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Gambling in the Stock Market

The Motivations behind Excessive and Speculative Trading

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Gambling in the Stock Market: The Motivations behind Excessive and Speculative Trading

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Abstract

Active stock trading by individual investors is hard to explain, as investors who trade more actively tend to perform worse. We investigate to what extent gambling motives can explain excessive and speculative trading. We use five different proxies for gambling motives, ranging from fairly innocent, such as aspiring a small chance to become rich, to quite severe, namely compulsive gambling. We find that especially compulsive gambling can explain frequent trading by individual investors well, in addition to indicators for recreational gambling (e.g., in casinos). Further, investors driven by gambling motives tend to be in a significantly worse financial situation.

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Keywords: individual investors; trading behavior; gambling

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1. Introduction

It is a major puzzle why some individual investors actively trade stocks, options and other financial products, because the literature shows that active trading tends to lead poor portfolio returns.[1] Classical models posit that rational investors should only trade as a result of new information becoming available or to rebalance their portfolio occasionally. However, many individual investors trade excessively and thereby lower their performance (Barber et al., 2009). Several explanations for these puzzling trading strategies have been put forward. Barber and Odean (2001; 2000) argue that investors are overconfident, over-estimating the precision of their private information. Another explanation is that investors trade simply because they like it (Black, 1996), directly deriving utility from their trading activities, For example, investors could be learning how to trade (Seru, Shumway and Stoffman, 2010), or using stock market trading as a form of entertainment or gambling (Dorn and Sengmueller, 2009).

Trading as a form of gambling has received strong empirical support in the literature recently, as the trading volume of individual investors tends to drop significantly on days with drawings of large lottery jackpots, such as the U.S. Powerball lottery (Dorn, Dorn and Sengmueller, 2014; Gao and Lin, 2015). In addition to this indirect evidence, it is also important to measure the gambling motives of investors at the individual level and to establish a direct link with trading behavior. In this paper we use a unique investor survey dataset to compare five different proxies for gambling motives, to see which one can best explain excessive and speculative trading. The proxies for gambling motives range from fairly innocent, such as aspiring a small chance to become rich or trading for entertainment, to quite severe, namely a standard test for compulsive gambling from the psychiatric profession.

[1] See Odean (1999), Barber and Odean (2000), Bauer et al. (2009), Entrop et al. (2014) and Hoffmann and Shefrin, (2014), amongst others.

The first well-known gambling motive is sensation seeking, taking risks just for the sake of the experience and the thrill of it (Zuckerman, 1994). Grinblatt and Keloharju (2008) and Dorn and Sengmuller (2009) show that the active stock market trading by individual investors can be driven by sensation seeking in the financial domain. To measure this gambling motive, we use an indicator variable for investing for the fun or the challenge of it, adapted from Dorn and Sengmuller (2009). A second established gambling motive is the aspiration to become rich (Conlisk, 1993), to quickly achieve a wealth level far beyond the current value ("to become a millionaire"). Statman (2002) argues that not only lottery players, but also stock traders, can be driven by the aspiration to become rich. As a measure for this gambling motive we ask investors whether they invest with the aim to have a small chance to become rich.

As a third gambling motive for active stock trading, some investors could use trading as a direct substitute for traditional forms of gambling such as casinos and sports betting (Statman, 2002; Kumar, 2009). Speculating in the financial market can offer large payoffs and direct feedback about gains and losses, similar to conventional forms of gambling, but arguably with better odds of winning and lower costs. Kumar (2009) documents that individual investors who prefer speculative stocks tend to have the same socio-demographic characteristics as gamblers. As a proxy for trading as a substitute for gambling, we ask investors if they have gambled in the last 12 months, such as in casinos, sports betting, and on slot machines. In addition, we also measure the DOSPERT gambling risk-taking scale (Weber, Blais and Betz, 2002), a proxy for gambling propensity. Markiewicz and Weber (2013) find that the DOSPERT scale explains the trading volume of investors in an experimental market.

Finally, as a fourth motive, we consider compulsive gambling, defined as a persistent counter-productive gambling behavior. It is well established in the psychiatric literature that for a small group of people gambling activities can become excessive and problematic; this may

also apply to speculative stock trading as well if some people use it as a substitute for gambling.[2] Compulsive gamblers have difficulty to resist their urge to gamble, regardless of the negative consequences. As a proxy we use the DSM-5 screen for compulsive gambling from the American Psychiatric Association (2013).

Using a unique survey dataset collected in a representative sample of Dutch investors, we show that frequent stock trading can be directly linked to the gambling motives of individual investors. Especially high gambling propensity (the DOSPERT scale) and compulsive gambling (the DSM-5 screen) explain active and speculative trading well, while controlling for other relevant factors such as overconfidence, trading experience and risk tolerance. Further, the compulsive gambling measure also predicts investing in derivatives and leveraged products that allow investors to chase highly skewed all-or-nothing payoffs. On the other hand, we find that more benign gambling motives, such as trading for fun or for a small chance to become rich, are not significantly related to active trading and investing in derivatives.

Next, we investigate the financial situation of investors with gambling motives. We analyze the number of financial problems experienced by the investors in the last twelve months, and two measures for the ability to save money and balance the household budget. We find that investors who use trading as a substitute for gambling (indicated by conventional gambling in the last 12 months, the DOSPERT scale, or DSM-5 compulsive gambling) are in a significantly worse financial situation compared to investors with an otherwise similar demographic profile. More innocuous motives like investing for fun or for a chance to become rich are not associated with worse financial situations.

Our paper makes several contributions to the literature. First, we show that investors can have a wide range of gambling motives for trading and speculating in financial markets, ranging from just aspiring a small chance to become rich, to trading as a substitute for conventional

[2] Youn et al. (2016) and Kamolsareeratana and Kouwenberg (2017) show that a small but significant number of individual investors in Korea and Thailand display symptoms of compulsive gambling in the stock market.

gambling, to compulsive trading as gambling. The extant literature does not distinguish between different gambling motives, while arguably one motive is not as important or worrisome as the other. Second, we show that especially trading as a substitute for gambling and compulsive gambling motives can explain active and speculative trading by individual investors well. Third, we show that investors who trade as a substitute for gambling are in a worse financial situation.

Our results are not only relevant for investors, but also for brokers and policy makers. In recent years highly speculative derivatives and leveraged products have been directly marketed and sold to individual investors, such as binary options and contracts for differences. Many of these new financial products facilitate gambling on short-term price movements, see Figure 1, with investment horizons as short as just a few seconds. Hence, it is important to developing a better understanding of what motives some people to gamble in the financial markets, what their profiles are, and to study the potential consequences.

We continue the paper by explaining our measures for gambling motives in the next section. The third section describes the Dutch survey data while the fourth section presents the results for trading behavior, followed by the financial consequences in the fifth section. Lastly, the conclusions are presented in the sixth section.

2. Gambling Motives for Trading

Active trading by individual investors in stocks, options and other financial products tends to lead to significantly lower portfolio returns (Entrop et al., 2014; Hoffmann and Shefrin, 2014; Bauer et al., 2009; Odean, 1999; Barber and Odean, 2000). It is a major puzzle why investors pursue these counterproductive speculative investment strategies, if better returns can be achieved by just passively holding the market using a low-cost exchange traded fund (ETF). Prior studies argue that investor may simply derive pleasure from risk taking and chasing a small chance to become rich in the financial markets (Dorn and Sengmuller, 2009; Kumar, 2009), in the same way that people enjoy gambling in casinos. In this section we discuss the

different types of gambling motives for speculating in the financial markets that investors may have based on the literature, and we introduce our measures for these gambling motives.

2.1 Sensation seeking motive

Sensation seeking is a personality trait that involves taking risks just for the fun and the thrill of the experience (Zuckerman, 1994). Horvath and Zuckerman (1993) document that sensation seeking is positively related to risky behavior in many domains, including gambling and financial risk taking. Active and speculative trading by individual investors in the financial markets can be better understood if some sensation-seeking investors derive utility directly from their risk-taking activities (Conlisk, 1993). Grinblatt and Keloharju (2009) indeed find that sensation-seeking investors tend to trade more frequently, using the number of speeding tickets as a proxy for the trait. Related, Dorn and Sengmueller (2009) directly ask investors if they trade for fun or entertainment, in a survey among clients of a German broker. They find that those who enjoy trading tend to have a portfolio turnover rate twice as high as other investors.

