

HOOKED ON STOCK TRADING

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Comments are invited.

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Abstract

Many amateur stock market traders buy and sell shares in naïve expectation of exceptional returns. Starting from a vast archival data set provided by a brokerage house in Belgium (2003-2012), we study the behavior of 300 or fewer individuals who get trapped in extreme short-term trading. A metric of speculative intensity --- the fraction of stock market trades that are reversed within 14 calendar days--- is used to isolate the sample. Survey data are matched with trading data, chiefly trading in bank shares at the time of the global financial crisis. We offer a profile of the subjects and document patterns in their conduct. Obsessive traders love share price volatility. At the same time as losses build up, their various tactics nourish the misconception that "they are doing fine." This denial of reality, a willful blindness, likely stops them from pulling out.

Keywords: Behavioral addictions, compulsive stock trading, gambling, sensation-seeking, motivated reasoning, illusion of control, self-deception

JEL classification: G11; G40

*"When I was young, people called me a gambler.
As the scale of my operations increased, I became known as a speculator.
Now I am called a banker. But I have been doing the same thing all the time."*

*Sir Ernest Joseph Cassel
Merchant banker, art collector, philanthropist, and advisor to King Edward VII
1852-1921*

Sir Ernest Cassel's legendary achievements in international finance a century ago earned him many honors and tributes. So, it is remarkable that this illustrious figure admitted to a continuity between gambling, speculation and banking. All three require taking chances, and doing so time and time again. Financial speculation involves trading securities with substantial risk, in expectation of high returns. It is not stable buy-and-hold investment. Speculators intend to take advantage of short-term asset price fluctuations, often linked to swings in crowd sentiment.

This article studies amateur traders, however, not banking professionals or investment managers. Trading shares of common stock may be entirely prudent. But some persons get carried away. They turn the stock market into a playground. If people trade too much, the chances of loss eclipse the chances of profit.¹ Here, we track short-term share betting patterns. Our data analysis suggests that some traders are delusional. They do not break off putting money on impending price movements even as they pile up big losses. Strings of setbacks are interrupted by smaller victories that traders self-engineer, in this way fooling themselves that they are skillful speculators.

Our findings are evoked in part by prior research on casino gambling (e.g., Andrade and Iyer, 2009). Still, short-term stock trading is unlike buying lottery tickets or sports betting. Like casino games, bets on stocks yield short-range outcomes that are less positively skewed than lotteries. Resembling wagers on horse races, stock bets involve both knowledge and skill. But there is a crucial difference: Traders themselves decide when to pull the plug on any given stock position. Hence, the timing of stock sales helps to structure the sequencing and size of wins and losses that individuals experience. Gains and losses are self-engineered. Yet, what people go through has bearing on their beliefs about later events.²

We work with an archival data set provided by a brokerage house in Belgium. The data involve trading accounts for thousands of individuals. The data run between January 2003 and March 2012. A key metric is the fraction of the value of common stock transactions that traders undo within 14 calendar days. We scrutinize the activities of the 2 percent highest-ranked individuals. Quick trade reversals, i.e., short-lived holding periods, attest to a trading style that hopes to benefit from modest price changes. Whereas "authentic investors" patiently let their profits run, so-called swing traders take lots of small gains. They mostly rely on instinct.

So far, past research has not explicitly modeled the dynamics of short-term stock trading.³ Our goal is to portray compulsive stock traders and to document aspects of

their behavior. We list readily observable maneuvers that many utilize, often unconsciously, to excuse conduct that is liable to prompt dismay. These tactics highlight how obsessive traders are subject to “willful blindness.”

It is essential to recognize that we analyze stock trading in its natural context and do not study demoralized subjects *per se*. Both features allows new insights. Many papers evaluate persons who come to a clinic and who feel defeated by futile attempts to conquer their addiction. The individuals in such studies are almost entirely severe addicts, yet whose self-awareness is not fully compromised. In contrast, our study comprises many people who would reject the thought that they are hooked.

Lastly, our analysis is valuable in view of the vast growth of first-time investors since 2020, in part a side-effect of corona pandemic lockdowns. The influx is also due to the launch of stock trading apps such as Robinhood that make investing easy and fun.⁴ Nowadays, ever more youth draw on social media to speculate on massive gains in meme stocks. When trading apps reduce markets to a game, the danger is that many traders do not understand the risks (Foroohar, 2021; Sor, 2022).

Section I reviews past research implying that willful blindness (undue self-confidence, self-esteem and self-deception) boosts trading. Section II presents the data as well as a profile of compulsive traders. Section III lists six short-term stock betting patterns linked to willful blindness. Section IV substantiates each tendency. Obsessive traders love turmoil. During the 2008-2011 crisis, they expanded their trading of troubled banks. Also, the demand for speculative trading is less elastic with respect to losses, often taken with delay, than to past self-engineered winnings. Many traders sustain the delusion that “they are doing fine.” Section V concludes.

I. Willful blindness

The love of gambling is deep-seated. It has been studied for decades, see, e.g., Thomas (1901), Cohen (1960), Kavenagh (1993) or Lears (2003). Nowadays, many people set up an online account to trade stocks.⁵ Prices are always in motion, however. A price reversal is the turning of a fleeting trend. Trading a stock when it is set to turn one way or the other is thrilling but risky.

Addiction may be modeled as a chemical dependency where people lack the power to choose.⁶ Yet, trading demands thought. What many addicts say is at variance with what they do. They “know” what is best for them but also state that they are “unable” to change. Counter to the medical profession, Becker and Murphy (1988) model addiction as rational utility-maximizing intertemporal choice. Quasi-rational theories of “the divided self” fall in between. Here, each person is seen as a collection of agents, e.g., a long-term planner manages a myopic doer (Thaler and Shefrin, 1981).⁷

Like pathological gambling, incessant trading is a purely behavioral disorder.⁸ Entertainment is a prime driver.⁹ What leads an individual to carry on laying bets? Clearly, the introspective reports that people supply, either as sincere efforts at self-explanation or as lame excuses, are inadequate.¹⁰ Hereafter, we briefly review studies of excessive self-confidence, self-esteem, and self-deception. The common denominator is willful

blindness (Heffernan, 2011). It applies when there is an occasion for knowledge, as well as a duty to be knowledgeable, but both are evaded. While a person could and should have been aware of certain information, he takes no notice of it and he misbehaves. Willful blindness has many origins, e.g., attention is a zero-sum game. The cognitive limits of our brain demand that we filter what we take in.¹¹

Behaviorist psychology links behavior with past success. Humans are more likely to perform an activity the more valuable they perceive its reward to be, and the more helpful the action is thought to be in getting the reward (Homans, 1961). Incentives shape performance. Reinforcement is constant or partial. Extinction refers to the gradual decline in response to nonreinforcement.¹² There are parallels between the behaviors of laboratory animals (e.g., pigeons), obsessive gamblers, and compulsive traders. Several factors matter, e.g., the price tag of engaging in a type of behavior, the size and changeability of rewards, as well as their immediacy or delay. Expectations are key, and that is where excessive self-confidence, inflated self-esteem and self-deception come into play.

Self-confidence

“Opening a position at an advantageous price level, then riding momentum to profit, is an essential part of the gameplan of many traders” (Grinblatt and Keloharju, 2009). A lot of traders are “sensation-seekers.” They imagine that, with effort and a bit of good luck, they can anticipate price turnarounds.¹³ Beliefs of illusory control are studied by Fenton-O’Creevy et al. (2003) and others. Even in pure chance tasks many subjects attribute their success to skill (Langer, 1975).¹⁴

Stock traders, especially men, tend to be overconfident. Their brashness causes subpar performance (Odean, 1999; Barber and Odean, 2001a, 2001b). Some use technical tools such as moving averages. Others are newswatchers and scrutinize social media to monitor minute-to-minute events. Since people ascribe success to their own actions and failure to external forces, overconfidence is partly endogenous (Gervais and Odean, 2001). They prefer settings in which the uncertainty is thought to be controllable, i.e., more skill- than environment-based (Cohen and Hansel, 1959; Howell, 1971; Klein and Kunda, 1994).

Also, many individuals mentally separate losses that they cash out from paper losses that they brush off.¹⁵ Yet, in a bid to climb out of the hole, he or she may take on added risks. Subjects with paper losses are disposed to lay more bets, Imas (2016) finds, whereas those who cash them out tend to curtail further risk-taking. In sum, past stock gains often instigate more trading and, perversely, some past losses do the same.

Self-esteem

People like to think that they are virtuous, open-minded, and smart, and that little can go wrong for them. Yet, at times, our self-esteem is compromised. It is hard to admit mistakes. We may experience ambivalence, i.e., concurrent tendencies to accept and reject a course of action. Festinger’s theory of cognitive dissonance (1962) says that, as people make sense of the world, they try to maintain their self-image. People reinterpret facts and truths that prove them wrong.¹⁶ A person may imagine that his beliefs are proper and that impartial observers would concur (Ehrlinger et al., 2005).

The tendency to ignore negative facts is fortified by selective recall (Sharot et al., 2012). Self-esteem has a freezing effect. For example, personal stories in memory that omit discordant information harden over time (Marsh and Tversky, 2004). Once committed, there is less objectivity in the way an individual views different decision paths. For instance, if a selection did not yield enough reward and cannot be overturned, it may seem more satisfying than it truly was.¹⁷

Dissonance is also an engine of persistence. It is a process of entrapment, a chain reaction, ever more desperate as things go wrong. We tell many little lies to ourselves that stop us from accepting fault and moving on. One way to resolution is to undo a past action; another is to reaffirm it. In this case, decision conflict leads either to hyper-vigilance or defensive avoidance (Lewin, 1935). Procrastination and bolstering are typical. Many also bury their heads in the sand, and live in denial.¹⁸ Dissonance theory predicts that small rewards may be more effective than large rewards. Festinger's 1961 study of rats shows that extinction takes longer for partially reinforced animals than for animals that are rewarded all the time.¹⁹ There is a parallel with gamblers. Festinger surmises that both rats and people "come to love things for which they have suffered."

Self-deception

People sometimes self-engineer signals of a desirable type and later interpret them as fact-based evidence of a wanted trait or skill. Quattrone and Tversky (1984) asked subjects to immerse their forearm into a stream of ice-cold water until they could no longer bear it. Next, they pedaled an exercise bike. The subjects were also told that either high or low tolerance to cold water points to a healthy heart type and long life-expectancy. Post exercise, the dip in cold water was repeated. Many individuals changed their tolerance in the direction "predicting cardiovascular health," yet denied that they had tried to do so. People worked to bring about the symptom of a wished-for condition, one may say, even while the act did not produce the desired state.²⁰

Self-deception requires a "technology." In Bénabou and Tirole (2002), distortions of memory suppress past failure but highlight past success. This is one of the mechanisms listed by Mele (1987) who argues that people who deceive themselves typically do not intend to do so.²¹ Selective exposure to data, its misinterpretation as well as ignorance, may all be factors in self-deception. Also, attitudes often follow behavior. We may form beliefs about ourselves as we watch our own actions, while being unaware of our true motivation (Bem, 1965, 1967). Laboratory tests put together by Gödker et al. (2023) support biased learning. The disposition effect fuels false self-confidence, they find. In preference to the true performance of their portfolios, many traders develop bogus beliefs about their personal investment ability based on past strings of realized gains and losses, neglecting paper gains and losses.²²

Summing up

What leads an individual to carry on laying bets? Surely, numerous traders are playful sensation-seekers. A lot of people also hope to strike it rich. Yet, many are misled: they follow naïve strategies of which they are incompletely aware and of which they misread the consequences. For instance, a "big win" may arouse the hope that a similar success will repeat itself.²³ A sizable group of individuals simply act in partial ignorance

of their own motives. Below, we examine the degree to which, for this group, “willful blindness” describes their trading habit and its downward spiral. We dissect and elaborate various stylized facts inspired by this theory.

II. Data

The data set consists of financial and demographic information provided by a brokerage house in Belgium. We have access to transactions executed by thousands of individuals between January 2003 and March 2012. The data include prices and quantities of financial instruments bought or sold, time stamps, and transaction costs. We also use MiFID data. Since November 2007, the European Union’s *Markets in Financial Instruments Directive* (MiFID) requires investment firms to collect client information. To attain access to advice and products, retail traders answer questions regarding their aspirations and financial experience. As our inquiry centers on trading in shares, we study the sequence of transactions and stock portfolios related to each individual. Price data from *Bloomberg* and *Eurofidai* are used to find portfolio values at the end of each month, and to compute gross and net returns, i.e., after transaction costs.

To get around short-lived or dormant accounts, the primary data set is cut to persons who effect a minimum of 20 stock transactions and who are actively trading for at least one year. We use data for 14,037 traders.²⁴ Their aggregate stock holdings, valued at the end of each month, were on average worth €936 million. Together, they executed 2.1 million transactions for a total traded value of €17.2 billion. To identify compulsive traders, we compute the fraction of the value of trading that is reversed within 14 calendar days. This metric is named R . All 14,037 traders are ranked by R . Remarkably, of the €17.2 billion that was traded, €7.2 billion was reversed within 14 days.

Much of the analysis that follows is done with the top 100 or top 300 quick round-trip traders. How significant are quick round-trip traders? The top 300 only embody 2.1% of all traders. Their minimum R is 83%; their median ratio is 89% (whereas the median for others is 10%). The top 300 executed 119 thousand transactions for a total value of €2.1 billion (with €2.0 billion quickly reversed). This was done with aggregate stock holdings of merely €6.1 million. In addition, our analysis also focuses on trading in shares of four major Belgian banks: Fortis, Dexia, KBC and ING. Of 14,037 subjects, 11,386 traded one or more of these bank stocks and 10,127 sold bank shares at least once. The total number of bank transactions was 227,435 and the number of round-trips in banks was 75,876. Transactions in Fortis take the lion’s share of trades (40%) before Dexia (25%), KBC (24%), and ING (11%).²⁵

The median number of transactions by each individual bank trader is 5, but 729 individuals trade more than 100 times, 100 trade more than 300 times, and 37 more than 500 times. (The most active trader of all carries out 3,259 transactions.) Among the top 100 obsessive traders, 80 are bank share traders; among the top 300, 249 are bank traders. The top 100 bank traders (.3% of all bank traders) account for 5.7% of all trades; the top 300 (.9% of all), for 10.6%. Nearly half (46%) of all bank share sales are quick reversals, i.e., sales that follow within 14 days of earlier purchases of the same bank. Most of these reversal trades, 61%, record a profit before costs.

For perspective, Figure 1 puts three groups side by side: (1) 12,211 traders with R below 50%; (2) 1,526 traders with R above 50% but below 83%; and (3) 300 traders with R at or above 83%. Low R individuals represents 87% of all traders, 94% of all stock wealth, and 61% of all stock trading volume (including 49% of all trading in bank shares). High R traders embody just .7% of stock wealth. Yet, this tiny, poorly capitalized group accounts for 12% of stock trading volume, 16% of trading volume in bank shares, and 27% of the value of all transactions reversed within 14 days.

The remainder of this section sketches a brief portrait of compulsive traders. As shown by Table I, the typical quick round-trip trader is about 4½ years younger than other amateur traders and more likely to be single and male. It is less likely that he is university-educated. It is more probable that the target return for his investment strategy is high. The same is true for his risk tolerance. He is more likely to self-assess as a “financially literate” and “experienced” trader with “high knowledge of financial markets.” Curiously, his trading objective is more often “stable income,” less often “capital appreciation.” His investment horizon is less faraway than for the average trader.

The financial profile of the compulsive trader, explored in Table II, reveals his lower annual net income, lower wealth, and lower chances of owning real estate. He is more likely to be a worker or self-employed. His family is less likely to be near retirement.

Table III analyzes the way in which obsessive speculators behave. Over their trading lifetime, top 300 traders process a (mean) sum total of €7.07 million. They complete on average 396 stock transactions, about three times the number for a typical retail investor. The median total trading volume of €1.53 million is six-fold the number for typical investors. Yet, on average, compulsive traders only hold (at month’s end) a 2.2 stock portfolio worth €20,457 (while the average platform user owns 8.2 stocks valued at €67,747). It appears that many of them fully rebalance their portfolios several times a month. The median top 300 trader holds a portfolio of 1.4 stocks worth €6,397. Yet, the median transaction is valued at €8,503.

Few top 300 traders, 18%, make money. The average annual gross portfolio return is -8.5%. After costs, the net return is -13.9%, greatly inferior to the -5.9% earned by other platform users.²⁶ The length of the average top 300 trading record is 5.1 years, appreciably below the lifespan of regular investors, 6.1 years. The matching medians are, respectively, 4.3 and 6.3 years. In accord with Koestner et al. (2017), these statistics hint that, on the whole, obsessive traders may learn from their mistakes.

