51.
- Tirole, J. 1982. On the possibility of speculation under rational expectations. *Econometrica* **50**(5) 1163–1182.
- Van Steenis, H., C. Ossig. 2000. European online investor. Equity Research Report, J.P. Morgan, London, UK.
- White, H. 1980. A heteroskedasticity-consistent covariance estimator and direct test for heteroskedasticity. *Econometrica* **48** 817–838.
- Zuckerman, M. 1994. *Behavioral Expressions and Biosocial Bases of Sensation Seeking*. Cambridge University Press, Cambridge, UK.