In our study we measure the *Sensation seeking* motive by an indicator variable that equals one if the investor mentions "the fun or the challenge of it" as one of his investment goals, following Dorn and Sengmueller (2009). Our survey asks investors to indicate their investment objectives, with seven possible answers: 1. "Saving for retirement, or to generate additional income", 2. "Saving for a special expense (e.g., a new car, or vacation)", 3. "Saving for a specific purpose, such as mortgage prepayment, or the kids' education", 4. "Preserving my wealth. The money is not needed for any specific goal or expense, and it should just maintain its value", 5. "The fun or challenge of investing", 6. "Investing gives me a small chance to get rich, and I am willing to take risk for this purpose", 7. "Another purpose" (with open response). Respondents could select multiple investment objectives from the list.

2.2 Gambling to become rich motive

Statman (2002) and Dorn and Sengmuller (2009) argue that another gambling motive for active stock trading is to pursue a small chance to become rich ("to become a millionaire"). Statman (2002) explains that lottery players and stock traders often share the same dream of becoming rich quickly, hoping to gain a large payoff to achieve their aspirational wealth level. Kahneman and Tversky (1979) find that when people's wealth falls below their aspiration level they tend to become risk seeking and try to gamble their way out. Kumar (2009) documents that especially low-income investors tend to trade lottery stocks that offer a small chance of an extreme positive return. In addition, he shows that the trading volume of lottery stocks also tend to rise during economic downturns. We measure the *Wealth aspiration* gambling motive by an indicator variable that equals one if investors agree that their investment objective is "to give me a small chance to get rich, and I am willing to take risk for this purpose".

2.3 Trading as a substitute for conventional gambling

Recent studies argue that stock market trading may also be used by some investors as a direct substitute for conventional gambling activities, such as lotteries, casinos and sports betting (see, Kumar, 2009, Dorn et al., 2014, Gao and Lin, 2015). Similar to conventional forms of gambling, speculating in the financial markets can offer large payoffs, and direct feedback about gains and losses. Gao and Lin (2015) and Dorn et al. (2014) show that stock trading volume by individual investors decreases substantially on days when large and salient lottery jackpots are drawn. Gao and Lin document that trading volume can drop as much as 7% on jackpot days among stocks that are likely to attract individual traders. Kumar (2009) shows that investors in speculative lottery stocks tend have a socio-demographic profile similar to conventional gamblers: young single men with relatively low income and low education.

One way to measure the trading as a substitute for gambling motive is to ask investors if they participated in the following gambling activities in the last 12 months: playing slot machines, gambling in casinos, online gambling, sports betting or real money poker games. This is our first proxy. The drawback of this measure is that it neither considers the amount of risk people are willing to take when gambling, nor whether they plan to gamble again in the future. As a second proxy, we measure the DOSPERT gambling risk-taking propensity scale of Weber et al. (2002), used previously by Markiewicz and Weber (2013) to explain trading volume in an experimental market. The scale consists of the following four questions:

How likely is it that you will participate in the following activities?

1. *Betting with 100 euro or more on a slot machine.*
2. *Betting with 100 euro or more in a poker game, or in an online casino game.*
3. *Betting with 100 euro or more on the result of sports game, or in a sports betting pool.*
4. *Betting with 500 euro or more in a casino.*

Each question above has a response scale ranging from 1. "Very unlikely", 2. "Unlikely", 3. "Neither likely nor unlikely", 4. "Likely", 5. "Very likely". Besides the summated scale, we also construct a dummy equal to one when investors answer "Very likely", "Likely", or "Neither likely nor unlikely" to at least one of the four DOSPERT propensity gambling questions above.

2.4 Compulsive gambling motive

Finally, we consider compulsive gambling as a motive for excessive and speculative trading in financial markets. It is well established in the psychiatric literature that for a small group of people gambling activities can become excessive and problematic, and this may also apply to trading as gambling. Compulsive gambling is defined as a 'persistent and recurrent counter-productive gambling behaviour' characterized by the inability to control the urge to

gamble, often leading to harmful consequences, such as financial and familial problems (Blaszczynski and Nower, 2002). Youn et al. (2016) and Kamolsareeratana and Kouwenberg (2017) provide evidence that a small number of individual investors in Korea and Thailand display symptoms of compulsive gambling behavior in the stock market. Engelberg and Parsons (2016) provide evidence that stock market declines have an almost immediate impact on the physical health of some investors, as hospitalization rates increase significantly over the next two days, particularly for mental health problems such as anxiety and depression.

As compulsive gambling often comes along with a host of other serious problems, such depression, substance use and financial difficulties, it is important to distinguish this behavior from relatively harmless gambling motives. Psychiatrists use the Diagnostic and Statistical Manual of Mental Disorders, DSM-5 (2013) of the American Psychiatric Association (APA) to diagnose compulsive gambling. It is based on the following nine criteria:

1. *Needs to gamble with increasing amounts of money in order to achieve the desired excitement.*
2. *Is restless or irritable when attempting to cut down or stop gambling.*
3. *Has made repeated unsuccessful efforts to control, cut back, or stop gambling.*
4. *Is often preoccupied with gambling (e.g., having persistent thoughts of reliving past gambling experiences, planning the next venture, thinking of ways to get money with which to gamble).*
5. *Often gambles when feeling distressed (e.g., helpless, guilty, anxious, depressed).*
6. *After losing money gambling, often returns another day to get even ("chasing" one's losses).*
7. *Lies to conceal the extent of involvement with gambling.*
8. *Has jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling.*
9. *Relies on others to provide money to relieve desperate financial situations caused by gambling.*

A person displaying at least four out of nine symptoms above is classified as a compulsive gambler (APA, 2013). We adapt the DSM-5 diagnostic questions above to measure compulsive gambling behavior in the financial markets, by replacing the word 'gambling' with

'trading financial products' (see Appendix A). The response scale for each question ranges from "Never", "Sometimes" to "All the time". Answers "Sometimes" and "All the time" count as 1, and "Never" as 0. We use a score of four or higher as an indicator for compulsive gambling in the financial markets.

3. Data

3.1 Investor surveys

Our data was collected in 2017 using two different panels composed of Dutch individual investors that make their own trading decisions. The first panel is the Dutch National Bank Household Survey (DHS). It is operated by CentERdata, a research institute affiliated to Tilburg University that is specialized in socio-economic research. Our second dataset is obtained via a panel of the Dutch Authority for Financial Markets (AFM). The AFM is the Dutch equivalent of the U.S. Securities and Exchange Commission (SEC), and it supervises savings, investments, insurance and loan markets in the Netherlands.

The DHS panel contains 2,300 members and is representative for the Dutch population. Members of the DHS receive a small compensation for each survey that they complete. We collected our dataset in the DHS in October 2017, fielding a survey targeting all panel members who invest in financial markets, as well as a reference group of non-investors. We received a total of 619 responses, consisting of 274 investors who invest in stocks, bonds, mutual funds, leveraged products, derivatives or other financial products and 345 non-investors. Out of the 274 investors, only 106 traded stocks, ETF's, derivatives or leveraged products themselves during the past twelve months.[3] Hence, only about 5% of the Dutch households (= 106/2,300) directly trade stocks and other risky financial products. Our main analysis is based on this

[3] The remaining 168 investors have delegated all their trading decisions to a broker, or they only invest in bonds, mutual funds and/or property, assets less prone to active and speculative trading.

subsample of 106 direct investors, because our aim is to investigate active and speculative trading behavior by individual investors.