Among the top 100 traders, the 80 who are bank traders execute 7,248 bank transactions in 3,103 round-trips. The total value of their bank trading is €147.5 million. Ten percent of trades are reversed within 32 minutes; 25% within 2 hours and 17 minutes; 50% within 21 hours; 75% within 3 days and 8 hours, and 90% within 7 days.

Past research on the hesitancy to realize losses (Odean, 1998; Imas, 2016), the propensity to trade (Odean, 1999; Barber and Odean, 2001a), or overconfidence in trading (Barber and Odean, 2001b) does not distinguish between types of traders. Without a doubt, compulsive speculators trade massively but so do individuals who administer large portfolios or people who trade a lot but hold most stocks over long periods.

It is instructive to compare the top 300 in each group --along with the remaining traders. We find that quick round-trip traders (RT) are a distinctive socio-economic group. While the typical retail investor builds up a trading volume worth €650 thousand, the matching figures are €7.07 million for quick round-trip traders, €24.46 million for large traders (LT), and €10.65 million for those who own large portfolios (LP).

Table IV reveals that, as a rule, LT- and LP-traders have higher incomes and own more financial wealth than other investors, especially RT-traders. Even though they are about a decade older, their investments are more long-term oriented. They save more, and many have especially high knowledge of financial products. Nine out of ten own their own homes.

Table V indicates that the everyday platform user runs a portfolio worth €39 thousand, about twice as much as the typical RT-trader. Still, parallel figures are, respectively, €653 thousand and €1.29 million for LT- and LP-traders. Likewise, the mean number of stocks held is 7.8 (regular platform users), 2.2 (RTs), 13.6 (LTs) and 22.3 (LPs). The disposition effect --a blend of the eagerness to cash in gains and the aversion to realize losses-- is on average stronger among RT-traders than among others.²⁷ While large trading is generally harmful, obsessive traders are hit the hardest. Their gross and net portfolio returns fall below those of large traders. LT-profits, in turn, are significantly below LP-returns. This rank order is maintained no matter whether one studies mean or median returns, or whether one focuses on the fraction of traders who earn positive returns. Simple tests for equality of means, medians and proportions between groups, some non-parametric, all reject the null hypothesis at the .001 level. Transaction costs reduce gross annualized returns by 5.40% for RT-traders, 2.42% for LT-traders, and .81% for LP-traders. They are 2.39% for the average platform user.

III. Six trading patterns

We reason that willful blindness helps to explain compulsive trading. One aspect of traders' naïveté is that they seek out financial uncertainty. For example, during the world financial and European sovereign debt crises, compulsive traders amplified their trading of bank shares. A key point is that traders themselves choose when to move into any given stock and when to pull the plug. Since the timing of transactions governs the size and sequencing of wins and losses, the decision process may produce an illusion of control. Compulsive traders like to take gains often and quickly. Distortions in the fabrication of (mostly short-term) gains and (mostly longer-term) losses foster self-deception. As losses build up, many people maintain the unfounded belief that "they are doing fine." Hereafter, we present evidence with respect to six stylized facts.

#1: Both chance and skill enter into trading decisions. Individuals face uncertainty in relation to (i) fortuitous external factors ("chance"), and (ii) their level of "skill." Since greater external randomness offers more prospects to establish one's skill, self-confident traders prefer such settings. Hence, *compulsive individuals seek out (volatile) bank stocks, and they trade them more actively than do other traders.*

#2: Compulsive traders are cautious at first. They intensify their activity later. *Bit by bit, they (i) accept a lower winning percentage, and (ii) close positions more quickly.*

#3: A treshold effect: the frequency distribution of round-trip gains and losses shows a peak right above the threshold of zero profit (before transaction costs) as well as a dip right below zero. Hence, *compulsive traders take more small wins than they take small losses.*

#4: Small losses are near misses. But, as traders wish to avoid losses, they stretch out the determination of the finishing outcome. Hence, *losing positions are kept open longer than are winning positions.*

#5: Traders maneuver to secure advantage in other ways. At times, they add to their holdings of a given stock; at other times, they lower their holdings but do not sell out. *As the complexity and duration of round-trip transactions increase, overall performance variability rises and average results worsen.*

#6: "Loss chasing," the effort to recoup money that was lost, describes compulsive trading behavior. Loss chasing is gambling and losing ---followed by more intense gambling to get even. That is why *cumulative returns get worse as the number of transactions and their total value go up.* Facts #2 through #6 jointly imply that, while its gains are front-loaded, compulsive trading produces losses *in toto*.

IV. Evidence

Henceforward, we empirically substantiate each of the six trading patterns.

Fact #1: Traders seek share price volatility

To repeat, many obsessive traders are sensation-seekers. But a predictable game is dull. In general, games do not hold our interest in the absence of uncertainty –which may occur in the outcome, the game's path, its complexity, etc. (Costikyan, 2013). Below, we study bank trading because we want to find out how compulsive traders react to share price volatility. We ask: Does variability attract traders? Or, just the opposite, does high financial instability worry traders and scare them away? ²⁸

Our dataset tracks individuals over a little less than a ten-year period that includes the 2008-09 global financial crisis and the later European debt crisis. Starting in mid-2008, the financial crisis struck Belgian banks. Shares of Fortis, Dexia, KBC, and ING were exceptionally erratic. From July 2008 to June 2009, 16% of daily bank returns were below -5%. The BEL20 stock index dropped more than 20% during the week of 6-10 October, 2008, the largest weekly decline in the history of the stock index. At that time, Fortis, Dexia and KBC stocks made up nearly 30% of the index. Figure 2 shows, semi-annually, the cross-sectional average share price of the four large banks.²⁹ It also exhibits semi-annual averages of the fraction of business days that bank shares drop in price by more than 2% as well as the fraction of days that bank prices change, up or down, by more than 2%. This last statistic, labeled *Vb*, rises as high as 70% during 2008-09. The behavior of *Vb* corroborates a well-known fact, i.e., that episodes of price instability are two-sided: Great risk is associated with great opportunity.

It is interesting to study the response of the top 100 compulsive traders. Eighty among them buy and sell bank shares whereas twenty-six generate a personal (cumulative) trading volume in bank shares exceeding €1 million.³⁰ Figure 2 indicates the number of traders among this group who are active in any six-month period and the mean number of bank transactions per trader. As average bank prices plunge between 2007 and 2009, from about 46 to 6 Euro per share, compulsive bank trading soars. The greater part, close to 60%, happens during 2008 and 2009. Later on, when the European debt crisis of 2011 threatens to ruin the banks, many traders once again boost their activity levels and jump into the fray. In contrast, the prior five years of steadily rising bank prices (2003 through 2007) reveal low bank trading activity.

Table VI details how, in the cross-section, the behavior of compulsive bank traders differs from the behavior of other retail investors. A key insight is that, for top 300 compulsive traders, the weight of bank trading, relative to all stock trading, is about the double of what it is for other traders, 24% vs. 13%. For the 26 most intense bank traders, the proportion rises to 44%. In addition, it is seen that bank speculators “do little else,” i.e., the average number of stocks in portfolio and the average value of their holdings at month’s end are only a fraction of what is observed for other traders.

Figure 3 tests by how much surges in bank volatility tilt general bank trading towards compulsive traders. We divide the sample period into three intervals: (i) the first half of 2003 (with V_b equal to 43%), (ii) July 2003 through December 2007 ($V_b=6\%$), and (iii) the period starting in January 2008 ($V_b=48\%$). (The corresponding BEL20 market volatility statistics, V_m , are 26%, 3% and 19%.) Figure 3 shows the fraction of traders who buy and sell bank shares, the fraction of bank share transactions, and the fraction of the value of bank transactions that are generated by, respectively, 12,211 traders with $R<50\%$, 1,526 traders with $50\%<R\leq 83\%$, and 300 obsessive traders with $R>83\%$.

We find that during outbreaks of high volatility compulsive bank trading more than triples. For instance, during 2008-2011, top 300 quick round-trip traders, being 2.3% of all bank traders, executed 9.5% of all bank transactions, worth 20.4% of bank share trading volume. These numbers far surpass what happened during 2003-2007, a period of tranquility. At that time, top 300 quick round-trip traders, being 1.1% of all bank traders, only completed 2.9% of all bank transactions valued at 5.2% of all bank trading.

A last way to investigate how obsessive traders shift towards volatile bank stocks is to predict the portion of the value of all trading that is steered towards banks from an individual’s R itself. We sort all 14,037 retail investors into 100 groups and, within each percentile of R , find the average $(TV_b)/(TV)$. Given that there are many observations for low R -percentiles but few for high percentiles, the estimates of $(TV_b)/(TV)$ become more noisy as R rises. Figure 4 depicts the result and a matching regression equation. Clearly, as R rises from zero to 100%, so does the desire to transact bank stocks: from 11% to 26% of the value of all trading.

Fact #2: Traders are cautious at first

As stated previously, the timing of security purchases and sales shapes the sequencing and size of wins and losses that traders experience. The tests that follow rely on these sequences and related outcomes. Thus, our methods require assumptions about

cognitive processing or “mental accounting” (Thaler, 1999). We separate the trading record of each person, with respect to each individual security, into parts which we label “brackets.” A bracket is a mental account that is either kept open or that is closed. A closed bracket is a round-trip that is resolved and that thereby allows us to register the profit or loss associated with it, as well as its duration over time.

Mental accounting controls how past outcomes ---actual results as well as missed opportunities--- affect later bets. For example, many amateur traders are averse to closing an account with a loss. People may be especially watchful and cautious at first, when they begin trading. Yet, as they trade more, this inclination weakens.

We apportion trading records so that every new bracket starts off with a share purchase of x number of shares (say, in bank A) at price p . Individuals, we reckon, keep an eye on how the market price evolves and, at some point, “pull the trigger.” Our analysis also presumes that, when one or more sales of shares in bank A is trailed by a new purchase of A shares, the prior mental account has been closed, i.e., its sum total gain or loss is felt to be final. Thus, brackets consist of one or more buys (B) followed by one or more sales (S), so that their format is BS, BBS, BBBS, BSS, BSSS, and so on. In some cases, round-trips consist of as many as 7, 8 or 9 individual transactions. What our bracketing methods disallow is a sequence like BSBBS ---since that sequence contains two brackets: BS first and BBS next. Within each bracket, inventory first rises, then descends. Because short sales are banned on the trading platform that we study, the inventory of shares cannot fall below zero. In actual fact, it is commonplace for our traders to start and end brackets with zero inventory but, to repeat, our bracketing method does not require it.

Pulling the trigger may be mentally “easy” if the price rises: $p' > p$. In that case, closing the trading position brings the individual inventory of x shares back down to zero and it yields a profit, not considering transaction costs, of $(p'-p)*x$. To repeat, it may be mentally “difficult” to close the position if it generates a loss. Among compulsive traders, nearly 4/5's of the individual share round-trip transactions show a “one-buy-one-sale” (BS) format and 59% of BS-type brackets are gains, a much higher percentage than we would expect if traders close their positions at arbitrary moments in time and if share price movements are adequately described by a random walk (Fama, 1965).³¹ Conditional on it being a gain, the median gain is €383. (After transaction costs, 52% of BS-brackets remain net wins, and the median gain is €325.) The median time interval between the moment of purchase (B_1) and the instant of sale (S) is 18 hours and 27 minutes. Yet, many roundtrips take less than one hour; some, only minutes.

If the share price falls after time B_1 , a trader may suffer distress since the drop clashes with his initial pledge of resources and makes the risk of a further price decline more salient. He may also be driven to justify and bolster his decision.³² After all, he may tell himself, if A was “a steal” at price p , it becomes an even more attractive investment at $p' < p$. Both predictions find confirmation in our data. About 70% of second (third, or more) purchases, not interrupted by a sale, are preceded by a price drop between B_1 and B_2 (or between B_2 and B_3 , and so on).³³ Even if the stock price has gone up relative to p , a trader, hoping for a bigger gain, may not want to sell right away. This

hesitancy lengthens the BS-time interval. Or he may sell only a fraction of the shares (S_1) that were purchased ---hereby cutting the risk that a "sure" paper gain is lost--- before selling the remainder (S_2). We find that, for about 60% of BSS-type brackets, the price rises between B and S_1 .

To repeat, individual traders do control "when to pull the trigger" and when to finish a round-trip. Round-trips involve mental accounts that are deliberately opened and closed. It is likely that, while "learning about risk and return," traders are cautious at first. This means that, early on, they are both more timid and more patient. It also suggests that, early on, they shoot for a higher winning percentage of gains, relative to losses.

Figure 5 and 6 sort round-trips over time. We compare the chances that a gain is recorded on the first, first five, .., first twenty-five round-trips to later chances. We also put side by side the returns earned by early and late round-trips, and the duration of early and late round-trips --while marking whether they lead to a gain or a loss. Because of the immense variability and skewness in the data, we prefer to contrast median statistics for chronologically-sequenced groups of trades.

Figure 5 is based on the full bank trading records of the top 300 compulsive traders. Yet, traders with high R (here, in each case, greater than 81.4%) are not inevitably frequent bank traders. Hence, Figure 6 repeats the analysis for 93 compulsive traders with more than 25 round-trips in bank shares. The results do not change. Each panel in both of the figures confirms in its own way that obsessive traders have a relatively slow start, at least when it comes to buying and selling banks. First round-trips produce, in general, a 65 to 70% chance of gain, about 10% more than for later transactions. The median percent profit earned on a first round-trip is nearly triple of what it is on the 25th trip. The median duration of a first round-trip is more than twice as long as the duration of later trips. If the first trip results in a loss, its duration is at least three to four times the duration of later trips.

Fact #3: Traders take many small wins, avoid small losses

The frequency distribution of round-trip gains and losses shows a peak right above the threshold of zero profit (before costs) as well as a dip right below zero. The histogram in Figure 7 shows this threshold effect for 26 individuals, chosen from the top 100 compulsive traders, who transact at least €1 million in bank shares. Together, they execute 2,356 round-trips in bank shares.

To demonstrate the oddity of the peak and dip centered around zero, we contrast the gains that are truly earned to those associated with two counterfactuals. These are the hypothetical gains that would have come about if an identical trade (in the same bank, for the same quantity of shares, held over the same length of time) had taken place immediately *before* or *after* the time of the actual transaction. In the case of the first (early) hypothetical #1, the ending sales price matches the purchase price of the actual matching transaction; for the second (late) hypothetical #2, the beginning purchase price matches the actual sales price. (The other prices are daily closing prices.) The key feature of these two experiments is that both remove the trader's freedom to

choose *at what exact time to exit* the round-trip transaction. Thus, we build two matching samples in a similar market environment but we do away with traders' capacity to time the sale of shares that concludes a round-trip.

Figure 7 has two aspects of interest. First, the peak in the bin of gains between €0 and €1,000 is present for actual bank trades but not for matching hypothetical trades. Tests of proportions show a gap of 18% (47% vs. 29%) relative to hypothetical #1 and 13% relative to #2. Both gaps are highly significant ($p < .000$). Second, relative to the null hypothesis that gains and losses have equal chances of occurring, a binomial test comparing 1,052 actual gains between €0 and €1,000 to 694 similar-sized losses shows a z-statistic of 8.57 ($p < .000$). In contrast, for the two hypotheticals, there is no peak-and-dip pattern. Indeed, both times we see more losses directly below zero than we see similar-sized gains.³⁴

Fact #4: Traders are slow to close losing positions

In agreement with the empirical findings of Odean (1998) on the disposition effect, there is an interesting link between the profitability and duration of round-trips. The peak-and-dip pattern is strong for round-trip transactions that are rather brief in duration. A direct way to show this is to arrange round-trips by their length over time. Figure 8 examines several categories: those that are completed within 12 hours (group 1), within 12 to 24 hours (group 2), within 1 to 2 days (group 3), and so on. The final (7th) group unites all round-trip transactions that take 14 or more days to be concluded. Each graph in Figure 8 is for 3,103 round-trips in bank shares realized by the top 100 compulsive traders. As seen in panel C, the total number of very-short term gains, on trades finalized within 24 hours (groups 1 and 2), surpasses the number of short-term losses.³⁵ Panels A and B further show that short-term gains are larger in size than short-term losses.

The picture shifts noticeably as the duration of round-trips lengthens. For every single group of round-trips that continue longer than 24 hours, the median/average loss exceeds the median/average gain. For example, the average loss in group 7 (before transaction costs) is €3,093, about four times the average gain of €770. Also, beyond group 2, the threshold effect does not apply. Therefore, a hefty proportion of the aggregate losses suffered by compulsive traders is situated in round-trips that "take time" to close. And, by the same token, most of the aggregate gains realized by compulsive traders are very short-term. See panel D.

Fact #5: Traders maneuver at the cost of worse performance

It is useful to highlight the trading histories of the 26 individuals who account for the bulk of quick round-trip trading. Together, these persons accomplish 2,356 round-trips with 2,255 completed within 14 days. The matching number of bank transactions is 5,542. The mean bank transaction has a value of €26,572. The gain or loss of each round-trip is defined as the difference between the sales price and the (average) original purchase price multiplied by the quantity of shares sold.