We collected additional data by fielding our survey in the AFM-panel in March 2017. The financial markets regulator AFM regularly conducts surveys in its own panel of 1,733 people. The panel is composed of people who previously contacted AFM with questions or complaints (40%), members who enrolled voluntarily (10%) and people recruited from a large representative panel managed by the market research company GfK (50%). The AFM panel is not representative for the Dutch population because it overweighs individual investors and users of other financial products, which is suited for our purpose. Our survey was distributed to all AFM panel members and we received 866 responses within one week, corresponding to a 50% response rate.[4] Among the 866 AFM respondents, only 259 directly invest in stocks, ETF's, derivatives or leveraged products and are relevant for our research.

Although survey data has the disadvantage that trading behavior is self-reported and lacks detail, it also has important advantages over the alternative of using brokerage records. Investors can have multiple brokerage accounts such that data from one particular account may represent only a fraction of an investor's total portfolio and trading behavior. For example, an investor investing $10,000 in a lottery stock may not be taking much risk overall if he has also $500,000 invested in bonds outside his brokerage account. Our survey data represents the investors' overall portfolio and trading behavior, overcoming these limitations. DHS survey data was used in previous well-known studies of individual investor behavior and portfolios, such as Van Rooij, Lusardi and Alessie (2011) and Von Gaudecker (2015).

[4] Panel members recruited by GfK receive compensation for their participation, while the voluntary enrolled AFM panel members participate in a semi-annual lottery to win a lunch with AFM's CEO.

3.2 Demographics of the investor samples

Descriptive statistics for the both samples are reported in Table 1. Panel A shows the demographic composition of the AFM and DHS samples. Differences in means or proportions between the two datasets are tested with *t*-statistics, with significance indicated by stars in the AFM column. The typical Dutch direct investor in financial markets is a 60-year old man,[5] while female investors are almost absent: only 9% of the DHS investors and 6% of the AFM are female. Further, the large majority of investors (about 90%) have more than five years of experience investing in stocks, and one out five investors have access to a financial advisor. The two investor samples are similar in these key aspects, but there are also some significant differences: investors in the AFM panel are somewhat wealthier, have higher income and are more likely to be a business owner.

3.3 Summary statistics of the main variables

Panel B of Table 1 reports descriptive statistics of our measures for gambling motives. About 45% in both samples mention "investing for the fun or the challenge of it" as one of their investment goals, indicating that entertainment and sensation seeking are very common motives among individual investors. On the other hand, only 10% (DHS) to 15% (AFM) of the investors are willing to take financial risk for a small chance to get rich, our proxy for the gambling to become rich motive.

Turning to the trading as a substitute for gambling motive, 9% (AFM) to 14% (DHS) of the investors have gambled conventionally in the last 12 months. Further, about 9% of both investor samples can be classified as risk-taking gamblers based on the DOSPERT scale, indicating that they may gamble with at least 100 euro of real money at stake in casinos, on slot machines, or on sport and card games. Finally, about 5% of the investors in both samples can

[5] Less than 10% of the investors are younger than 35 years in the DHS panel, and less than 10% are younger than 45 years in the AFM panel.

be classified as potential compulsive gamblers in the financial markets, because they display four or more DSM-5 symptoms. We note that there are no significant differences between the gambling motives of investors in the AFM and DHS samples, lending support to our approach of combining the two groups for the main analyses in Section 4.

Panel B of Table 1 also shows descriptive statistics for the DOSPERT gambling risk-taking propensity scale that ranges from 1 to 5, and for the number of DSM-5 compulsive gambling symptoms, ranging from 0 to 9. The mean of the DOSPERT scale is close to 1 (="Very Unlikely"), indicating that overall the propensity to gamble among Dutch investors is low. Similarly, the typical investor displays almost no symptoms of compulsive gambling in the stock market. In sum, gambling motives are relatively rare among Dutch investors, except for the sensation seeking motive of trading for the fun or challenge of it.

Our survey also includes measures for other variables that are often related to active trading behavior in the literature, namely risk tolerance, overconfidence and financial literacy. Risk tolerance is assessed on a 10-point scale ranging from 1 indicating "Not willing to take risks" to 10 being "Very willing", using the general risk question of Dohmen at al. (2011). Financial literacy is measured by nine questions from Van Rooij et al. (2011) in the DHS panel, and by seven questions in the AFM panel. The financial literacy measures in both sample are rescaled to range from 0 (0% correct) to 1 (100% correct) to make them comparable.

We also measure two types of overconfidence: miscalibration and the better-than-average effect (see Glaser and Weber, 2007). We asked respondents how many of the financial literacy questions they think they answered correctly. We use the difference between the respondent's estimated and actual number of correct answers as a measure of the miscalibration form of overconfidence. Respondents were also asked to compare their investment abilities with the average investor on a 5-point response scale ranging from 1 being "No, much worse"

to 5 “Yes, much better”. We create a dummy variable for the ‘better than average’ form of overconfidence that equals one if the response is "Yes, somewhat better" or "Yes, much better".

Finally, our survey includes questions on trading behavior during the last 12 months. We use five variables to capture excessive and speculative trading behavior. *Trading frequency* measures the frequency at which the investor trades individual stocks on a 5-point scale with response categories: 1 = “I barely trade”, 2 = “1-10 times/year”, 3 = “1-10 times/month”, 4 = “3-4 times/week”, 5 = “almost every day”. We construct a dummy for *High trading frequency* that equals one if the investor trades three times a week or more. Respondents are also asked to indicate if they bought or sold the same stock within a single day, which we recode into the indicator variable *Day trading*. Barber et al. (2014) find that day trading accounts for more than 20% of the total trading volume in Taiwan, but the vast majority of day traders lose money. We also ask respondents how many different individual stocks they hold in their portfolio, as a measure of *Diversification*. Finally, investors are asked if they traded or invested in *Derivatives* and *Leveraged products* during the last 12 months.

Summary statistic of the trading variables are shown in Panel C of Table 1. Investors in both samples trade stocks quite infrequently, with the typical answer being “1-10 times/year”. Only 9% of the investors in the AFM panel trade stocks 3-4 times a week, or almost every day, versus a mere 2% of the DHS investors. The prevalence of day trading is around 20% in both samples. Hence, only a minority of the direct investors in the Dutch population trade stocks frequently. AFM investors tend to trade somewhat more actively and have more stocks in their portfolio on average, compared to the representative DHS sample.[6] Trading in derivatives and leveraged products is rare in the DHS sample (11% and 4%, respectively), but slightly more common in the AFM sample (28% and 12%).

[6] The median number of different individual stocks owned is five: four in the DHS, six in the AFM sample.

4. Explaining Trading Behavior

4.1 Excessive stock market trading

As noted in the introduction, it is a major puzzle why some individual investors trade stocks frequently, as most research indicates that they would be better off if they did not (Odean 1999, Barber and Odean, 2000). We now test to what extent different gambling motives for trading can provide an explanation. As our main proxy for excessive stock trading we use the *High trading frequency* dummy, equal to one for investors who trade at least 3-4 times a week, or every day. As a second proxy for excessive trading we use the *Day trading* dummy, equal to one for investors who bought and sold the same stock within one day. For the main results presented in this section we combine the two investor samples, DHS and AFM, given their similar composition in terms of age, gender, trading experience, access to financial advice, and gambling motives. Moreover, this assures us to have a sufficient number of observations to estimate regression models for trading behavior. In all regressions we control for any residual sample selection effects by including a dummy for AFM respondents.

Table 2 compares descriptive statistics of trading behavior between investors with different gambling motives, for the combined sample of 365 investors in the AFM and DHS. The baseline investor group in the first column of Table 2 consists of respondents who do not have any gambling motives. On average, investors in the baseline group trade stocks just 1-10 times per year, only 6% have a high stock trading frequency (3-4 times per week or daily), and 13% day-trade stocks. Among *Sensation seekers*, investors who trade for fun, and *Wealth aspirers*, who trade to become rich, the trading frequency is slightly higher, but there is no significant difference in the prevalence of high trading frequency or day-trading compared to the baseline group.

Our next two proxies for gambling motives measure trading as a substitute for conventional gambling, namely *Past gamblers,* those who participated in conventional forms

of gambling in the past twelve months, and *Risk-taking gamblers*, investors exhibiting some gambling propensity on the DOSPERT scale. Table 2 shows that *Past gamblers* are about three times more likely to day-trade stocks. Further, the proportion of investors with high stock trading frequency is double in this group, at 11% compared to 6% for the baseline (but not significantly different). Among *Risk-taking gamblers*, about 50% day-trade stocks and 14% have a high stock trading frequency.

Finally, among the *Compulsive stock market gamblers*, those who display four or more symptoms of compulsive gambling on the DSM-5 diagnostic criteria, the day-trading rate is 63% and one out of five (19%) have a high stock trading frequency. Overall, the pattern of results in Table 2 suggests that excessive trading is more common among investors with stronger gambling motives. Figure 2 illustrates this pattern.

As other factors may also drive trading behavior, we now estimate regression models for excessive stock trading while controlling for overconfidence, risk tolerance, financial literacy and socio-demographic variables. The models include measures for two forms of overconfidence, the miscalibration effect and the better-than-average effect, alongside proxies for risk tolerance (Dohmen at el., 2011) and financial literacy (Van Rooij et al*.,* 2011). Further, we include controls for age, gender, marital status, education level, income, wealth and stock trading experience. As noted before, we also include a dummy variable to account for any structural differences in trading behavior between the AFM and DHS samples.

The main results of the regression analyses in Table 3 are in line with the descriptive statistics.[7] The DSM-5 *Compulsive stock market gamblers* screen is highly significant in explaining high trading frequency in Panel A and day-trading in Panel B. This group of investors is approximately two times more likely to trade excessively in the stock market and

[7] Coefficients of the demographic control variables are not shown in Table 3 to save space. Table B1 in Appendix B shows the complete set of results with the coefficients of all control variables included. Appendix B also shows additional results for the 5-point *Trading frequency* scale, using an ordered logit regression.

to engage in day-trading. Similarly, *Risk-taking gamblers* based on the DOSPERT scale also have significantly higher stock trading frequency and tend to day-trade more often. *Past gamblers*, *Wealth aspirers* and *Sensation seekers* do not trade more actively than other investors, after controlling for other factors and demographics.

Finally, when we include all gambling motive proxies simultaneously in Column (7) of Table 3, it is the *Compulsive stock market gamblers* screen that best explains excessive trading behavior. Among the control variables, the better-than-average effect helps to explains high stock trading frequency in Panel A, which is in line with previous studies by Barber and Odean (2000, 2001). High risk tolerance and low financial literacy predict day trading in Panel B.

4.2 Derivatives and leveraged products

We noted in the introduction that financial innovation has increased the availability of derivatives and leveraged products. These instruments allow investors to achieve highly skewed and levered payoffs, making them attractive from a gambling perspective. However, because of their complex nature and often low liquidity, these products are also relatively expensive due to high fees and trading costs. Bauer et al. (2009) show that Dutch investors tend to suffer substantially larger losses on their option investments than on their stock investments. Further, Entrop et al. (2016) document that retail investors typically realize negative abnormal returns when investing in structured financial products. Hence, similar to active stock trading, it is puzzling why some individual investors choose to invest in these products.

Bauer et al. (2009) argue that gambling and entertainment motives are the main drivers for option trading by Dutch retail investors. Related, Filippou et al. (2017) show that there is a substitution effect between options and stocks with lottery-like features for retail investors, with out-of-the-money options displacing lottery stocks when they are available. These studies suggests that gambling motives likely play a role when individual investors invest in options

and leveraged products. Table 2 indeed shows that investors with gambling motives typically are twice as likely to invest in derivatives, with the proportion ranging from 27% to 38%, compared to the baseline rate of 16% for investors without gambling motives. Focusing on leveraged products, Table 2 shows that *Past gamblers* and *Risk-taking gamblers* are about three times more likely to invest in these products at 23%, compared to only 7% in the baseline group.

Table 4 shows estimates for a logistic regression model that explains whether investors traded derivatives or leveraged products during the past twelve months.[8] In line with the previous results for trading individual stocks, we find a strong positive relationship between the DSM-5 compulsive gambling screen and trading of derivatives or leveraged products. *Compulsive gamblers* are more likely to invest in these products, while other gambling motives show a weaker positive relation. Only the *Past gamblers* proxy is marginally significant at the 10% level. Other factors that predict investment in derivatives and leveraged products are high risk tolerance, high financial literacy, and the better-than-average effect. These results are plausible since investors need to have some knowledge and confidence in their financial skills to trade these relatively complex products. Among the control variables, financial literacy has the most significant effect on trading of derivatives and leveraged products.

Our results show that gambling motives can explain excessive and speculative trading by individual investors well, beyond factors such as overconfidence, risk tolerance, and financial literacy. Especially trading as a substitute for gambling and compulsive gambling motives explain active trading behavior well. Other more innocuous gambling motives, such as aspiring to become rich, or trading for fun and entertainment reasons do not play a significant role. These results raise concerns about the potential negative consequences for the investors' wealth and well-being, especially for the compulsive gamblers. In the next section we analyze how these gambling motives relate to the financial situation of the investor.

[8] Coefficients of the demographic control variables are not shown in Table 4 to save space. Table B1 in Appendix B shows the complete set of results with the coefficients of all control variables included.

5. Gambling Motives and Financial Situation

We now investigate whether investors with gambling motives are in a relatively worse financial situation, and which gambling motives in particular are associated with more financial problems for investors. If gambling motives stimulate excessive stock trading and investment in derivatives and leveraged products, we expect these investors to be in relatively worse financial situations than others given the poor performance of these active trading strategies (see, for example, Barber and Odean, 2000, Bauer et al., 2009, and Entrop et al., 2016)

5.1 Financial situation

We create three indicators for the financial situation of the investor. First, we ask if they are able to *Make ends meet* financially using a 5-point response scale ranging from 1. "Very easy", 2. "Easy", 3. "Neither easy nor difficult", 4. "Difficult", and 5. "Very Difficult". The second question (*Financial situation*) asks "What is your current financial situation?", with possible responses ranging from 1. "I have a lot of money leftover", 2. "I have some money leftover", 3. "I make ends meet exactly", 4. "I am slightly dipping into my savings", to 5 "I am running into debt". The third set of questions asks whether the investor has experienced eight common financial problems within the past twelve months, such as receiving letters from a debt collection agency, and being late on rent or mortgage payments. These financial problems are defined by the National Institute of Household Budget Research (NIBUD). We use the total number of affirmative answers, ranging from 0 to 8, as a proxy for financial problems (*Number of financial problems*). Finally, we construct two dummy variables, one for accumulating debt, and one for households with at least one serious financial problem (excluding late bill payment).

Table 5 shows descriptive statistics of the investors' financial situation across the five gambling motive groups, as well as the baseline group. *Compulsive stock market gamblers* tend

have significantly worse scores on all indicators of financial situation, compared to the baseline investor group without any gambling motives. These excessive gamblers are three times more likely to make debt or use their savings, and they are more than twice as likely to have experienced at least one financial problem in the last 12 months. A similar picture emerges for investors with conventional gambling motives, although less extreme. *Past gamblers* and *Risk-taking gamblers* are about twice as likely to make debt or use their savings. On the other hand, investors with more benign gambling motives like *Sensation seekers* and *Wealth aspirers* have a financial situation similar to the baseline group. Figure 3 illustrates this overall pattern.

The regression results in Table 6 confirm that *Compulsive gamblers in the stock market* tend to be in significantly worse financial situation and have more financial problems, compared to other investors with a similar socio-demographic profile. *Risk-taking gamblers* also have more difficulty making ends meet, while *Past gamblers* report a worse financial situation and have more financial problems. Investing for fun and for a small chance to get rich are not associated with a worse financial situation, in line with the previous results.

Although it is difficult to establish the direction of causality, one way to interpret the results is that investors who gamble excessively in the stock market end up in a relatively worse financial situation due to the costs and losses of their active trading strategies. However, it is also conceivable that being in a relatively worse financial situation is a trigger for people to gamble in the financial markets in an attempt to catch up and gain a large amount of wealth quickly. Regardless of what the direction of causality is, either scenario is worrisome, and warrants upfront screening for symptoms of excessive trading as gambling by brokers.