Figure 9 shows that the variability of performance climbs with the complexity of round-trips. Most round-trips (1,848 out of 2,356) are one buy followed by one sell.

Slightly more than half of such trips (52%) result in a gain and, if we compare the 10th and 90th percentiles, most outcomes range between plus and minus €1,000. In contrast, only 43% of 187 round-trips with more than three transactions lead to a gain, and the outcome range more than doubles. It now stretches between €2,000 and -€3,000. Figure 10 reveals that the average result of a complex trip, after transaction costs, is nearly -€1,200. Figure 11 indicates that the duration of round-trips also rises with complexity, especially if the final result is negative.

Fact #6: Traders chase losses

In the cross-section of traders, there is a strong negative relationship between total performance and the total number of round-trip bank trades. (An alternative but similar predictor is the total value of bank trading volume.) Figure 12 (panel A) shows how losses accumulate with trading activity for the top 300 compulsive bank traders. Panel B shows gains. Panel C indicates performance, i.e., gains minus losses. All calculations include transaction costs. On average, losses grow at a rate of €699 per extra round-trip (t-statistic is 12.15) and gains at a rate of €510 (t-statistic is 7.96). Hence, net performance gets worse by €190 for each extra round-trip (t-statistic is -5.57).

The previous finding could be unduly influenced by individuals with high R but with only few bank trades. Yet, when we redo the analysis for subsets of 100 bank traders with a minimum of 24 round-trips, and 50 bank traders with a minimum of 53 round-trips, the verdict remains the same. Net profits go down, respectively, at a rate of €194 (t-statistic is -2.77) or €214 (t-statistic is -1.80, p is .08). (See also panel D.)

Further tests are run for the top 100 compulsive traders. To repeat, only 80 of these are bank traders.³⁶ We regress individual performance against bank trading volume in Euro. On average, each additional million of trading produces an added loss of €3,662. (If we remove seven traders with bank trading volume greater than €5 million, that loss statistic increases to €4,362. The t-statistic is -4.4.) A different way to make the same point is to regress performance against the total number of trades. In that case, every single additional trade causes a further loss of €114. The R^2 of this bivariate regression, .46, is even higher than the previous one, .38. Despite the sturdy negative relationship, 57% of round-trips produce gains before transaction costs. (Only 48% do so after costs.) The size of the median transaction is €10,820 and the median outcome is a gain of €62. Yet, the standard deviation is €2,624. Fifty-seven out of eighty traders (70%) lose money. Altogether, the 3,103 round-trips generate a loss of €144 thousand before costs and €574 thousand after costs. The top ten traders with the best performance gain, in combination, €138 thousand; the bottom ten lose €473 thousand.

It is striking that, while aggregate losses are sizeable and expand with trading intensity, 57% of round-trips nonetheless result in profits (before transaction costs). This observation raises many questions. What is going on? Clearly, the evidence supports the idea that obsessive traders, taking gains swiftly but postponing losses, deceive themselves. Some have got to imagine that they are "learning," others that they have "control" and "are doing fine." This denial of reality stops traders from pulling out.

Traders chase past losses. Moreover, there are signs that stock bets grow bigger and that traders close positions faster as they get hooked. For 50 bank traders (with a

minimum of 53 round-trips), we ask how, in the cross-section, the number of round-trips predicts the magnitude and duration of bets. For each person, we find the change-over-time in the scale of bank bets. First, the median amount put into a bank stock during the first 5 round-trips is subtracted from the median for the last 15 round-trips. Next, that change is normalized by the standard deviation of all bets placed by a given individual. We apply a similar method with respect to the time-length of round-trips. Figures 13 and 14 present the findings. While the regression R-squares remain small, the slopes have the anticipated signs with t-statistics of, respectively, 1.40 (p is .17) and -1.80 (p is .08).

X. Conclusion

Many amateur stock market traders buy and sell shares over short intervals in naïve hope of exceptional returns. We study individuals who engage in extreme short-term trading. They form a unique socio-economic group. Our analysis takes advantage of the global financial crisis to examine speculative trading in bank stocks.

We observe a strong desire to gamble that is sustained by willful blindness. Many obsessive traders are shrewdly able to sustain the fallacy that “they are doing fine.” This denial of reality likely stops them from pulling out, despite the fact that they incur heavy losses. We record six stylized facts. People who are hooked on trading are fond of volatile bank stocks. While cautious at first, they slowly step up their trading activity. They are eager to cash in small wins, and they delay the realization of small losses (or “near-misses”) which are likely to grow into larger losses. Hence, the gains from trading are front-loaded. People try hard to recoup past losses. As their maneuvering becomes more complex, performance variability goes up and the average result worsens.

Our study contributes to the psychology of voluntary risk-taking, especially its dynamic elements. Sir Ernest Cassel’s admission of continuity between gambling, speculation and banking extends to many other aspects of life. What happens to us is often a matter of sheer luck.³⁷ In the degree to which any choice is a means of acquiring a prize, it is an opportunity. In the degree to which it imperils one’s stake, it is a risk. Chance is most vividly manifested when improbable circumstances are realized. It makes shambles of our best-laid plans. Then again, things sometimes turn out well despite folly and incompetence.³⁸

Fateful events that put the risk-taker and his resources in danger are occasions to show strong character. Evidently, “one cannot win the race one does not enter.” Nothing ventured, nothing gained. But to rely on luck alone is to court disaster. Unwarranted optimism nurtures risk-taking and myopia; it discourages planning ahead. Yet, confidence also offers a psychic boost that may cause better performance. Someone who mistrusts luck is unlikely to put forth the labor through which good results may be achieved. Bad luck also serves as an instrument of self-exculpation.³⁹

Tumultuous circumstances make extreme outcomes. Therefore, instability offers ample opportunity for self-assured skill to prove how it can “control the uncontrollable.” Skill and effort, while not enough to secure success, help to abate luck. Rational

forecasts aim to get things right more often than accounted for by chance. Luck takes over when knowledge, logic and foreseeability no longer offer secure guidance.⁴⁰

Some retail investors enter the stock market by looking for thrills. Undeniably, trading volatile securities creates suspense. Three mindsets are present at once: a perception of danger; the resolute exposure of oneself to this threat; and the hope that all will turn out well. It is anxiety *plus* excitement. Whenever people take avoidable but consequential chances, self-determination is celebrated.⁴¹ But, as we have seen, that “freedom,” the chance to buy stocks and to sell them expeditiously at higher prices, also gives rise to abundant risk. Still, life is full of circumstances where it takes willful blindness to keep going.

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Table I
Compulsive traders: A psychological profile

Selected from $N = 14,037$ traders, we compare the top 100, the next 200 and the (combined) top 300 compulsive short-term traders to all remaining retail traders. We test for equality of means and proportions; p indicates the likelihood that the null hypothesis cannot be rejected. Since the survey data start in 2008, we also compare means and proportions for reduced samples of 135 and 3,777 respondents with "after 2008" trading data only.

Apart from self-explanatory variables, *TR-lo* lists the fraction of traders who hope for "a positive yield without any risk of capital loss." *TR-hi* indicates the % who seek "more than 8% per year over-and-above the annual inflation rate." *RT-lo* lists the % of traders with low risk tolerance who would "sell" an investment at a loss "if it dropped 20% in value, in line with the market situation." *RT-hi* is the portion who, after a 20% drop, would "take advantage to invest even more." *GL-st* is the % who "wish to obtain stable and recurrent income from investment," enough "to maintain my current life style after retirement." *GL-cg* is the % who "seek a strong increase of [their] fortune" and who aim for "a [long-term] increase of capital." *FS-lo* is the fraction who could manage their personal finances for "less than two years" without access to the funds that they invest. Contrarywise, *FS-hi* is the % who, without such access, can manage their finances "more than seven years." *FM-hi* is the % who "consider themselves experienced investors" who understand "the functioning of financial markets." *FP-hi* indicates the % with "good" self-assessed knowledge and experience of financial products. *FLhi* refers to the % of traders who think that they have "thoroughly mastered all aspects of financial markets."

	2003-2012					After 2008			
	First 100	Next 200	Top 300	Other	p	Top 135	Other	p	
Age (years in 2008)	43.4	41.7	42.2	46.9	.000	39.2	42.8	.002	
Single	31%	37%	35%	27%	.004	41%	31%	.008	
Female	4%	6%	5%	9%	.038	7%	10%	.236	
University-educated	59%	57%	58%	74%	.000	59%	73%	.001	
Did not finish high school	8%	7%	8%	5%	.019	9%	6%	.126	
Low target return	<i>TR-lo</i>	8%	6%	6%	5%	.288	7%	4%	.139
High target return	<i>TR-hi</i>	66%	63%	64%	42%	.000	64%	43%	.000
Low risk tolerance	<i>RT-lo</i>	13%	9%	10%	7%	.046	10%	6%	.074
High risk tolerance	<i>RT-hi</i>	38%	40%	39%	31%	.002	41%	33%	.077
Goal is stable income	<i>GL-st</i>	33%	34%	34%	21%	.000	33%	22%	.005
Goal is long-term capital gains	<i>GL-cg</i>	40%	46%	44%	61%	.000	40%	58%	.000
Low financial security (short horizon)	<i>FS-lo</i>	37%	27%	30%	10%	.000	35%	12%	.000
High financial security (long horizon)	<i>FS-hi</i>	29%	34%	32%	38%	.022	27%	32%	.295
High knowledge of financial markets	<i>FM-hi</i>	28%	16%	20%	13%	.001	12%	8%	.065
High knowledge of financial products	<i>FP-hi</i>	37%	32%	33%	34%	.814	25%	22%	.322
High subjective financial literacy	<i>FL-hi</i>	18%	15%	16%	11%	.002	12%	5%	.002
Number of traders	<i>N</i>	100	200	300	13,737	135	3,777		

Table II
Compulsive traders: A financial profile

Selected from $N = 14,037$ traders, we compare the top 100, the next 200, and the (combined) top 300 compulsive short-term traders to the remaining 13,737 traders. We test for equality of proportions with p indicating the likelihood that the null hypothesis cannot be rejected. The variables indicate (i) household annual net income, (ii) wealth invested in financial assets, (iii) home ownership (in 2008), (iv) stage of the family life cycle, and (v) employment.

	First 100	Next 200	Top 300	Other	
	fractions				p
Annual net income < 20,000 €	20%	20%	20%	13%	.001
Annual net income > 75,000 €	12%	14%	14%	18%	.074
Household saves < 10% of annual income	26%	29%	28%	24%	.137
Household saves > 30% of annual income	20%	30%	27%	23%	.149
Wealth in financial assets < 20,000 €	42%	33%	36%	23%	.000
Wealth in financial assets > 1 million €	1%	3%	2%	5%	.066
Household owns home	68%	67%	67%	81%	.000
Young family	23%	20%	21%	16%	.007
Mature family	20%	21%	21%	27%	.013
Family at or near retirement	26%	22%	23%	30%	.010
Worker	47%	40%	42%	33%	.000
Self-employed	27%	26%	26%	21%	.033
Manager	11%	12%	11%	19%	.001
State official	3%	6%	5%	9%	.029
Retired	9%	9%	9%	15%	.003
Does not want employment	1%	3%	2%	2%	.728
Unemployed	1%	2%	2%	1%	.138
Student	1%	4%	3%	2%	.115
Number of traders	N	100	200	300	13,737

Table III
Compulsive traders: Portfolio and performance statistics

Selected from $N = 14,037$ traders, we compare the cross-sectional means and medians of selected variables for the top 100, top 200, and top 300 compulsive traders, and other traders. The test on the equality of medians is nonparametric; the chi-square statistic tests the null hypothesis that two samples are drawn from populations with the same median.

Apart from self-explanatory variables, R (or "ratio") denotes the fraction of the value of trading volume that is reversed within 14 calendar days; TV , the total value of all stock purchase and sales transactions; NTR , the total number of transactions; ATS , the average trade size; APV is the average end-of-month portfolio value; NST , the average number of stocks held at the end of each month; $NSTmax$, the maximum number of stocks held at month's end; UST , the number of distinct stocks ever bought or sold; DE , Odean's (1998) measure of the disposition effect; $LIFE$, the # of years that an individual trader stays in the sample; $R-gro$, the annualized gross stock portfolio return; $R-net$, the net return after transaction costs. We also show the percent of traders who earn positive returns, before and after transaction costs.

		First 100	Next 200	Top 300	Other		Top 300	Other	
		averages				p	medians		p
% trading value reversed =< 14 days	R	96.3%	87.4%	90.4%	18.3%	.000	89.4%	9.8%	.000
% trading value reversed =< 7 days	$R7$	89.8%	75.2%	80.0%	12.1%	.000	80.8%	4.8%	.000
% trading value reversed =<3 days	$R3$	75.0%	56.6%	62.7%	7.1%	.000	63.4%	1.2%	.000
% trading value reversed =<1 day	$R1$	58.6%	38.6%	45.3%	3.7%	.000	44.3%	0.0%	.000
Value of trading (in 000 €) (full period)	TV	9,969	5,626	7,074	1,097	.000	1,526	246	.000
# stock transactions (full period)	NTR	490.1	348.4	395.6	145.9	.000	175.5	71.0	.000
Trade size (in €)	ATS	13,899	18,390	16,893	5,730	.000	8,503	3,174	.000
Portfolio value, month end (in €)	APV	19,061	21,155	20,457	67,747	.067	6,397	19,701	.000
# stocks held, month end	NST	1.7	2.4	2.2	8.2	.000	1.4	5.9	.000
Max. # stocks held, month end	$NSTmax$	4.5	5.8	5.4	14.5	.000	4.0	11.0	.000
Universe of # stocks held	UST	46.7	37.2	40.3	35.7	.037	23.0	24.0	.915
Odean's measure of disposition effect	DE	9.9	13.7	12.5	11.1	.209	8.4	7.1	.143
Length of trading record (in years)	$LIFE$	5.2	5.1	5.1	6.1	.000	4.3	6.3	.000
Gross portfolio return, % per year	$R-gro$	-9.4%	-8.1%	-8.5%	-3.6%	.000	-8.4%	-3.0%	.000
% traders who earn + gross returns	$Rgro+$	24.0%	26.5%	25.7%	38.6%	.000			
Net portfolio return, % per year	$R-net$	-15.5%	-13.2%	-13.9%	-5.9%	.000	-13.4%	-4.9%	.000
% traders who earn + net returns	$Rnet+$	19.0%	17.5%	18.0%	31.4%	.000			
Number of traders	N	100	200	300	13,737		300	13,737	

Table IV
Compulsive traders are unlike other retail investors

We list averages and proportions for variables pertaining to (1) 300 compulsive traders (RT), (2) the 300 traders with the largest trading volume in value (LT), (3) the 300 traders with the largest portfolios, measured by the average portfolio value at month's end (LP), and all remaining traders. The first three samples overlap: 51 traders belong to both (1) and (2); 74 traders belong to both (2) and (3); and one trader belongs to all three samples. Many variables are self-explanatory. Others are explained in the notes to Tables I and II. Estimates marked with * are significantly different from the matching estimates for 13,261 traders at the $p < .01$ level.

		300 compulsive traders (RT)	300 largest traders (LT)	300 largest portfolios (LP)	13,261 other traders
Age (years in 2008)		42.3*	53.8*	53.9*	46.6
Single		35%*	18%*	17%*	28%
Female		5%	8%	8%	9%
University-educated		58%*	69%	82%*	74%
Did not finish high school		8%	6%	3%	5%
Annual net income < 20,000 €		20%*	13%	8%	13%
Annual net income > 75,000 €		14%	32%*	42%*	17%
Wealth in financial assets < 20,000 €		36%*	8%*	4%*	24%
Wealth in financial assets > 1 million €		2%	23%*	40%*	4%
Household owns home		67%*	89%*	91%*	80%
Young family		21%*	5%*	6%*	16%
Mature family		21%*	27%	32%	27%
Family at or near retirement		23%	50%*	45%*	30%
Low target return	<i>TR-lo</i>	6%	5%	5%	5%
High target return	<i>TR-hi</i>	64%*	52%*	40%	42%
Low risk tolerance	<i>RT-lo</i>	10%	10%	7%	7%
High risk tolerance	<i>RT-hi</i>	39%*	39%*	34%	31%
Goal is stable income	<i>GL-st</i>	34%*	29%*	21%	21%
Goal is long-term capital gains	<i>GL-cg</i>	44%*	52%*	65%	61%
Low financial security (short horizon)	<i>FS-lo</i>	30%*	12%	6%	10%
High financial security (long horizon)	<i>FS-hi</i>	32%	44%	53%*	38%
High knowledge of financial markets	<i>FM-hi</i>	20%*	23%*	29%*	13%
High knowledge of financial products	<i>FP-hi</i>	33%	51%*	61%*	33%
High subjective financial literacy	<i>FL-hi</i>	16%*	20%*	28%*	10%
Household saves < 10% of annual income		28%	26%	19%	24%
Household saves > 30% of annual income		27%	35%*	40%*	23%

Table V
Compulsive traders behave in a distinctive way

Selected from $N = 14,037$ traders, we list cross-sectional means and medians of selected variables for samples of 300 compulsive traders (RT), 300 large traders (LT) and 300 traders with large portfolios (LP). Some variables are observed monthly. In those instances, the listed statistics are cross-sectional means, or medians, of time-series averages or maximums (in the case of $NSTmax$). As before, R (or ratio) denotes the percent of the value of trading volume that is reversed within and up to 14 calendar days. Most variables are self-explanatory or defined in the notes to Tables III and IV. Estimates marked with * are significantly different from the matching estimates for 13,261 traders at the $p < .01$ level.