6. Conclusions

We contribute to the literature by testing four different gambling motives to explain active and speculative trading by retail investors, namely sensation seeking, wealth aspiration, trading as a substitute for gambling, and compulsive trading. We measure these gambling

motives at the individual level in two investor samples from the Dutch population, and then link the gambling motives to investor trading behavior. To the best of our knowledge, only Dorn and Sengmueller (2009) have tested this link before, but most evidence about trading as a form gambling is indirect from the impact of lottery jackpots on stock trading volume. Further, from a policy and consumer-protection perspective it is important to distinguish among different gambling motives for speculative trading in the financial markets. For example, while gambling for fun or entertainment is usually harmless, detecting compulsive gambling early may protect some investors from large losses and other negative side-effects.

We find that gambling motives can explain a substantial part of individual investors' speculative trading behavior, beyond factors like overconfidence, risk tolerance, trading experience and financial literacy. Trading as a substitute for gambling and compulsive trading best explain high trading frequency, day-trading and investing in derivatives and leveraged products. In a horse race between the different gambling proxies, we find that compulsive gambling best explains excessive and speculative trading. In addition, individual investors with compulsive gambling symptoms also tend to be in a significantly worse financial situation compared to investors who do not trade compulsively but are otherwise similar. By contrast, more innocuous gambling motives, such as investing for fun or for a small chance to become rich, are not associated with more active trading behavior or a worse financial situation.

Our data also reveals that only a small fraction of the Dutch population directly trade in individual stocks, derivatives or leveraged products, about 5%. Further, the large majority of these direct investors trade stocks less than 10 times a year, and do not invest in derivatives or leveraged products. However, a small group of investors follow more active and speculative trading strategies, with day-trading and investing in derivatives being common strategies pursued by about one out of five *direct* investors (or 1% of the Dutch population). Screening for compulsive gambling in the stock market may help to identify those active investors who

are most at risk of harming their own finances. Compulsive gambling is a known risk that can have serious consequences for people's personal life, including their wealth, health and family relations, but compulsive trading in financial markets has so far received little attention. Further studies could illuminate the causes and consequences of compulsive gambling in the stock market, and to what extent trading as gambling is influenced by past gains and losses.

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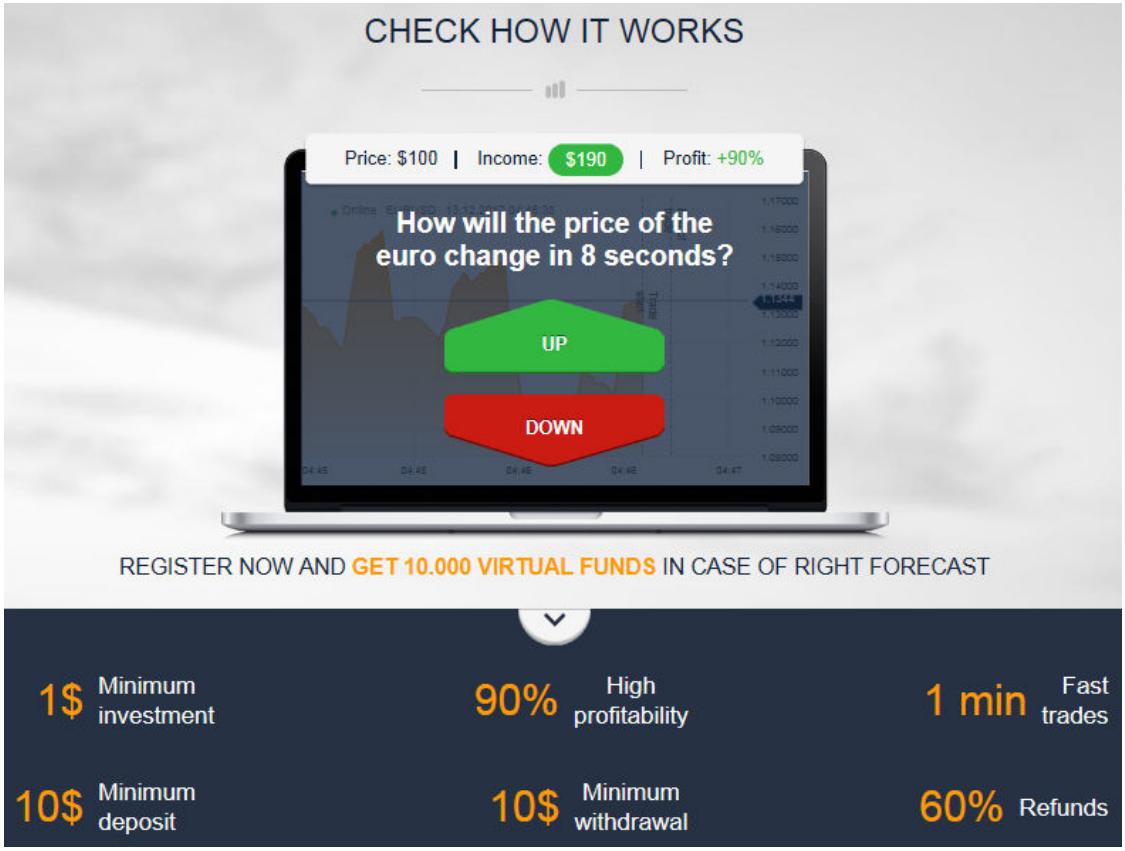
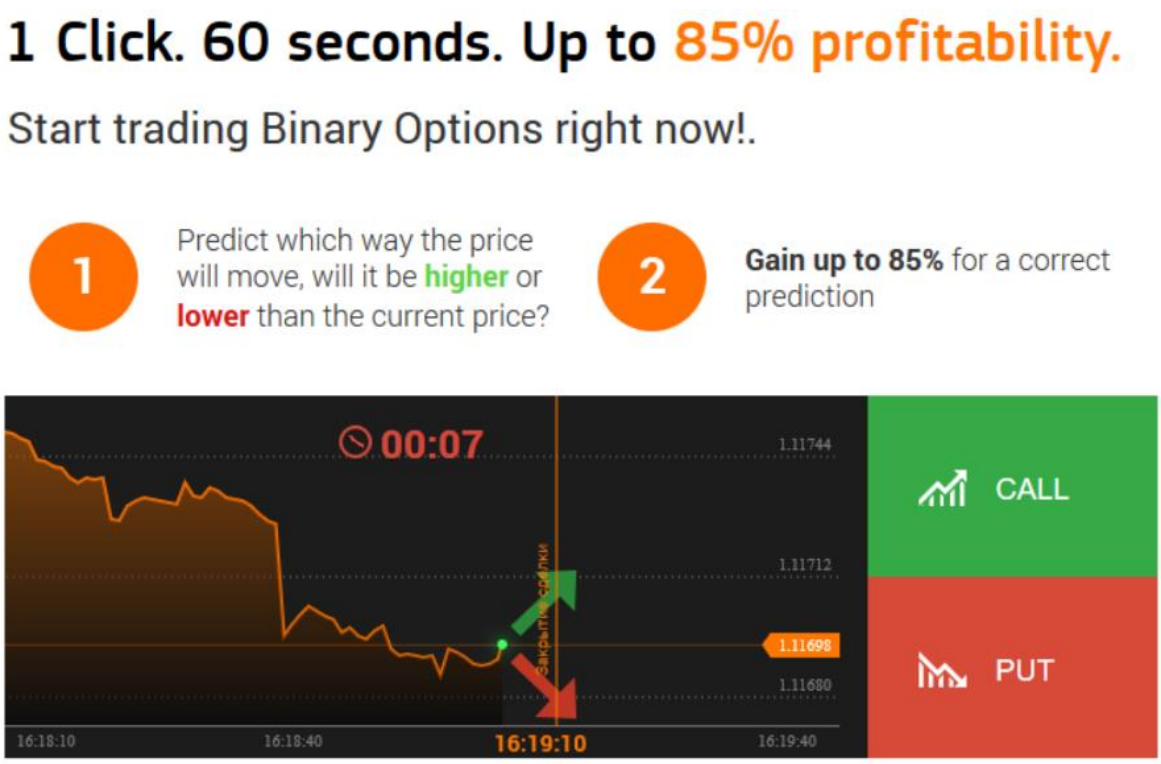
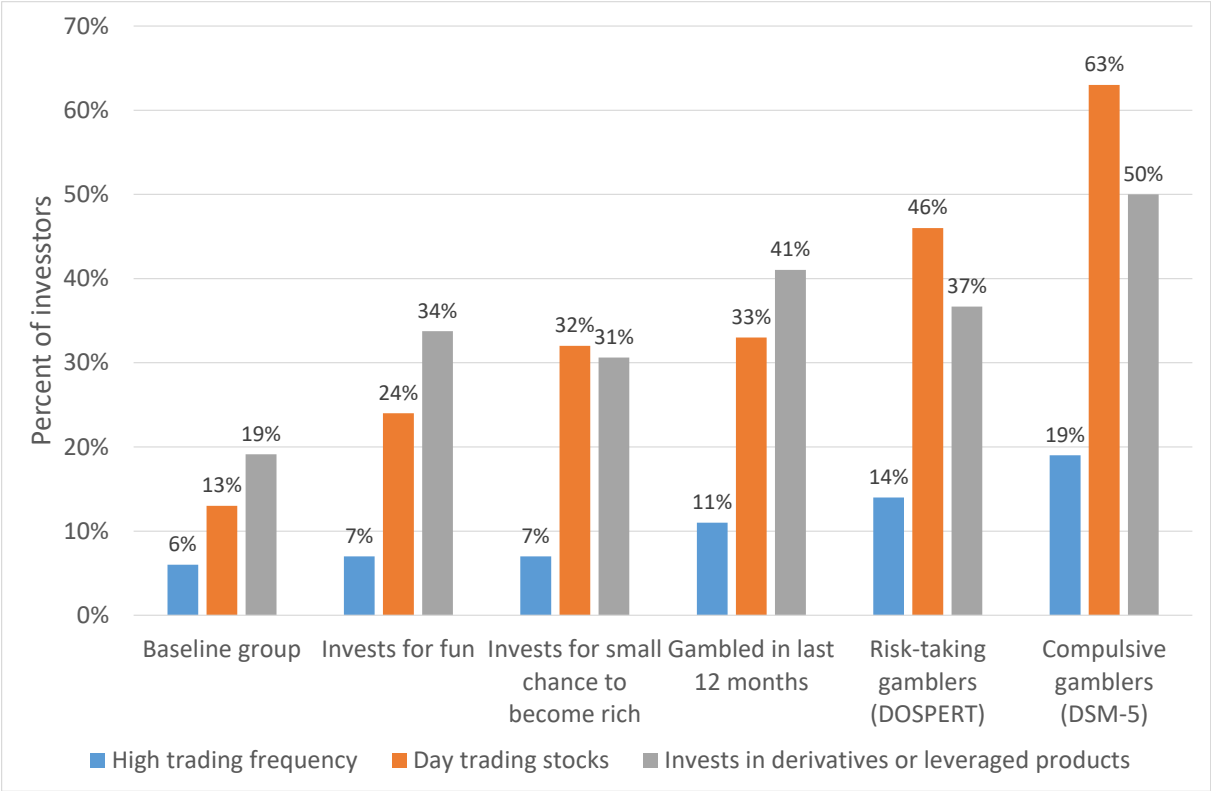
Figure 1: Example of an Advertisement for a Binary Option





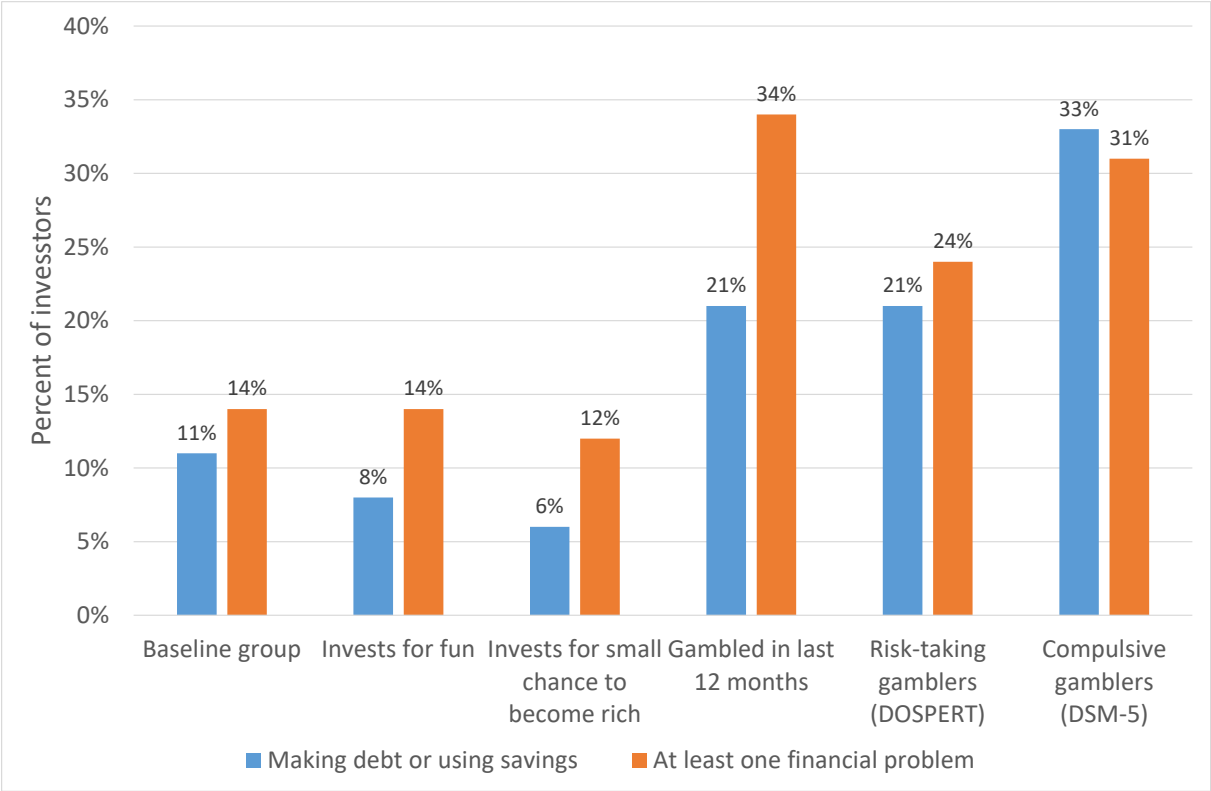
Source: Olymp Trade, Binary Options Broker. https://olymptrade.com/lands/LPL09-03-01en/

Figure 2: Trading Behavior of Investors with Gambling Motives



Note: this figure compares trading behavior between investor groups with different gambling motives, based on the five proxies for gambling motives described in Section 2. The investors in the "Baseline group" do not have any gambling motives for trading, and this group is shown as a baseline for comparisons.

Figure 3: Financial Situation of Investors with Gambling Motives



Note: this figure compares the financial situation between investor groups with different gambling motives, based on the five proxies for gambling motives described in Section 2. The investors in the "Baseline group" do not have any gambling motives for trading, and this group is shown as a baseline for comparisons. The dummy variable "Making debt or using savings" indicates that the investor answered "I am slightly dipping into my savings" or "I am running into debt" to the question "What is your current financial situation?" The dummy variable "At least one financial problem" indicates that the investor has at least one out of eight possible financial problems in the last 12 months, excluding late bill payment.