		300 compulsive traders (RT)		300 largest traders (LT)		300 largest portfolios (LP)		13,261 other traders	
		mean	median	mean	median	mean	median	mean	median
% trading value reversed =< 14 days	R	90%*	89%*	54%*	55%*	11%*	5%*	18%	10%
% trading value reversed =< 7 days	$R7$	80%*	81%*	42%*	39%*	7%*	2%*	12%	5%
% trading value reversed =< 3 days	$R3$	63%*	63%*	29%*	23%*	4%*	1%	7%	1%
% trading value reversed =< 1 day	$R1$	45%*	44%*	19%*	12%*	2%*	0%	4%	0%
Av. value of trading (in mln €) (full period)	TV	7.1*	1.5*	24.5*	15.8*	10.7*	3.7*	.7	.2
Av. # stock transactions (full period)	NTR	396*	175*	1,197*	824*	560*	230*	124	68
Av. trade size (in 000 €)	ATS	16.9*	8.5*	39.3*	22.8*	29.3*	17.6*	4.9	3.1
Av. portfolio value, month end (in 000 €)	APV	20.5*	6.4*	653.4*	200.1*	1,286.4*	801.4*	38.6	18.7
Av. # stocks held, month end	NST	2.2*	1.4*	13.6*	6.6	22.3*	15.8*	7.8	5.8
Max. # stocks held, month end	$NSTmax$	5.4*	4.0*	26.3*	15.0*	37.1*	27.5*	13.8	11.0
Av. universe of # stocks held	UST	40.3*	23.0*	114.9*	79.5*	87.8*	60.5*	33.5	23.0
Odean's measure of disposition effect	DE	12.4	8.3	10.7	6.7	4.5*	2.6*	11.2	7.2
Length of trading record (in years)	$LIFE$	5.1*	4.3*	7.5*	8.4*	7.4*	7.9*	6.0	6.3
Av. gross portfolio return, % per year	$R-gro$	-8.55%*	-8.38%*	-1.31%*	-1.48%*	4.15%*	2.04%*	-3.77%	-3.21%
% traders who earn + gross returns	$Rgro+$	25.7%*		41.7%		64.7%*		38.0%	
Av. net portfolio return, % per year	$R-net$	-13.94%*	-13.37%*	-3.73%*	-3.68%	3.34%*	1.09%*	-6.16%	-5.14%
% traders who earn + net returns	$Rnet+$	18.0%*		34.0%		59.3%*		30.8%	

Table VI
Compulsive traders of bank shares vs. other traders: A comparison

We list cross-sectional means and medians of selected variables for four different samples: (i) 26 traders, chosen from the top 100 compulsive traders, who transact at least €1 million in bank shares; (ii) all 80 traders who trade bank shares and who also belong to the top 100 compulsive traders; (iii) 300 compulsive traders as defined in Tables I through V; (iv) all remaining 13,737 traders.

		26 compulsive bank traders (RT)		80 compulsive bank traders (RT)		300 compulsive traders (RT)		13,737 other traders		ratio (2)/(8)
		mean & median		mean & median		mean & median		mean & median		
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Value of trading in bank shares (in mln €)	<i>TVb</i>	5.06	3.12	1.84	.58	1.20	.16	.13	.02	205.8
Value of all trading (in mln €)	<i>TV</i>	22.20	8.46	11.48	2.91	7.07	1.53	1.10	.25	33.8
Value of trading reversed <= 14 days (in mln €)	<i>TV14</i>	21.62	8.31	11.11	2.73	6.51	1.36	.38	.02	413.5
Ratio of bank share trading to all trading	<i>TVb%</i>	43.7%	46.0%	28.3%	15.0%	24.4%	13.3%	12.8%	6.6%	7.0
Av. # transactions in bank shares	<i>NTRb</i>	213	144	91	45	63	25	15	6	24.0
Av. # stock transactions	<i>NTR</i>	738	535	543	272	396	176	146	71	7.5
Ratio of # bank share trades to # stock trades	<i>NTRb%</i>	39.4%	39.4%	25.6%	14.4%	24.4%	12.7%	12.5%	7.4%	5.3
Av. portfolio value, month end (in €)	<i>APV</i>	21,267	12,199	21,270	5,585	20,457	6,397	67,747	19,701	0.6
Av. # stocks held, month end	<i>NST</i>	1.7	1.5	1.6	1.2	2.2	1.4	8.2	5.9	0.3
Av. trade size for bank shares (in €)	<i>ATSb</i>	26,572	17,671	15,785	10,820	15,341	8,354	5,802	2,904	6.1
Av. trade size (in €)	<i>ATS</i>	26,166	16,072	15,047	12,690	16,893	8,503	5,730	3,174	5.1
Av. total cost for bank share transactions (in €)	<i>TCb</i>	14,276	9,712	5,374	1,937	3,435	765	476	105	92.5
Av. trading cost per €100 of bank share transactions (in €)	<i>TCb%</i>	.30	.31	.43	.36	.53	.43	.84	.60	0.5
Av. trading cost cut in portfolio return, % per year	<i>TC%</i>	4.10%	3.88%	5.74%	4.07%	5.40%	3.40%	2.42%	1.49%	2.6

Fig. 1: Cumulative # traders, invested wealth, value of trading volume, bank trading, and reversal trading, all sorted by R (14,037 traders)

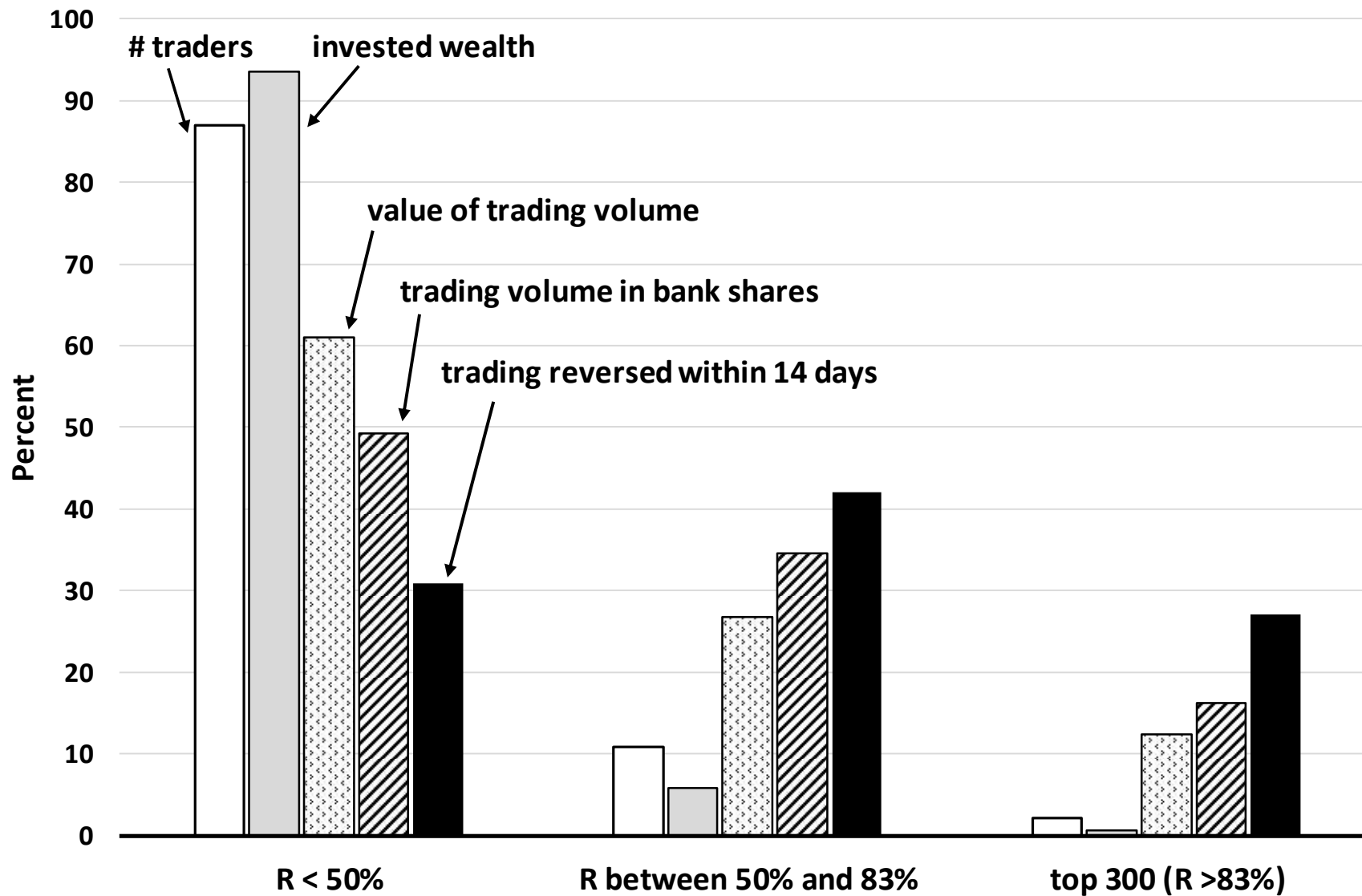


Fig. 2: Semi-annual bank share prices and measures of price volatility, trading intensity & volume traded by 80 compulsive traders, 2003-2012

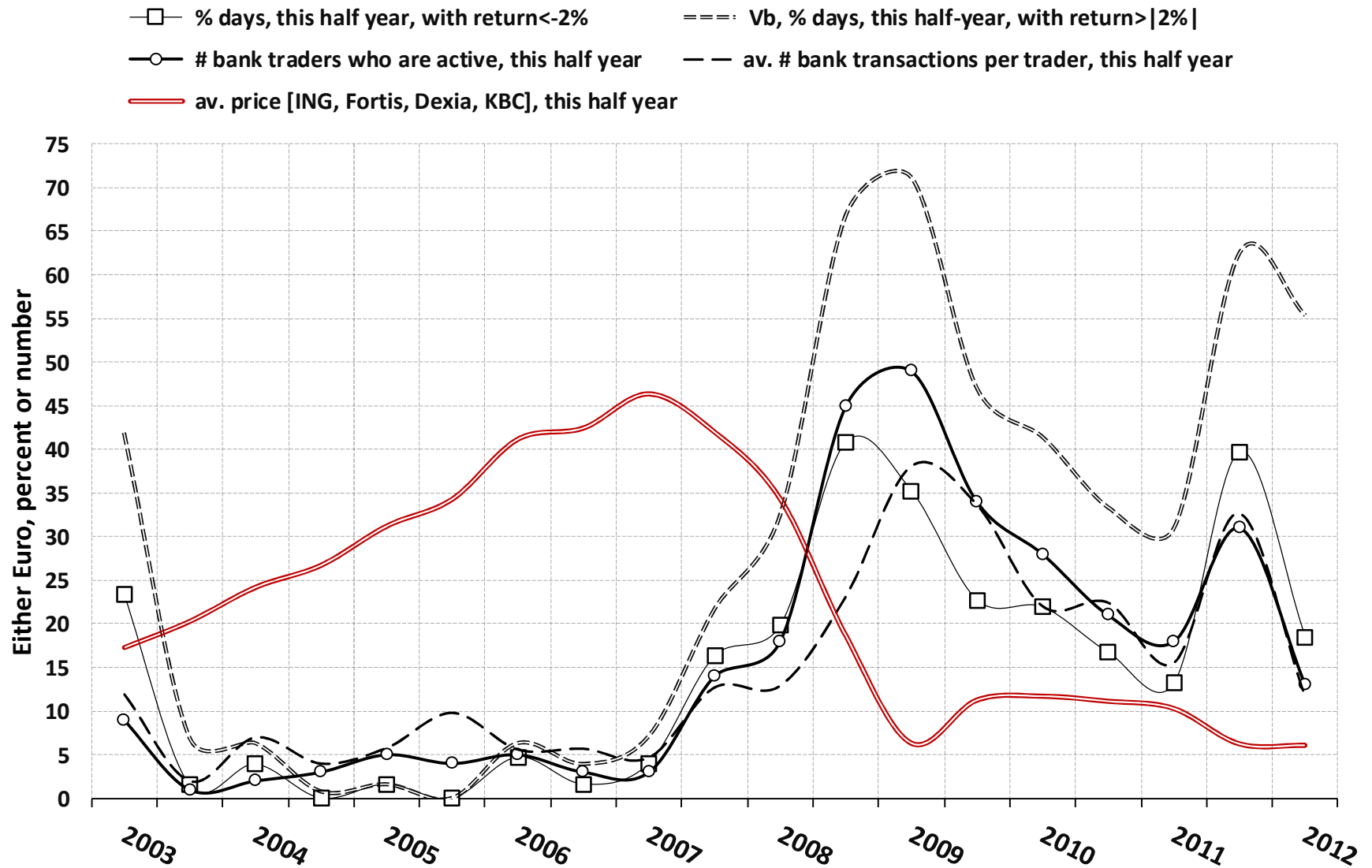


Fig. 3: Share price volatility and bank trading activity of compulsive and other traders: 2003(1) vs. 2003(2)-2007 vs. 2008-2011

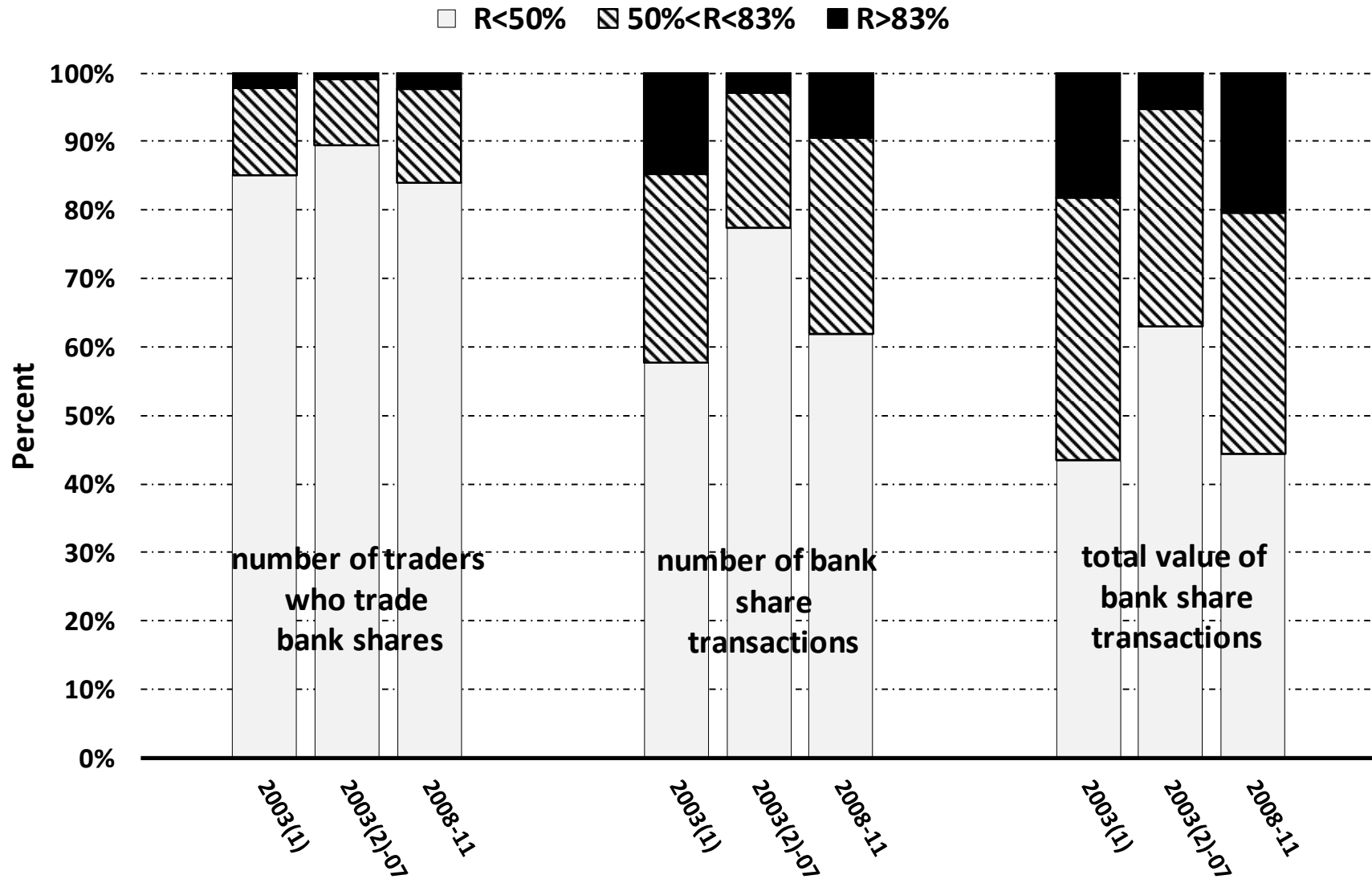


Fig. 4: R predicts trading in bank shares

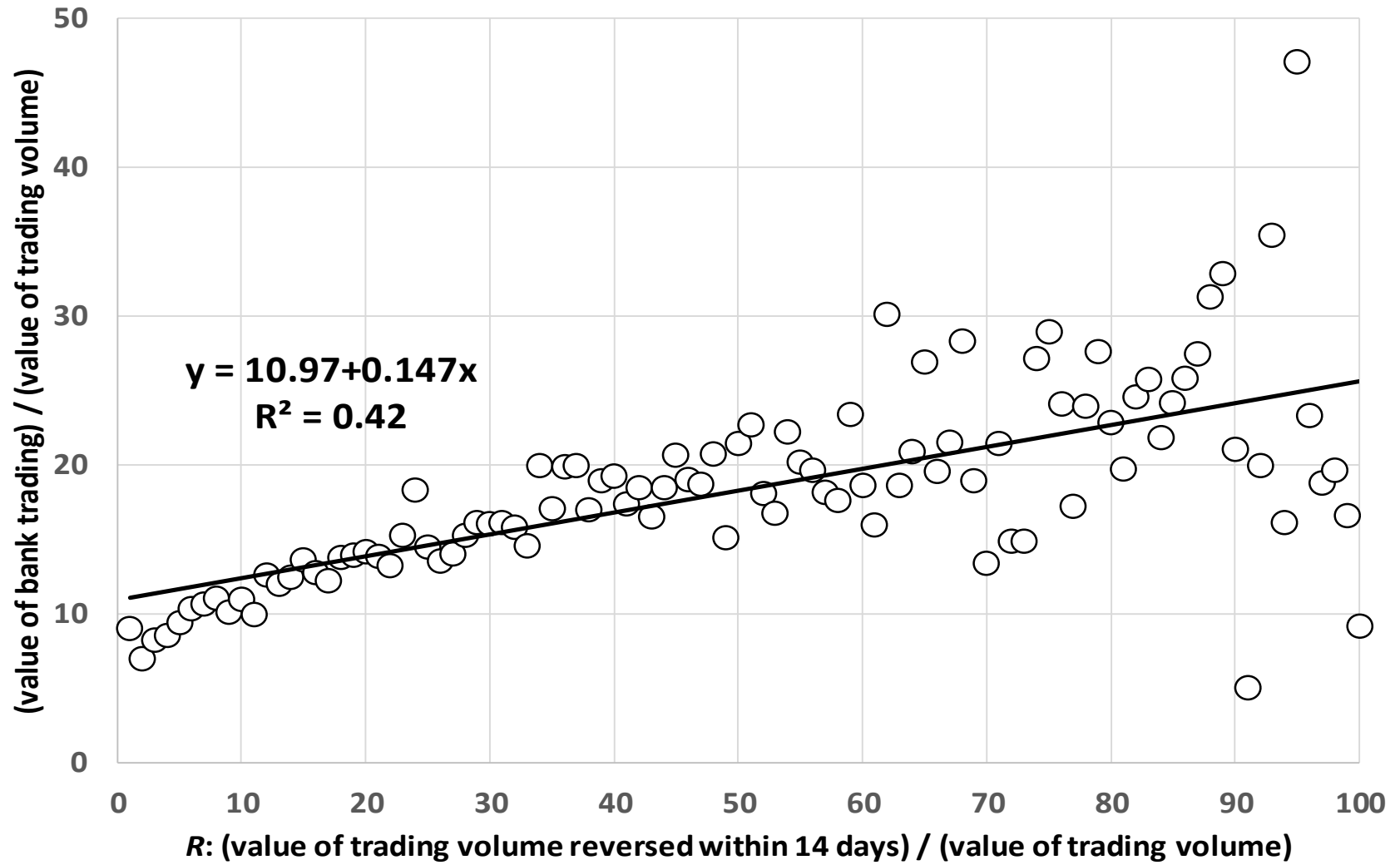


Fig. 5: The profits and duration of 8,476 round-trips in bank shares, completed by 300 traders, with the data ordered in time

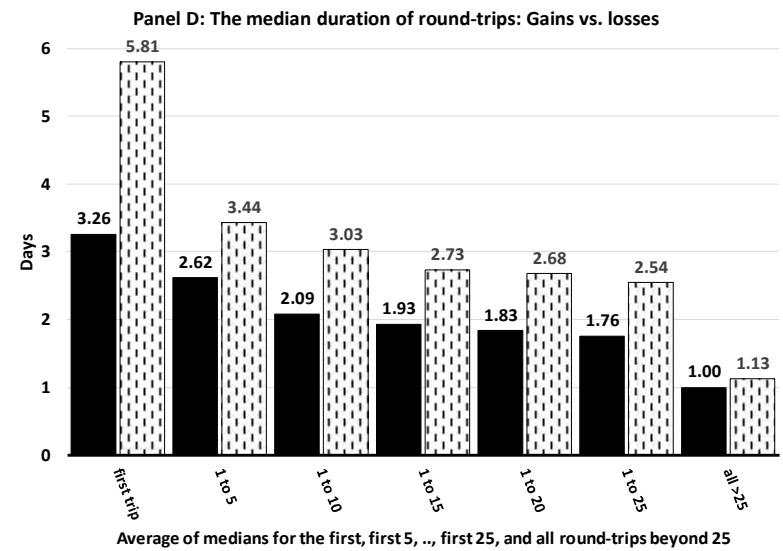
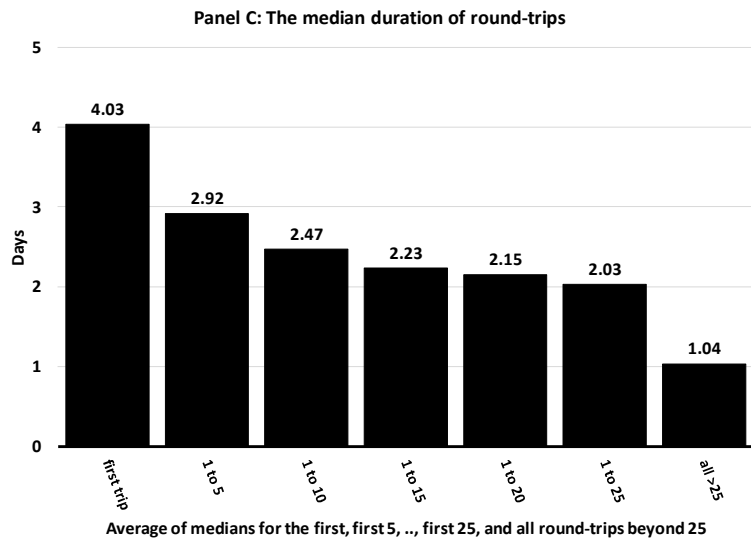
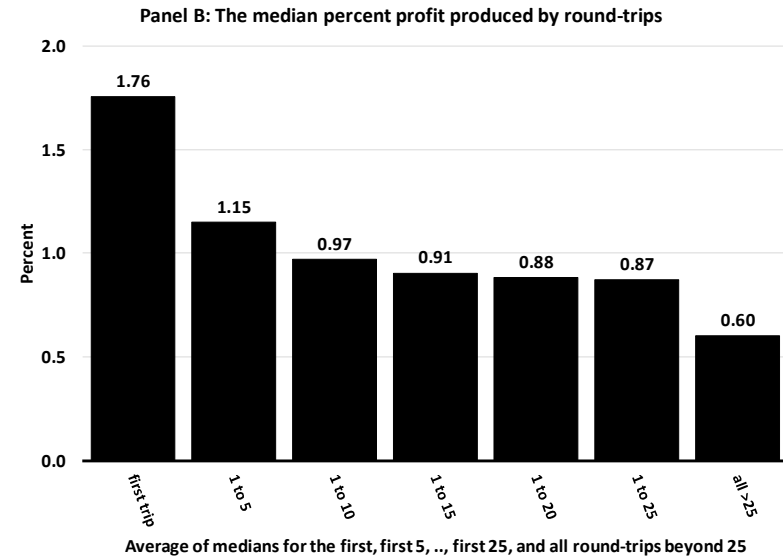
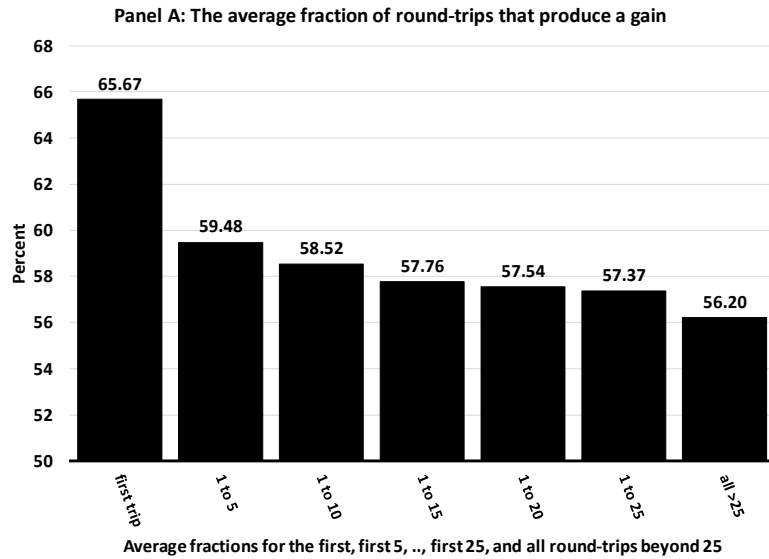


Fig. 6: The profits and duration of 6,508 round-trips completed by 93 traders, each one with more than 25 round-trips in bank shares

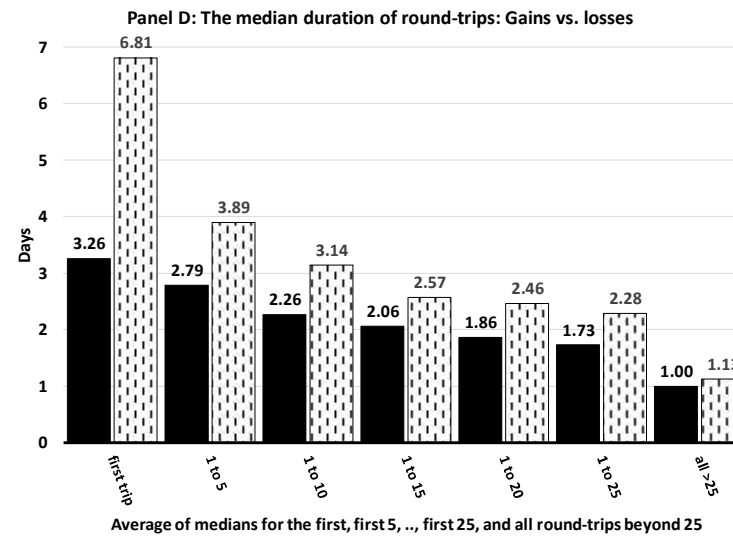
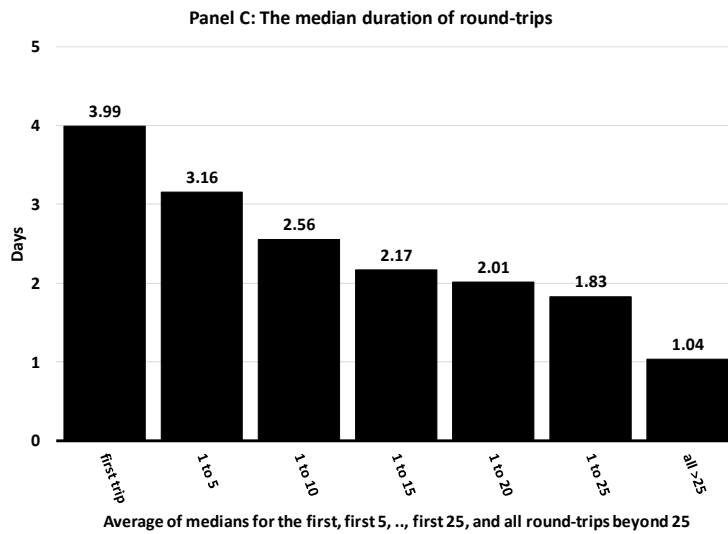
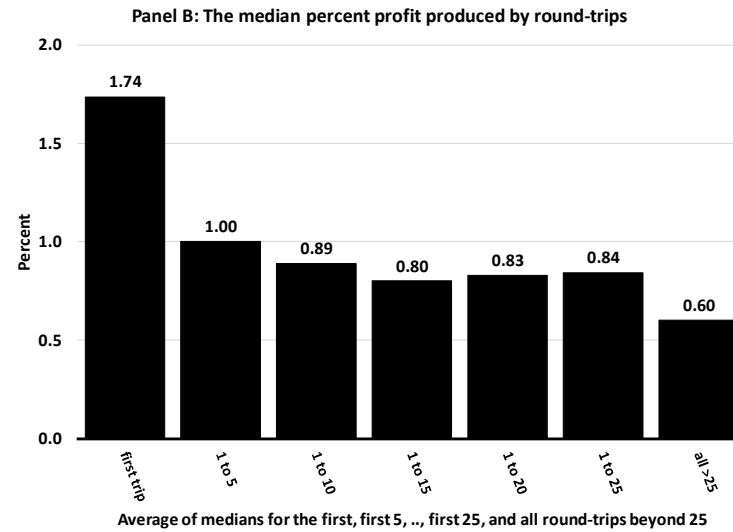
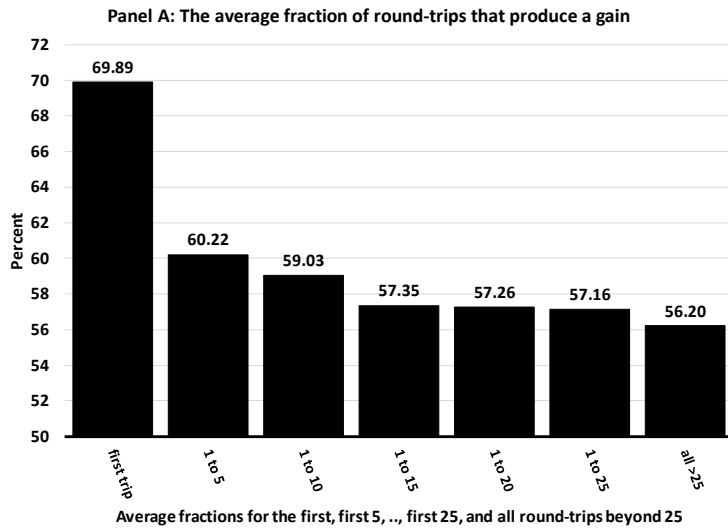


Fig. 7: Do round-trip gains reflect "true" trading ability in bank shares or are they merely diagnostic of such talent? (26 compulsive traders)