Table 1: Summary statistics of the main variables

Panel A: Demographics

	AFM			DHS		
	Mean	Min	Max	Mean	Min	Max
Age in years	61.52	30	92	59.01	21	92
Male	0.94	0	1	0.91	0	1
Single	0.19*	0	1	0.27	0	1
Low education	0.04**	0	1	0.11	0	1
High school education	0.19	0	1	0.25	0	1
Bachelor education	0.45	0	1	0.36	0	1
Master education	0.31	0	1	0.28	0	1
Low income (< 39k euro)	0.18*	0	1	0.25	0	1
Medium income (39k to 78k euro)	0.34***	0	1	0.55	0	1
High income (> 78k euro)	0.36***	0	1	0.20	0	1
Low wealth (< 50k euro)	0.18***	0	1	0.35	0	1
Medium wealth (50k to 150k euro)	0.20**	0	1	0.31	0	1
High wealth (> 150k euro)	0.48**	0	1	0.33	0	1
Low stock trading experience (< 1 year)	0.03	0	1	0.01	0	1
Medium stock trading exp. (1-5 years)	0.06**	0	1	0.14	0	1
High stock trading experience (> 5 years)	0.91	0	1	0.85	0	1
Regular employment	0.35**	0	1	0.46	0	1
Business owner	0.17**	0	1	0.08	0	1
Retired	0.42	0	1	0.40	0	1
Unemployed/disabled/other dummy	0.06	0	1	0.06	0	1
Has access to financial advisor	0.24	0	1	0.18	0	1
Observations	259			106		

***, ** and * denote significant differences in the mean or proportion between the AFM and DHS samples, at the 1%, 5% and 10% level

Panel B: Gambling motives and control variables

	AFM			DHS		
	Mean	Min	Max	Mean	Min	Max
Sensation seeking motive ("invest for fun or the challenge")	0.43	0	1	0.48	0	1
Wealth aspiration motive ("invest for a small chance to get rich")	0.15	0	1	0.10	0	1
Conventional gamblers (Gambled conventially in the last 12 months)	0.09	0	1	0.14	0	1
Risk-taking conventional gamblers (Gambling propensity based on DOSPERT)	0.08	0	1	0.09	0	1
Compulsive gamblers in the financial market (4 or more DSM-5 symptoms)	0.04	0	1	0.06	0	1
DOSPERT gambling risk-taking scale (1 to 5)	1.13	1.0	3.5	1.17	1.0	3.5
DSM-5 compulsive gambling symptoms (0 to 9)	0.96*	0	9	0.71	0	7
Risk tolerance scale from 1 to 10	6.08**	1	10	5.53	1	10
Financial literacy score (0 to 100% correct)	0.76***	0.29	1	0.95	0.33	1
Overcondifence miscalibration	0.04***	-0.86	0.71	-0.03	-0.38	0.13
Overconfidence better-than-average	0.20	0	1	0.13	0	1
Observations	259			106		

***, ** and * denote significant differences in the mean or proportion between the AFM and DHS samples, at the 1%, 5% and 10% level

Panel C: Dependent variables

	AFM			DHS		
	Mean	Min	Max	Mean	Min	Max
Stocks trading frequency scale 1-5	2.46***	1	5	1.88	1	4
(1= I barely trade, ..., 5 = almost every day)						
1) I barely trade	0.13***	0	1	0.29	0	1
2) 1-10 times per year	0.43**	0	1	0.56	0	1
3) 1-10 times per month	0.35***	0	1	0.13	0	1
4) 3-4 times per week	0.04	0	1	0.02	0	1
5) Almost every day	0.05**	0	1	0	0	1
Frequent stock trading indicator	0.09**	0	1	0.02	0	1
Day trading stocks	0.22	0	1	0.19	0	1
Number of stocks	10.03***	1	45	5.08	1	25
Investing in derivatives	0.28***	0	1	0.11	0	1
Investing in leveraged products	0.12**	0	1	0.04	0	1
Making ends meet scale 1-5	1.72***	1	4	1.98	1	4
(1= very easy, ..., 5 = very difficult)						
Financial situation scale 1-5	1.88	1	5	2.01	1	4
(1= money leftover, ..., 5 = debt increasing)						
Financial situation deteriorating dummy	0.09	0	1	0.11	0	1
Number of financial problems (0 to 8)	0.32	0	4	0.26	0	3
Has at least one serious financial problem	0.15	0	1	0.15	0	1
Observations	259			106		

***, ** and * denote significant differences in the mean or proportion between the AFM and DHS samples, at the 1%, 5% and 10% level

Table 2: Trading behavior statistics by gambling motives groups

	Baseline investor group	Invest for fun or the challenge	Invest for a chance to become rich	Gambled in the last 12 months	DOSPERT gambling propensity	APA-DSM compulsive gambling
Stock trading frequency (1-5)	2.11	2.41**	2.51*	2.53*	2.64**	2.88**
High trading frequency	0.06	0.07	0.07	0.11	0.14	0.19*
Day trading stocks	0.13	0.24	0.32*	0.33*	0.46***	0.63***
Invests in derivatives	0.16	0.30***	0.29	0.33	0.27	0.38
Invests in leveraged products	0.07	0.12	0.10	0.23***	0.23***	0.19
Number of stocks: mean	8.10	9.44*	7.69	7.56	7.50	8.38
Number of stocks: median	5	6**	5	5	5	6
Observations (N)	145	153	41	36	28	16

Note: this table compares trading behavior between investor groups with different gambling motives, based on the five proxies for gambling motives described in Section 2. The investors in the "Baseline group" do not have any gambling motives for trading, and this groups is shown as a baseline for comparisons. The stock trading frequency scale: 1= I barely trade, 2 = 1-10 times/year, 3 = 1-10 times/month, 4 = 3-4 times/week, 5 = almost every day. ***, ** and * denote significant differences in the mean or proportion compared to the baseline group, at the 1%, 5% and 10% level.

Table 3: Panel A. High trading frequency and gambling motives

	(1)	(2)	(4)	(3)	(5)	(6)	(7)
APA-DSM compulsive gambling		2.17***					1.92***
DOSPERT gambling propensity			1.59**				1.25
Gambled last 12 months				0.89			0.37
Investing for a chance to become rich					0.01		-0.08
Investing for fun or the challenge						-0.11	-0.22
Risk tolerance	0.22	0.18	0.18	0.19	0.22	0.22	0.14
Financial literacy	-0.16	-0.17	-0.17	-0.16	-0.16	-0.16	-0.16
Overconfidence miscalibration	-0.11	-0.08	-0.09	-0.08	-0.11	-0.11	-0.05
Overconfidence better than average	1.36**	1.51***	1.45**	1.36**	1.36**	1.38**	1.56***
Pseudo-R2	0.139	0.174	0.167	0.149	0.139	0.139	0.196
Observations	328	328	328	328	328	328	328

Notes: The table reports logit regression coefficients. The dependent variable is a dummy for high stock trading frequency: trading at least 3 times per week, or every day. Demographic control variables are included: see Table B1 in Appendix B. ***, ** and * denote significance at the 1%, 5% and 10%.

Table 3: Panel B. Day trading and gambling motives

	(1)	(2)	(4)	(3)	(5)	(6)	(7)
APA-DSM compulsive gambling		1.98***					1.81**
DOSPERT gambling propensity			1.21***				0.97*
Gambled last 12 months				0.60			-0.00
Investing for a chance to become rich					0.81*		0.79
Investing for fun or the challenge						0.27	0.20
Risk tolerance	0.44***	0.42***	0.41***	0.43***	0.42***	0.42***	0.37***
Financial literacy	-0.25**	-0.26**	-0.26**	-0.24**	-0.26**	-0.26**	-0.29**
Overconfidence miscalibration	-0.20*	-0.18*	-0.18*	-0.18*	-0.20**	-0.19*	-0.18*
Overconfidence better than average	0.00	0.11	0.02	-0.03	-0.01	-0.05	0.07
Pseudo-R2	0.101	0.135	0.121	0.107	0.112	0.104	0.159
Observations	328	328	328	328	328	328	328

Notes: The table reports logit regression coefficients. The dependent variable is a dummy for day-trading: buying and selling the same stock within one day. Demographic control variables are included: see Table B1 in Appendix B. ***, ** and * denote significance at the 1%, 5% and 10% levels.