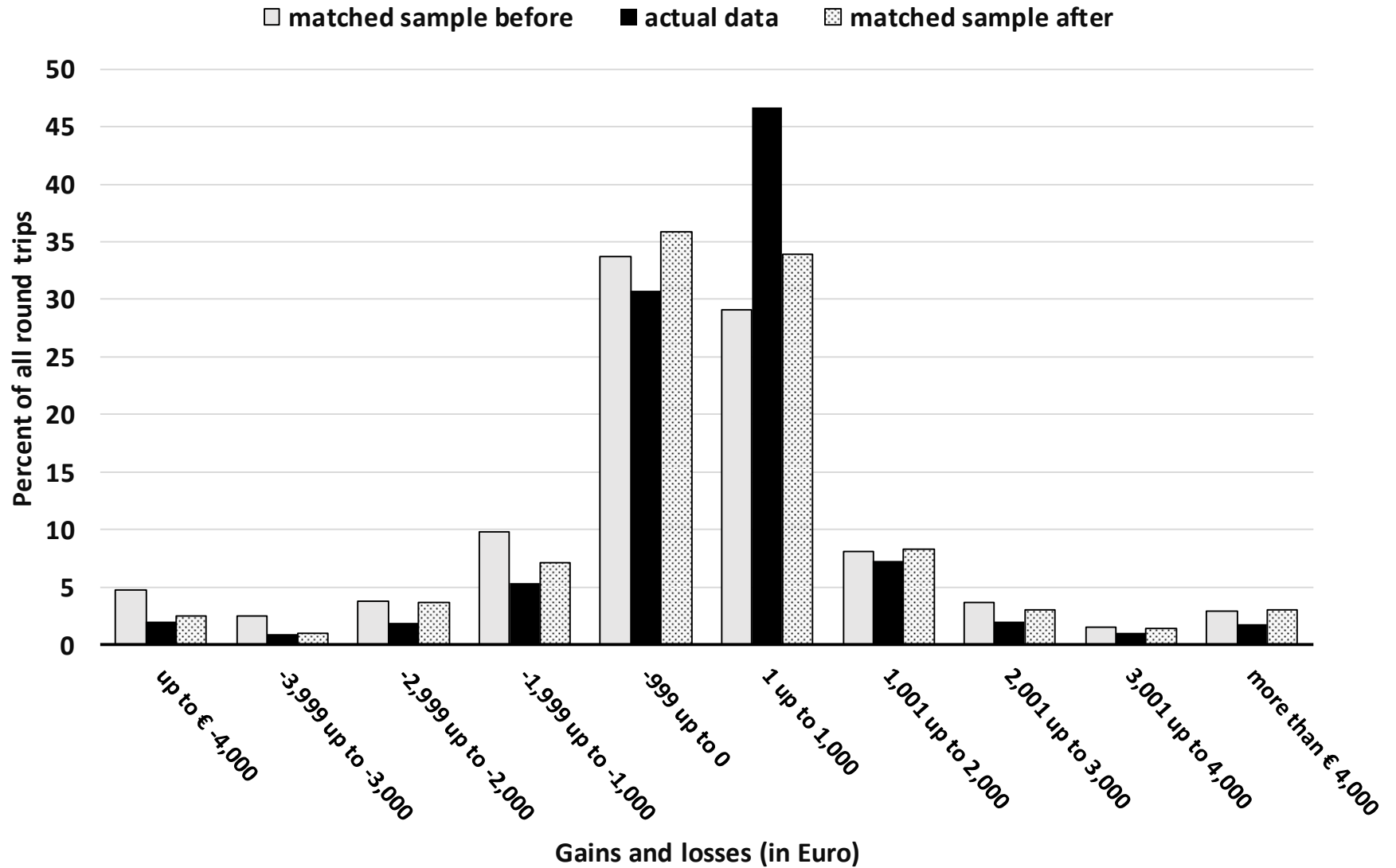


Fig. 8: The performance of 3,103 round-trips in bank shares with the data sorted by the duration of round-trips

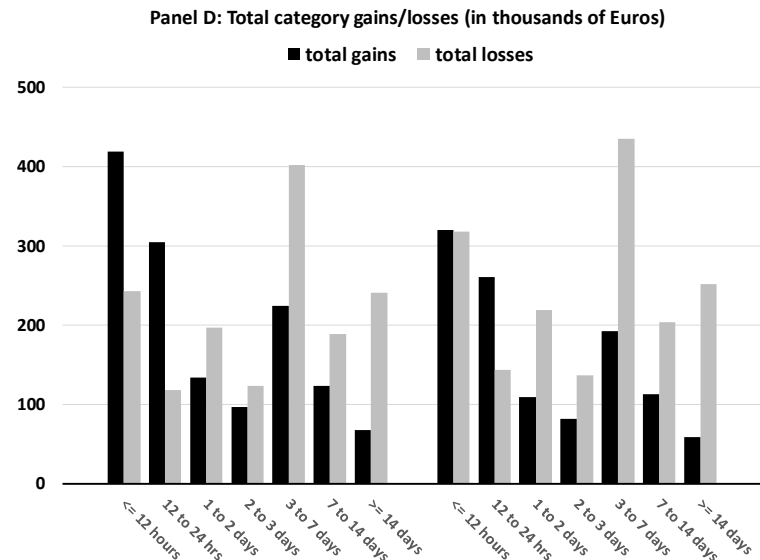
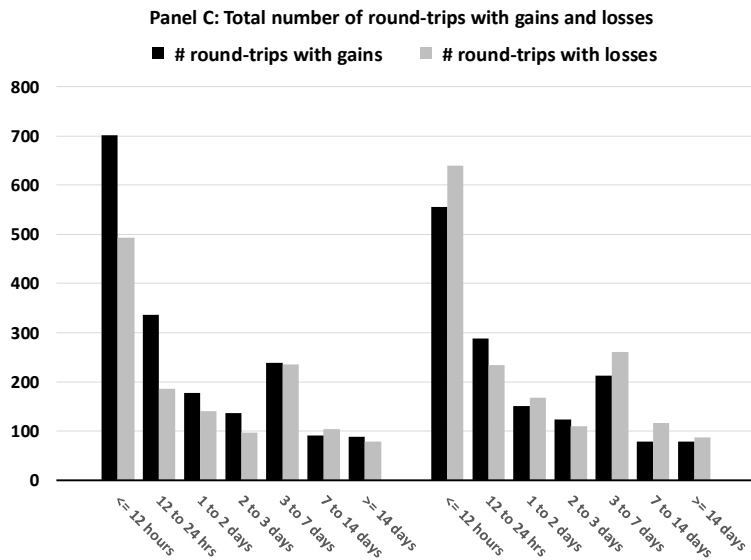
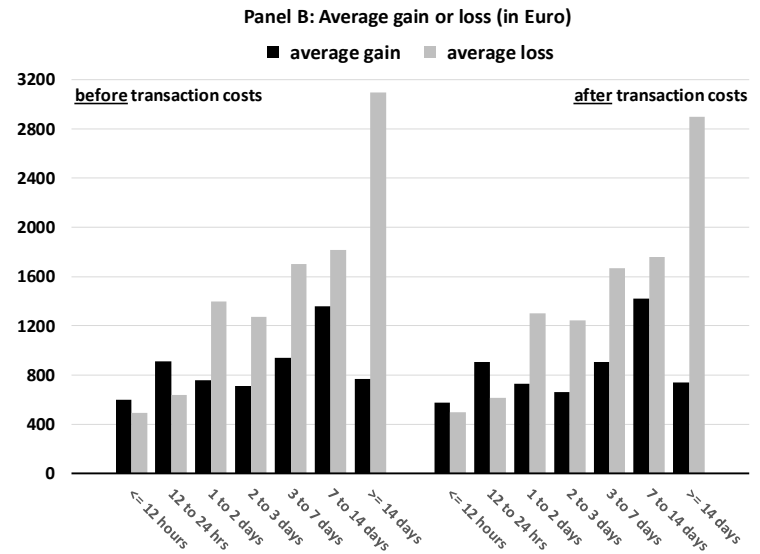
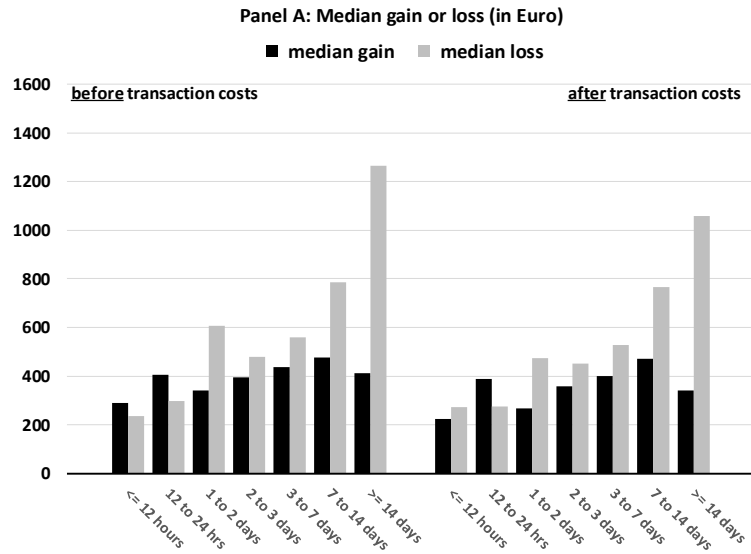


Fig. 9: The performance variability of 2,356 round-trips in bank shares, with 2, 3 or more transactions (after transaction costs, in Euro)

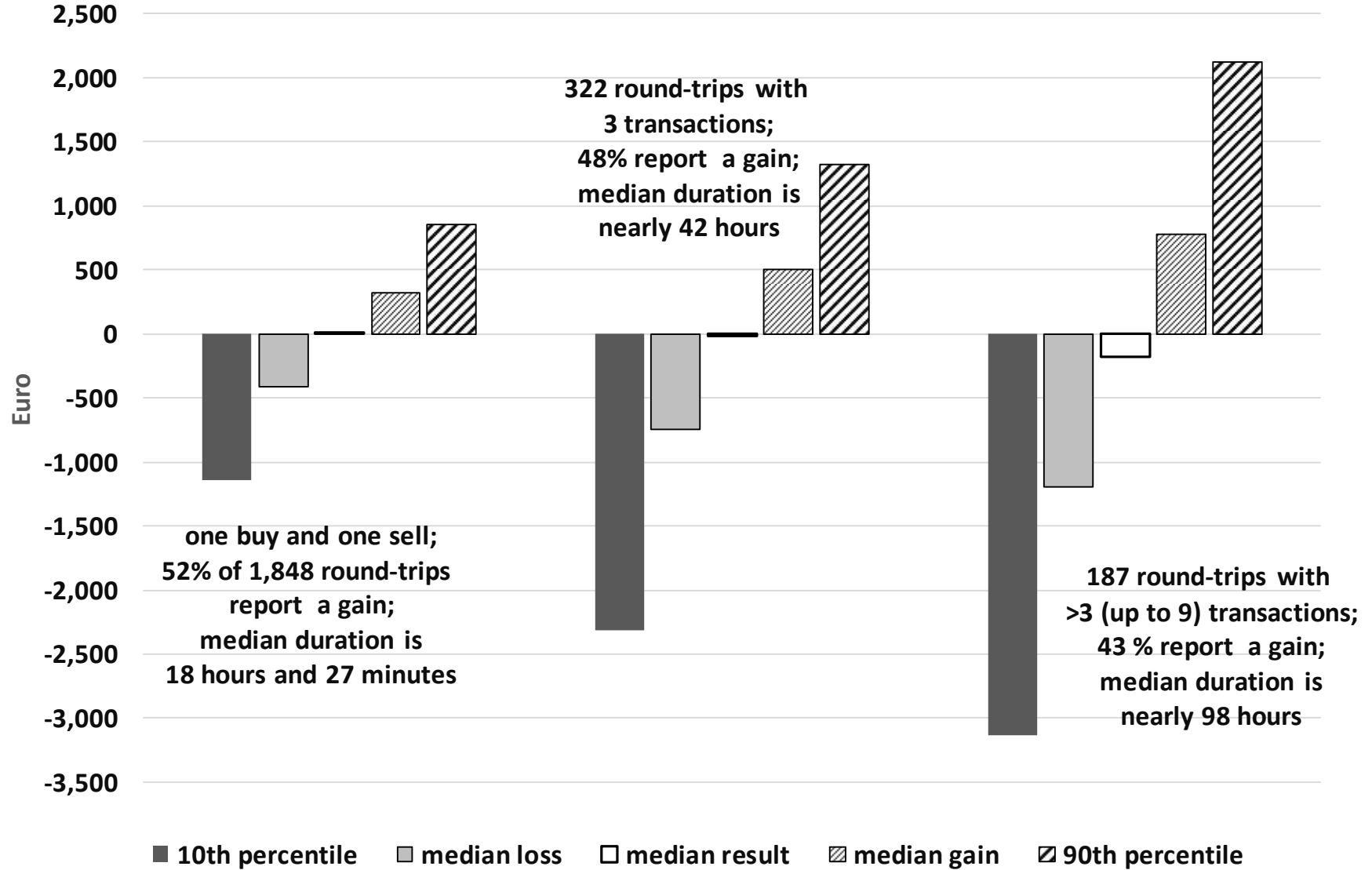


Fig. 10: The performance of 2,356 round-trips with 2, 3 or more transactions in bank shares, before and after transaction costs (in Euro)

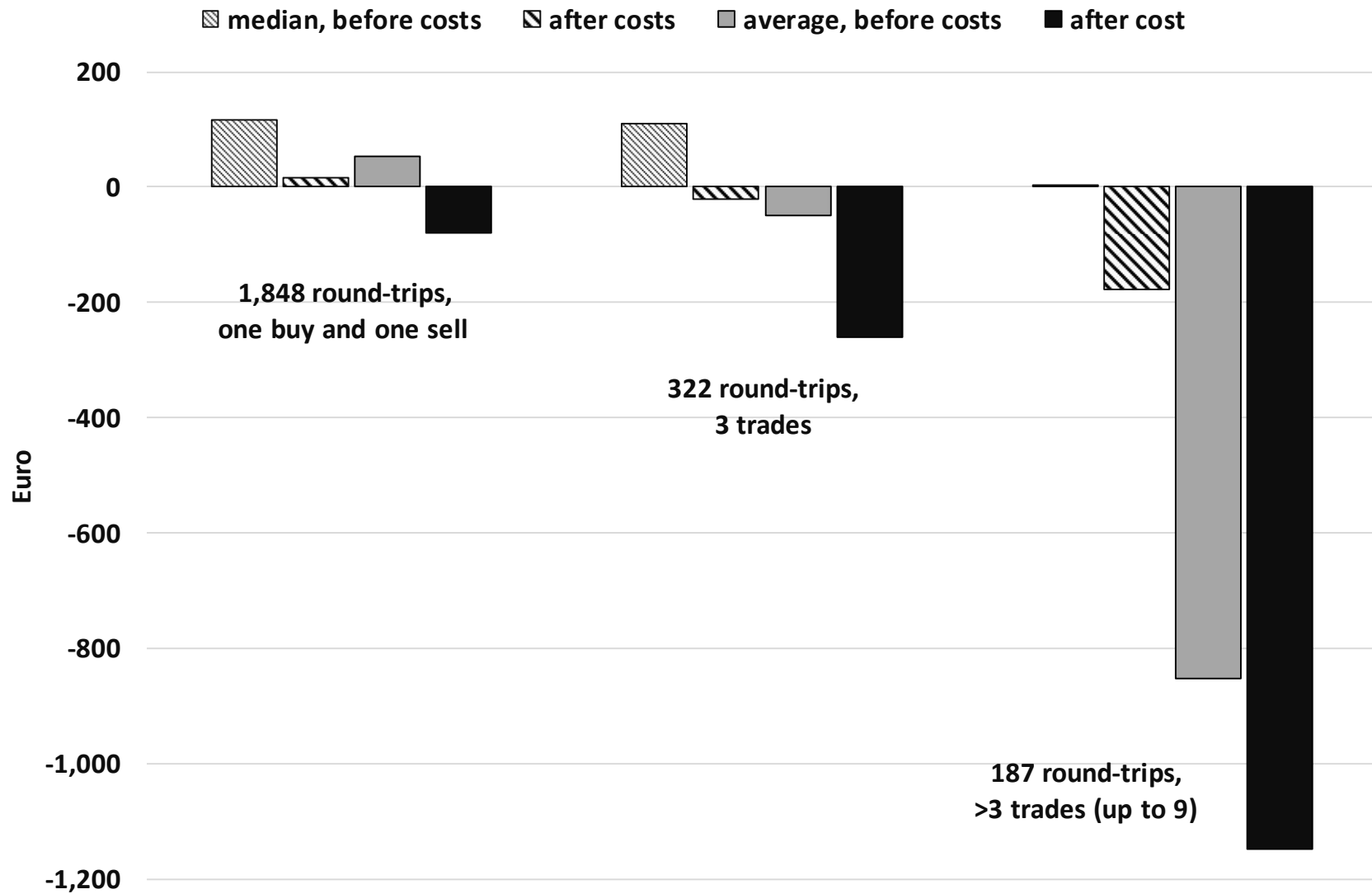


Fig. 11: The median duration (in hours) of round-trips that ultimately result in gains vs. the median duration of those that result in losses

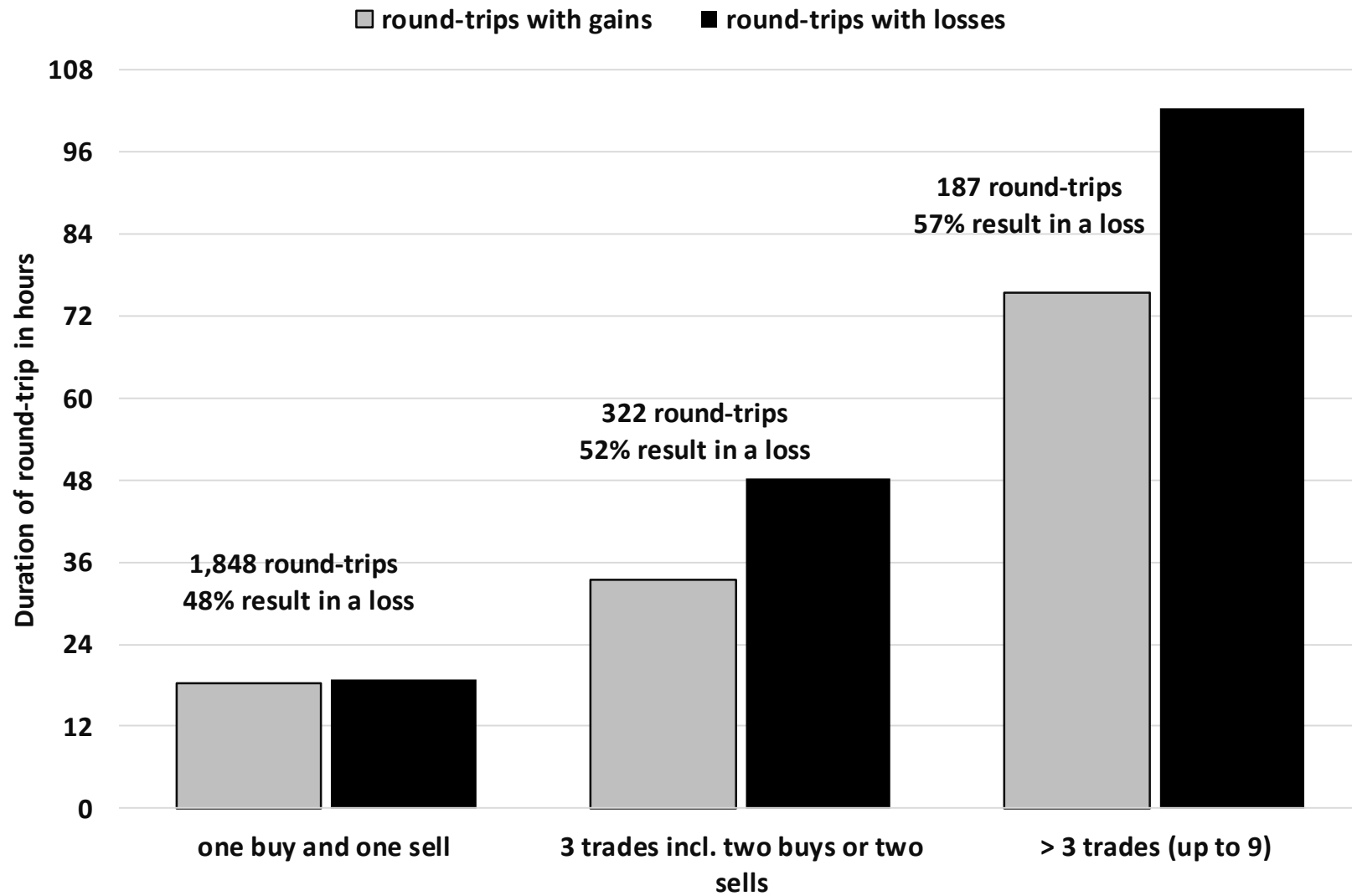


Fig. 12: Cumulative gains and losses in the trading of bank shares

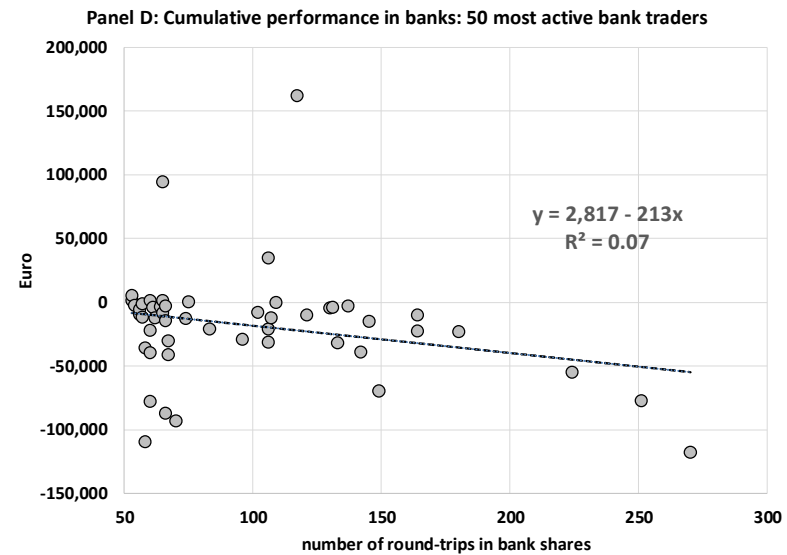
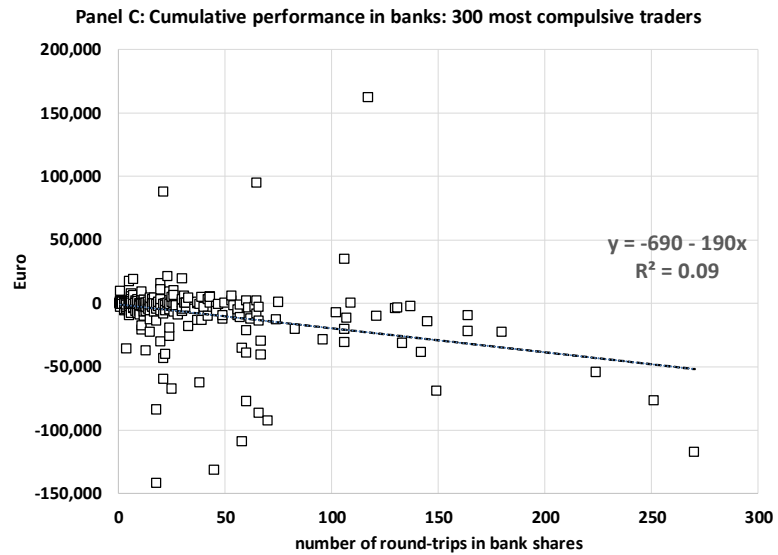
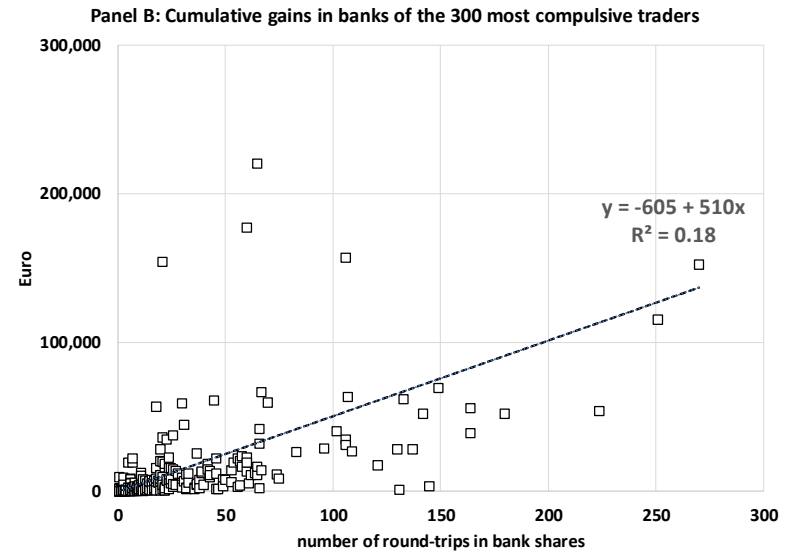
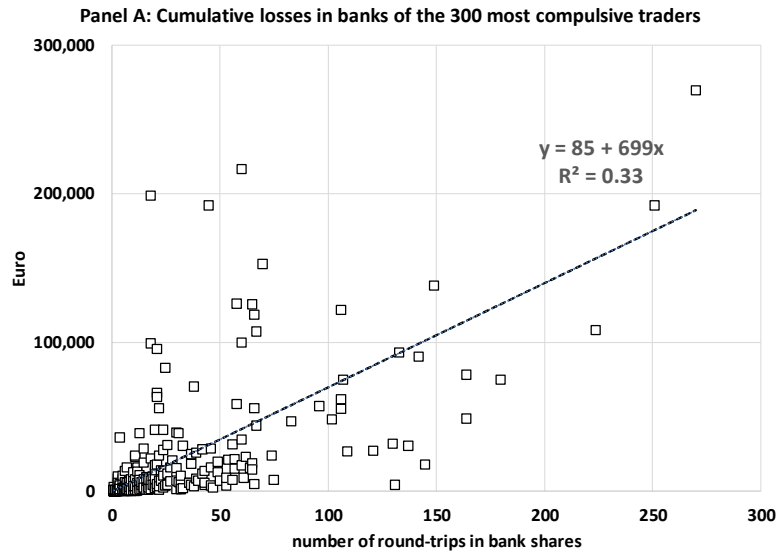
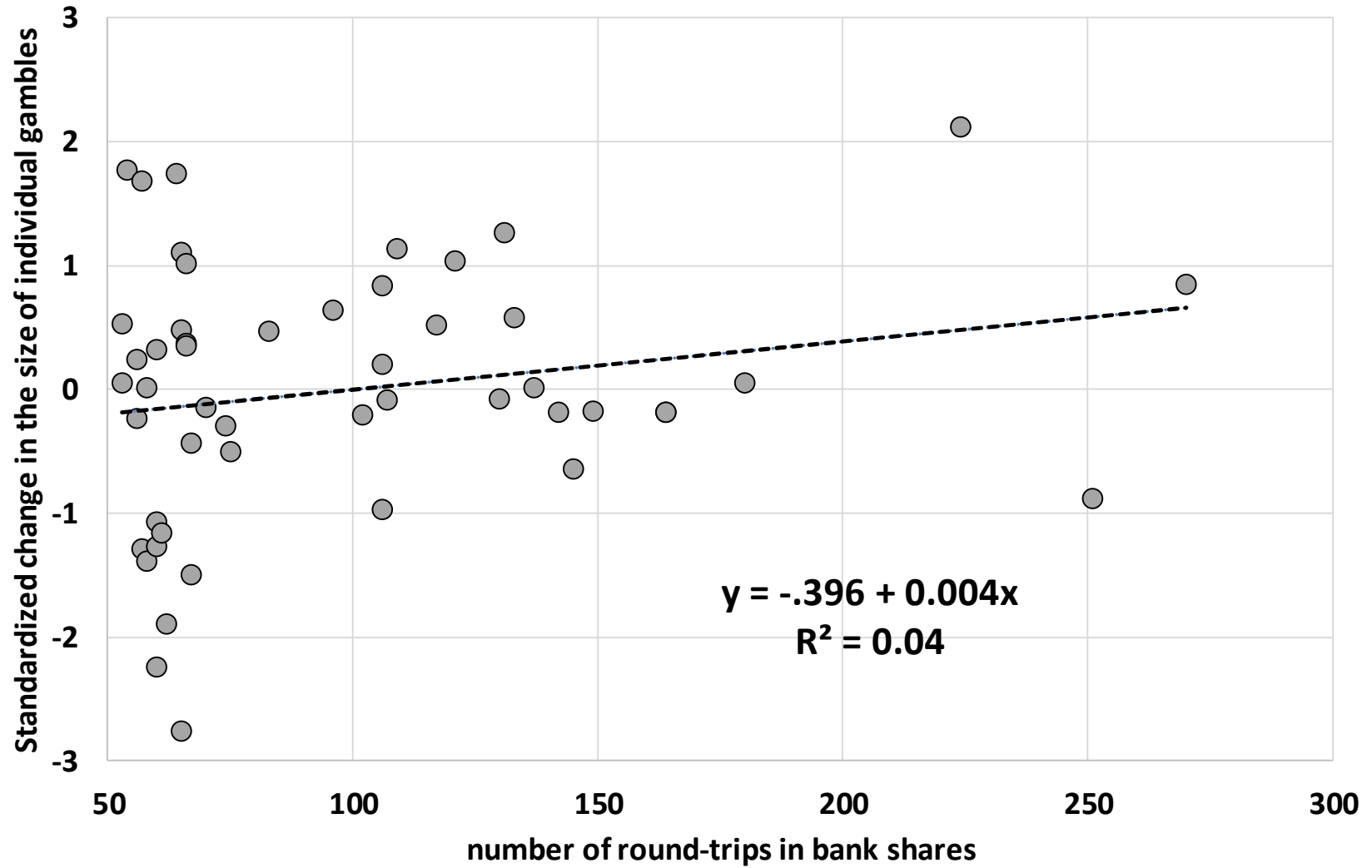


Fig. 13: Do compulsive bank traders gamble more money as they chase losses?



ENDNOTES

¹ See, e.g., Dorn and Sengmueller (2009). Stock market trading as entertainment competes with the casino industry. The expansion of casino gambling over the last half century, especially in the United States, is striking (Eadington, 1999; Fong, 2005). As people trade more stocks, their portfolios perform worse (Odean, 1999). One reason is the randomness of short-term changes in prices (Fama, 1965). Most passively held equity portfolios beat actively managed portfolios run by experts (French, 2008).

² This remains true even when the sequence of events is random. Consider, e.g., the gambler's fallacy (Clotfelter and Cook, 1993; Terrell, 1994). Furthermore, past experience shifts reference points and influences the willingness to take further risks. Within cumulative prospect theory, a small chance of big accumulated winnings may be alluring to loss-averse agents who tell themselves that they will keep gambling if they are winning but quit if they start accruing losses. Barberis (2012) proves that this "sensible" strategy is dynamically inconsistent. Naïve traders keep taking chances while they are losing. They overweight the tails of probability distributions. See also Barkan and Busemeyer (1999, 2003).

³ However, Conlisk (1993), Barberis (2012) and others do examine the utility of gambling, i.e., the lure of a series of gambles with exogenously determined payoffs and probabilities.

⁴ Robinhood saw its customer base soar from 10 million to 13 million during the first four months of 2020. The jump in new users was bolstered by low fees and commissions, low minimum investment amounts, and access to fractional shares. According to a 2021 Charles Schwab survey, 15 percent of all current US stock market investors say that they first began trading in 2020. A second survey, administered by GOBankingRates in June 2021, reports that 72 percent of stock investors between the ages of 18 to 24 say that they only started investing earlier in the year. See Bizouati-Kennedy (2021).

⁵ Kumar (2009) finds that state lotteries and lottery-type stocks attract similar socioeconomic clienteles. The desire to trade lottery-type stocks, with high idiosyncratic volatility and/or skewness, is so vehement that these securities underperform because their prices are pushed too high.

⁶ Clark et al. (2014) study the brain regions behind gambling-related cognitive distortions. How do patients with focal brain lesions match up against healthy people? A slot machine is used to analyze reactions to near-miss outcomes; a roulette game, to study the gambler's fallacy. Given that the motive to gamble is absent in patients with insula damage, Clark et al. think that interventions that reduce insula reactivity may be used to treat disordered gambling. A disease view of gambling was enunciated as early as the 16th century (Nadeau and Valleur, 2023).

⁷ For more theory, see Herrnstein (1990) and Herrnstein and Prelec (1991). Behaviors that are favored for a short time, but that people want to abandon, reveal a lack of willpower. The reduction of their value over time is traced by a hyperbolic curve. Hyperbolic discounting sheds light on impulsivity, impulse control, and the transitory dominance of inferior choices.

⁸ It does not involve the ingestion of chemical substances. Neither is it a drug that produces a reinforcing effect. Still, as with alcohol, tolerance for the negative side effects of gambling may rise over time.

Pathological gamblers differ from social gamblers in that they can quit gambling anytime, whether they are winning or losing. In truth, there is a continuum of involvement, not two discrete groups.

⁹ Even so, frequent trading also has a lot to do with anxiety about money, broken marriages, and so on. Many trading addicts pay a high price. As regards gambling in the United States, Petry (2005) reports that single young males of color who are poor and who drink or use drugs are most at risk.

¹⁰ Numerous motives justify gambling. The defenses people give should be viewed as "vocabularies of motives," not necessarily true motivation. One rationale is monetary gain. A second one is that gambling is a form of play. Games of chance can be a way of life, e.g., bridge-playing among upper middle-class individuals. Another attraction, e.g., in horse betting, is the intellectual exercise involved. Although profit matters, the money bet validates the decision made. Gambling may also be a hunt for thrills. Many people seek "action" to display character, e.g., toughness (Goffman, 1967). Some neurotic individuals simply "know" that they will win. Gambling may be a safety valve that relieves strain. (Some psychoanalysts point to guilt.) Lastly, the gambling industry often uses status appeals. People obtain prestige through their winnings. Smith and Preston (1984) find that "play" is the motive most often given to defend gambling. "Excitement" ranks second. Other motives, such as "monetary profit," are provided less frequently.

¹¹ Bias is a normal part of human brain function. There are beliefs and attitudes that we are not aware of, e.g., heuristics steer us toward confirmation of what we already know.