Table 4: Investing in derivatives or leveraged products and gambling motives

	(1)	(2)	(4)	(3)	(5)	(6)	(7)
APA-DSM compulsive gambling		1.58**					1.45**
DOSPERT gambling propensity			0.58				0.23
Gambled last 12 months				0.72*			0.46
Investing for a chance to become rich					0.06		-0.08
Investing for fun or the challenge						0.43	0.37
Risk tolerance	0.18**	0.16*	0.16*	0.16*	0.18**	0.16*	0.14
Financial literacy	0.32***	0.32***	0.32***	0.33***	0.32***	0.30**	0.31**
Overconfidence miscalibration	-0.04	-0.03	-0.03	-0.02	-0.04	-0.04	-0.01
Overconfidence better than average	0.71*	0.78**	0.72*	0.68*	0.71*	0.62*	0.69*
Pseudo-R2	0.135	0.152	0.139	0.142	0.135	0.140	0.162
Observations	328	328	328	328	328	328	328

Notes: The table reports logit regression coefficients. The dependent variable is a dummy for investing in derivatives or leveraged products during the last 12 months. Demographic control variables are included: see Table B1 in Appendix B. ***, ** and * denote significance at the 1%, 5% and 10% levels.

Table 5: Financial situation and gambling motives groups

	Baseline investor group	Invest for fun or the challenge	Invest for a chance to become rich	Gambled in the last 12 months	DOSPERT gambling propensity	APA-DSM compulsive gambling
Making ends meet scale (1-5)	1.79	1.75	1.73	1.95	2.23***	2.47***
Financial situation scale (1-5)	1.94	1.84	1.80	2.34**	2.41**	2.80***
Making debt or using savings (0/1)	0.11	0.08	0.06	0.21**	0.21**	0.33***
Number of financial problems (1-8)	0.24	0.30	0.33	0.79**	0.69	0.94*
At least one financial problem (0/1)	0.14	0.14	0.12	0.34***	0.24	0.31*
Observations (N)	147	158	49	38	29	15

Notes: this table compares the financial situation between investor groups with different gambling motives, based on the five proxies for gambling motives described in Section 2. The investors in the "Baseline group" do not have any gambling motives for trading, and this groups is shown as a baseline for comparisons. Making ends meet scale (1-5): Investors were asked "How easily can your household make ends meet monthly?", with a 5-point response scale ranging from 1. "Very easy" to 5. "Very Difficult". Financial situation scale (1-5): investors were asked "What is your current financial situation?", with possible responses ranging from 1. "I have a lot of money leftover", 2. "I have some money leftover", 3. "I make ends meet exactly", 4. "I am slightly dipping into my savings", to 5. "I am running into debt". ***, ** and * denote significant differences in the mean or proportion compared to the baseline group, at the 1%, 5% and 10% level.

Table 6: Financial situation and gambling motives regressions

	(1) Making ends meet scale (1-5)	(2) Financial situation scale (1-5)	(3) Number of financial problems
APA-DSM compulsive gambling	1.22***	1.37***	1.06***
DOSPERT gambling propensity	1.02**	0.38	0.46
Gambled last 12 months	0.17	1.27***	0.69**
Investing for a chance to become rich	-0.07	-0.26	-0.05
Investing for fun or the challenge	-0.25	-0.43*	-0.24
Risk tolerance	-0.03	0.01	0.02
Financial literacy	-0.11	0.01	-0.10
Overconfidence miscalibration	-0.03	-0.11	0.08
Overconfidence better than average	-0.21	-0.91***	0.35
High trading experience (> 5 years)	-0.22	0.74*	0.48
Age in years	0.01	0.03***	-0.02
Male	0.07	-0.23	-0.11
Single	0.12	0.01	-0.22
Master degree	0.17	0.03	0.26
Low income (< 39k euro)	0.68*	0.51	-0.24
High income (> 78k euro)	-0.67**	-0.67**	-0.02
Low wealth (< 50k euro)	0.53	0.52	0.35
High wealth (> 50k euro)	-0.70**	-0.40	-0.29
DHS panel member	0.60**	-0.05	-0.31
AFM respondent recruited by GfK	0.09	-0.08	-0.24
Pseudo-R2	0.130	0.116	0.108
Observations	322	309	327

Notes: The table reports regression coefficients with robust standard errors in parenthesis. Column (1) and (2) are ordered logit regressions, and column (3) is a Poisson count model regression. Making ends meet scale (1-5): Investors were asked "How easily can your household make ends meet monthly?", with a response scale ranging from 1. "Very easy" to 5. "Very Difficult". Financial situation scale (1-5): investors were asked "What is your current financial situation?", with responses ranging from 1. "I have a lot of money leftover" to 5. "I am running into debt". ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Appendix A. DSM-5 Gambling Disorder Diagnostic Criteria Adapted to Trading

DSM-5 Trading Addiction Questions in the Investor Surveys

The following questions are about your of trading of financial products, such as individual company stocks, ETF's (indextrackers), derivatives and leveraged products (such as turbo's, speeders, binary options and contracts for differences). While answering these questions please consider your actual trading activities during the last 12 months.

1. You trade financial products with larger amounts of money to maintain the excitement.

2. You have to borrow money from family members or friends to cover the losses from trading in financial products.

3. You always think of ways to get money to trade financial products.

4. You lie to your family or friends about your trading in financial products.

5. You tried to reduce your trading of financial products, or to quit altogether, but could not.

6. You trade financial products to escape problems in your life.

7. You trade more in order to win back your previous losses.

8. You have problems in your work, with family members or with your partner as a consequence of your trading in financial products.

9. You become irritated when trying to reduce or quit trading financial products.

Reponse scale shown for each of the above nine DSM-5 questions:

I. Never
II. Sometimes
III. Often
IV. All the time

Appendix B. Regression Results for Trading Behavior

Table B1: Trading behavior and gambling motives

	(1) High trading frequency dummy	(2) Trading frequency scale	(3) Day trading dummy	(4) Investing in derivatives or lev. products
APA-DSM compulsive gambling	1.92***	1.33**	1.81**	1.45**
DOSPERT gambling propensity	1.25	0.74	0.97*	0.23
Gambled last 12 months	0.37	0.14	-0.00	0.46
Investing for a chance to become rich	-0.08	0.33	0.79	-0.08
Investing for fun or the challenge	-0.22	0.48*	0.20	0.37
Risk tolerance	0.14	0.22***	0.37***	0.14
Financial literacy	-0.16	0.13	-0.29**	0.31**
Overconfidence miscalibration	-0.05	0.05	-0.18*	-0.01
Overconfidence better than average	1.56***	0.61*	0.07	0.69*
High trading experience (> 5 years)	-0.44	-0.51	0.16	1.34*
Age in years	0.04*	0.02**	0.01	0.01
Male	0.02	0.61	-1.15**	-0.09
Single	0.42	0.05	-1.20***	0.18
Master degree	-0.04	0.09	0.19	-0.24
Low income (< 39k euro)	-0.72	-0.43	0.56	0.23
High income (> 78k euro)	0.32	0.24	0.03	0.39
Low wealth (< 50k euro)	-0.05	0.05	-0.07	-0.09
High wealth (> 50k euro)	0.46	0.11	-0.14	-0.12
DHS panel member	-1.50*	-1.47***	0.25	-1.65***
AFM respondent recruited by GfK	-0.53	-0.17	-0.13	-0.34
Pseudo-R2	0.196	0.117	0.159	0.162
Observations	328	328	328	328

Notes: The table reports logit regression coefficients. The dependent variable in Column (1) is a dummy for high stock trading frequency: trading at least 3 times per week, or every day. The dependent variable in Column (2) is the stock trading frequency scale: 1= I barely trade, 2 = 1-10 times/year, 3 = 1-10 times/month, 4 = 3-4 times/week, 5 = almost every day. The dependent variable in Column (3) is a dummy variable for day-trading: buying and selling the same stock within one day. The dependent variable in Column (4) is a dummy variable for investing in derivatives or leveraged products. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.