¹² Like Jeremy Bentham and Edward Thorndike, reinforcement theorists highlight "pain and pleasure as sovereign masters." Thorndike's law of effect (1905) says that subjects will emit an action the more they get rewarded for it. In studies of "instrumental conditioning," the response occurs before it is paid. A random-ratio reinforcement schedule, where each act has a chance *not*

contingent on prior draws to be followed by a reinforcer, is key in explaining slow extinction (Skinner, 1948, 1974; Madden et al., 2007).

¹³ Illustrating the quest for intense experiences, Lears (2003) quotes Jack Straus, a winner of the World Series of Poker, who said that “if there’s no risk in losing, there’s no high in winning.” Much earlier, Adam Smith (1776) referred to “the vain hope of gaining some of the great prizes” as “the sole cause” of demand for lotteries, and of “the contempt of risk and the presumptuous hope of success” among young adults. He lamented “how little the fear of misfortune .. is capable of balancing the hope of good luck.”

¹⁴ Langer defines the illusion of control as “an expectancy of a personal success probability inappropriately higher than the objective probability would warrant” (1975, p. 313). When chance situations have the trappings that typify skill-based situations—familiarity, choice, involvement, or competition—people bet more on outcomes that they think they can influence.

Beliefs of illusory control are strengthened by the frequency of reinforcement and by early success. In a coin flipping task with 30 trials, subjects who start off with an unbroken series of four accurate guesses rate their prophetic talent higher than subjects who begin with four misses. Early winners also recall more past successes and predict more future successes than other subjects, even when the fraction of predictive successes is the same (Langer and Roth, 1975). After a initial attribution of skill, early winners give less weight to contrary outcomes. (See also Jones et al., 1968.) Langer (1977) reviews the literature showing that superstition often governs conduct. Thompson et al. (1998) offer a unifying theory. When assessing their level of control, people use a heuristic that estimates the connection between actions and outcomes. When people see a link, they put effort into attaining it and they have a sense of control.

While often toxic, positive illusions can be adaptive, e.g., if they foster perseverance in an arduous task. Illusions are pervasive in healthy individuals (Taylor and Brown, 1988). People assume that feedback allows them to gain greater control. “Practice makes better.” Near misses are frustrating but also encouraging. It feels foolish to quit at a time when one is close to winning. The capacity to “master the world” sustains life (Lefcourt, 1973) even as people are hesitant to tempt fate (Risen and Gilovich, 2008).

¹⁵ Shefrin and Statman (1984) labeled this bias the disposition effect. It refers to people’s inclination to postpone any sale of assets at a loss as well as their propensity to realize gains hurriedly.

¹⁶ Festinger says that cognitive dissonance theory “centers around the idea that if a person knows various things that are not psychologically consistent with one another, he will, in a variety of ways, try to make them more consistent” (1962, p. 93).

¹⁷ For more on motivated beliefs, see Bénabou (2015) and Bénabou and Tirole (2016). Adler (1964) regards man’s “striving for superiority” as a universal motive. According to Brunnermeier and Parker (2005), people choose the beliefs of their future selves at will. Motivated cognition goes beyond heuristic processing. Distortions are led by interest and are emotionally charged, e.g., while confirmation bias steers depressed individuals to bolster their negative self-view with vague evidence, the updating pattern of healthy people is optimistically biased (Korn et al., 2014). Sophisticated agents may be more inclined to delude themselves than naïve agents (Kahan, 2013).

¹⁸ Hence, they prefer ignorance to knowledge. Yet, the pure logic of rational choice says that information always has positive value since it allows better decisions.

¹⁹ For some rats, the dissonance is introduced during the training trials. A tangible number of times that they run toward a box, but not always, these rats do not find food there. During the extinction trials, when food is never provided, the partially rewarded rats are more likely to continue to run. That laboratory animals work harder under gambling-like reinforcement schedules agrees with a delay discounting model that says that rewards received after unpredictable delays are preferable to rewards obtained after predictable delays. Likewise, pathological gamblers who discount delayed rewards at a high rate consider unpredictably delayed rewards to be of greater value than predictable rewards. “Near wins” (objectively, losses) may also prolong trading (Gilovich, 1983). Strictly speaking, the near win effect goes against reinforcement theory. It makes rational sense in so far as a near win is skill-based, i.e., if an individual can twist past losses into learning experiences that help him to master the future. The efficacy of variable-rate reinforcement is well-known to the owners of casinos. Gamblers persist because of the hope that the next response may receive reinforcement. “The long-term net gain or loss is almost irrelevant,” says B.F. Skinner (1953).

²⁰ Self-deception is paradoxical. To be self-deceived (1) a person must hold two conflicting beliefs all at once, and (2) one of the two must not be subject to awareness but motivated by desires or fears. For analysis of “Freudian”-style mental partitioning, see Gur and Sackheim (1979), Pears (1984) and Mele (1987). Shafir and Tversky (1992) label conduct quasi-magical when people play-act as if their deeds result in a given outcome but do not truly believe it. Conversely, magical behavior is the mistaken idea that one can arrange an outcome by an act that has no causal link to it. For example, in an effort to affect chance, some dice players throw softly for low numbers and hard for high numbers (Langer, 1975).

The Quatrone-Tversky experiment leads Mijovic-Prelec and Prelec (2010) to model self-deception. When “stated belief” does not match “deep belief,” there is a bid to self-deceive. It succeeds if “experienced belief” equals “stated belief.” The model depicts how two agents interact inside the brain. The “actor” makes choices with private motives hidden from an “interpreter” who

sees what is done, infers motive, and grades the decision according to a formula that enters diagnostically into the utility function of the actor. The actor wishes to obtain a good score while the interpreter aims for impartiality. Mijovic-Prelec and Prelec report extravagant bias in a lab test where subjects select actions that offer false but hopeful interim news about the chances of winning a prize. The variation in observed bias is linked to awareness that one is biased. The confidence benefit of bias only exists if it does not stray outside of sensible margins. Noticing that one is fabricating or squelching beliefs destroys the effort's effectiveness.

²¹ In this case, self-deception is similar to wishful thinking. According to Szabados (1973), both the self-deceiver and the wishful thinker hold false beliefs, and both are stirred by desires or fears. But the self-deceiver "has good grounds" for thinking that a believed proposition is false whereas the wishful thinker "does not have such grounds."

²² Likewise, Campbell et al. (2014) verify "learning bias" in stock trading decisions made by retail traders in India (2004-2012). They find that "strong .. performance relative to the .. market reduces diversification [and] increases turnover." Also "past outperformance encourages investors to assess .. [their] skills more optimistically .. leading them to increase their idiosyncratic bets." Many households overreact to random personal experiences and repeat actions that happen to have performed well for them in the past.

²³ As further examples, consider the work of Hartzmark (2015) and Müller-Dethard and Weber (2020). The first study finds that many amateur traders seem to follow a naive rule: "Sell both the best and the worst position in your portfolio" (where return is computed relative to purchase price). The second study reports that the inclination to invest in a stock portfolio shifts with how many winner and loser stocks it holds. When deciding between portfolios with returns equal in expectation and variance, people proceed as if they compare the number of winning and losing positions. This heuristic, while user-friendly, clearly lacks rigor. Stock returns are not assessed jointly; instead, traders tackle the problem piecemeal.

²⁴ The primary data set contains trading information for 78,243 individuals; 83.5% are men. The activity period is defined as the stretch of time between the first and last stock trade. It extends further if, after the last recorded trade, the portfolio is not empty. In that case, the period ends the moment the portfolio is liquidated.

²⁵ The primary data set covers 506,691 bank share trades involving 911 million shares, bought or sold by 34,126 traders over 111 months between January 2003 and March 2012. Sixty percent of bank share transactions are purchases. The total value transacted is €5.2 billion; 76% of bank trading occurs after August 2007. The financial crisis had great effect on the magnitude of bank trading. Interestingly, September 2008 is the month with most purchases (€111 million); the highest monthly sales come about in May 2009 (€109 million). Up until March 2009, the monthly value of purchases exceeds sales during 71% of all months. Later, that fraction drops to 50%. Between June 2008 and June 2009, the total of bank shares held in inventory surges from 12 million to 31 million.

²⁶ With large trading action but a relatively small asset base, a representative quick round-trip trader, ranked into the top *R* decile, lost €980 per year. This corresponds to a net annual return of -11.3%, about twice the negative net annual return of -5.0% earned by those who belong to the remaining 90% of the sample.

²⁷ The pertinent gaps are not statistically significant, however. Only LP-traders show mean and median statistics for the disposition effect (DE) significantly below other groups ($p < .001$). Our methods follow Odean (1998) who compares the price of each stock sale to the average purchase price (APP). This controls the total of realized gains and losses. Odean also counts the number of paper gains and losses. On any day, a stockholding that is not sold is judged a paper gain or loss depending on how its APP compares with the high and low prices for that day. If the APP is beneath the low price, the holding is labeled a paper gain; if it is above the high price, a paper loss. (If the APP is in-between, the position is neither a paper gain nor a paper loss.) The DE is the difference between two percentages: The fraction of all (paper and realized) gains that is realized and the fraction of losses that is realized.

²⁸ That (undiversified) price volatility is a "negative" that lowers the appeal of an asset is the stance taken by modern finance theory. See, e.g., Fama and Miller (1972). Anselme and Robinson (2013) review the contrary evidence in neuro-science that instability itself is a cause of betting behavior and that many people are playing to play rather than to win. Mesolimbic dopamine (DA) is released more in pathological gamblers than in healthy controls. DA releases reflect the haphazardness of reward rather than reward per se. This explains why gambling is a pleasant activity; why, the more gamblers lose, the more they persevere; and why monetary wins prolong the duration of play. Payoff schedules with a probability of winning close to 50% maximize DA release, therefore maximally boost gambling.

²⁹ Eventually, the financial difficulties were resolved with bailouts, bank guarantees, the sales of some bank divisions, the extension of deposit insurance, and nationalization. Some details gathered from press reports are as follows. Early 2008, Fortis was the largest Belgian bank. In the Summer, it faced liquidity problems. Its earlier acquisition of the Dutch bank ABN Amro had depleted Fortis' capital. Fortis was partially nationalized on 28 September 2008. Belgium, the Netherlands and Luxembourg in-

vested a total of €11.2 billion. Fortis was split into two. The Belgian part was sold to the French bank BNP Paribas, with the Belgian and Luxembourg governments as minority shareholders. Some toxic assets were placed in a bad bank. The Dutch government purchased the Dutch portion of Fortis. It became the owner of the part of ABN Amro previously held by Fortis.

On 30 September 2008 the Belgian, French and Luxembourg governments agreed to provide €6.4 billion to keep the Dexia Group afloat. A state guarantee covered Dexia's liabilities toward counterparties. Top managers were replaced. A restructuring followed in March 2009. Eventually, in October 2011, the group was dismantled. Dexia Bank Belgium was bought by the Belgian government for €4 billion. It changed its name to Belfius. Some healthy parts were sold off. Other toxic assets remained in Dexia Holding, one of Europe's largest bad banks. Since Dexia Holding continued to produce losses, Belgium and France injected another €5.5 billion in 2012.

The Kredietbank, renamed KBC in 2005, is the only Belgian financial institution under Flemish control that outlived the 1930s Great Depression. It remains one of the top three banks. End October 2008, KBC received a €3.5 billion cash injection from the Belgian federal government. A second intervention by the Flemish regional government injected €2 billion. It also allowed KBC to issue bonds to the Flemish government for €1.5 billion. A third agreement came about in May 2009 with Belgium offering bank guarantees up to €2 billion. To satisfy European Commission conditions, KBC divested several subsidiaries. KBC became profitable again and, by the end of 2015, it had paid back all state aid.

The ING Group is a Dutch multinational bank which ranks among the largest European companies. The bank belongs to the Euro Stoxx 50 stock market index. ING purchased remnants of Barings Bank in 1995 and it acquired the Belgian bank Banque Bruxelles Lambert (BBL) in 1998. On October 19, 2008, the bank received a capital injection of €10 billion from the Dutch government to raise its capital ratio above 8 percent. In January 2009, the Dutch government further agreed to assume the risk on 80% of a large package of U.S. Alt-A mortgage bonds. As a condition of Dutch state aid, the European Union demanded the sale of multiple subsidiaries.

Besides its bailouts and nationalizations, the Belgian government in October 2008 also raised the (deposit insurance) guarantee to €100,000 for all bank savings.

³⁰ For the top 80, the average value of trading in bank shares adds up to €1.8 million; for the top 26, the average value is €5.1 million. Most trades (42%) are transactions of Fortis. The matching statistics for Dexia, KBC, and ING are 19%, 28% and 11%.

³¹ The illustrative statistics mentioned in this paragraph and the next reflect the records of 26 traders with individual bank trading that exceeds 1 million Euro.

³² Festinger's cognitive dissonance theory (1957) suggests that traders will delay selling positions at a loss and will double down on their original commitment by picking up more shares of the same bank.

³³ The median duration of BBS-type brackets is about 42 hours. It is lengthier if the round-trip triggers a loss (48 hours) rather than a gain (33 hours).

³⁴ We obtain similar results if the width of the bins is set at €250 or €500. A second method to produce equivalent findings is based on round-trip returns. For instance, we can evaluate three bins of gains between 0% and 6%: 1,149 cases for actual round-trips vs. 708 for hypothetical #1 or 853 for hypothetical #2. A further binomial test compares the number of actual gains (1,149) with the number of similar-sized losses between -6% and 0% (747). In every case, the differences are highly significant. The threshold effect is also robust if we analyze larger samples, e.g., the top 300 compulsive bank traders or the top 93 with more than 25 bank round-trips. The top 300 jointly execute 8,476 round-trips in banks. The bin with small negative returns between -2% and 0% (before transaction costs) has 1,317 entries (15.5%); the bin with small positive returns between 0% and +2% has 1,825 entries (21.5%). After costs, total entries are, respectively, 1,401 (16.5%) and 1,806 (21.3%).

³⁵ This is clearly the case before transaction costs: 1,037 round-trips that terminate in a gain vs. 680 that report a loss. The matching data after transaction costs are 844 vs. 873.

³⁶ The group includes the 26 individuals, mentioned in section VIII, with individual bank trading over 1 million Euro and average bank trading over €5 million. Their mean number of bank transactions is 213. Bank share transactions total nearly 44% of the value of all their stock trades. See Table VI. Yet, these traders usually hold one or two stocks. All 26 are male. As a group, they lose €449 thousand. Among the top 100, the 26 capture 77% of all bank trades and 89% of the value of all bank trading. Trading costs are more than €14 thousand per person. A bivariate regression reveals that each extra million of trading produces added damage, after transaction costs, of €3,963 (t-statistic: -3.4; R^2 : .30).

³⁷ Luck is the fortuitous happening of an event favorable or unfavorable to the interest of a person. Luck hinges on uncontrollable chance or unavoidable ignorance. It occurs against the background of normal expectation: unexpected good things happen, or expected bad things do not happen ("a narrow escape"). Two comments are in order. First, when an unfortunate result arises, the individual faces a double loss: the initial loss in question plus that of having failed to exercise intelligent control (Goffman, 1967). Second, a person may never be aware of the risk and opportunity that in fact exist. One can be lucky and not realize it. Or one can think oneself lucky and not really be so. Ignorance can have the same effect as chance. "Rationality" is a

matter of acting intelligently, not a matter of acting successfully. We are lucky when we realize our goal by dumb luck, i.e., when we guess right by accident alone.

³⁸ This is one reason why belief in good fortune remains one of the most widespread of human beliefs. Matters of chance are sometimes granted prophetic power. Do the Gods speak through randomness? While the pairing of fate and luck looks farcical, ritualistic superstition (e.g., gamblers blowing on dice) is rampant. Many people personify luck as an agency, the Goddess Fortuna, that can be enlisted. The prospect of luck brings hope to the otherwise hopeless. Good or bad luck is not deserved. It levels the playing field. In a fair world, fortune and merit are equilibrated. But the gambling instinct fights nature.

³⁹ Belief in blind luck protects the individual from the regret of knowing that something could have been done to protect oneself. Any practice that reduces risk has a defensive function. It helps to manage the anxiety, disappointment and guilt associated with fatefulness. To be doing all that anyone can do brings peace of mind and avoids blame. Some rituals do not channel fate, however.

⁴⁰ The capacity to retain self-control under trying circumstances is important too. Often, the main task is to avoid overreaction, i.e., to stay away from euphoria or hysteria. Note that, in many conditions, the individual faces an outcome matrix that is not wholly defined. (Yet, probability theory requires that we can fully map out the spectrum of possible results.)

⁴¹ And uncertainty is the spice of life. "[I]f the future could be predicted, what fun would remain in life? .. It is the very indeterminacy of things that emboldens us to believe that, within limits, we can make our own future," says Arthur Schlesinger, Jr. (1993).