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The Share Price Neglect: Inverse Exponential Relation between Initial Share Price and Risk Tolerance

Carbon CC[1,2]* and Schwarz ME[1,2]

[1]Department of General Psychology and Methodology, University of Bamberg/Bavaria, Germany
[2]Graduate School of Affective and Cognitive Sciences, Bamberg/Bavaria, Germany

Abstract

In an experiment, we systematically tested the risk tolerance for trading stock shares that vary in the initial price of the shares. Persons inexperienced with the stock market had to set the selling points for 60 stocks in the case of (a) decreasing or (b) rising prices. First, a stronger risk aversion for falling compared to rising prices was obtained. Second, the experiment revealed a dramatic increase in risk tolerance the lower the buying prices of the stocks were; nearly perfectly following a power function (Pearson-R's>.93). Furthermore, it seemed very difficult for persons to grasp the consequences of share price neglect, namely that the initial share price has a significant impact on the readiness to take higher risks, whether in a positive or negative direction. Therefore, we are also referring to it as a "hidden risk tolerance". This paper offers insights into irrational decision making in trading stocks. It allows the formation of estimates regarding trading volume and share price potential on the basis of the initial share price. Furthermore, it provides clues for the consequent reduction of risk-seeking behavior.

Keywords: Behavioral finance; Decision; Stocks market; Trading; Risk aversion

Introduction

Humans base typical everyday decisions on rules of thumb or mental shortcuts known as cognitive heuristics, rather than on deep and exhaustive analytical processing [1]. Cognitive heuristics most probably do come into play when people are faced with complex, difficult, uncertain or fast-to-make decisions for which they have no solid knowledge nor a concrete algorithm to apply [2]. Regarding the stock market, this paper analyzes selling decisions which are merely dependent on the initial buying prices of stocks in order to get insights into the flexibility of risk tolerance. We focused merely on the role of share prices, refraining from all other information usually considered and related with shares such as the volatility or the trading volume of the shares [3] the quality of products or services provided by the associated company, the previous share price performance, the brand value [4] or fundamental economic data such as the credit rating [5] or the growth of the company under scrutiny [6]. What qualities does the mere price of shares provide beside the simple fact that such a share costs less? For instance, "penny stocks", also known as "micro-cap equities", refer to shares which trade for a low amount of money, typically smaller than € 1 or $ 1, or, as an alternative definition, to a market cap of low value, e.g., approximately $50 million [7] Penny stocks, which are by definition thinly traded companies within illiquid markets [8] are known to be usual suspects for stock swindlers and trading manipulators [9], as they are often difficult to observe and are infrequently quoted. It is also known that shares become more volatile when they are split—which holds true even if microstructure biases are carefully controlled [10]. On the other side, high-priced shares are mostly called "blue chips", commonly associated with high-quality and endurable companies. They offer much less volatility, much higher stability and are not so susceptible to easy stock swindling due to their mere size of market capitalization.

Nevertheless, as there is no standardized or initially standardized price of stock shares, the mere price does not evidently reflect the quality of the regarding company. Although it is true that many penny stocks refer to financially stricken enterprises which have lost market value and might provide higher inherent risks, they can also refer to the simple fact that the stock is assigned to more shares, for instance by a recent capital increase with "thinning out" the value of single shares. Comparable with free-traded currencies, there is no standardized price at the beginning of the history of a monetary system which can be used as a benchmark. Consequently, the stability, reliability or transparency of a currency cannot clearly be derived from the mere price of the standard unit— this is particularly the case for non-experts who cannot assess or interpret fiscal information on companies adequately. In this paper, we tried to answer the question, to what extent the investors' investment decision is influenced by the initial share price and how the readiness to take higher risks is affected by pure price information.

Research Questions

The objectives of the study are: (1) analyzing risk tolerance for different price ranges of shares, and (2) testing for influences by treatments of the binding to the money to be invested. We expected the principal assumptions of the prospect theory [2] to be confirmed by this study. For example, potential losses should be weighted more strongly than potential profits when setting the selling points assuming rising and sinking share prices. Regarding the influence of different initial share price levels on risk behavior we hypothesized, on the basis of the share price neglect effect, an inverse exponential relation between initial share price and risk tolerance (rising profit expectations and growing loss tolerance at lower initial share prices). Finally, we expected the binding to the money to be invested to have a significant effect on risk behavior of the test persons. In this case, hard earned

*Corresponding author: Claus-Christian Carbon, Department of General Psychology and Methodology University of Bamberg, Markusplatz 3, D-96047 Bamberg, Bamberg/Bavaria, Germany, Tel: +49 951 863-1860; E-mail: ccc@experimental-psychology.com

money should be invested more carefully than unexpected received capital. All these effects should, as they are based on general cognitive mechanisms, work for novices as well as for experts—although potentially being weaker for the latter group.

Methods

Experimental design

In this experiment participants were asked to set their favorite selling points of 60 fictive shares assuming rising (profit scenario) or sinking (loss scenario) prices. Only persons inexperienced with stock trading were used as participants to reveal typical trading behavior of novices. Two treatments were employed to test the effect of the source of the money available for trading stock shares (all instructions were given in German (Table 1)). Within the first group's treatment, the available money was earned by "hard work". Within the second group's treatment the available money was received by a "legacy" from a close—and beloved—relative. Both treatments ought to generate tight binding to the money for investing. Previous research data showed that people who earned their money with great effort are less willing to spend this money carelessly [11]. Therefore, the variant of "hard work" should further decrease risk tolerance more than the variant "legacy".

Participants

Thirty-one volunteers inexperienced with trading stocks took part. They were randomly assigned to one of two treatments: "hard work" and "legacy", with 16 (12 female; mean age: 23.3 years) in the treatment group "hard work" and 15 (12 female; mean age: 22.6 years) in the treatment group "legacy".

Note: The high proportion of female participants in this study seems not to be problematic. There may be trade intensity differences between men and women [12] but gender seems not to be a critical determinant of investment choice per se. Participants were naïve to the purpose of the experiment; they were given course credit for participating in the study.

Materials

The stocks list contained 60 fictive stocks represented by non-sense trigrammic names (three-letter codes) comparable with typical ticker codes (e.g., SRX, WDJ, VQE). Non-sense codes were used to minimize associations with concrete companies and the referring profitability of these companies. The stocks differed in terms of their pre-set, initial buying price: 20 of them ranged between 1.00 and 9.99 (exactly 1.45 and 9.80; this range is called "low"), 20 of them ranged between 10.00 and 99.99 (exactly 11.50 and 98.40; "medium"), the residuary 20 ranged between 100.00 and 999.99 (exactly 150.65 and 980.15; "high").

In this study, we made a deliberate decision against a fictive share prices sample ranged below 1.00 because we do not expect laymen or newcomers in the stock market to gain their first experiences with penny stocks. Great care was taken to only use so-called "precise prices", e.g. 14.18 instead of 14.00, to circumvent potential precision

effects [13] for which precise prices are practically handled as being of lower value than comparable round prices. To minimize confounding effects of different price level distributions among the ranges, the mean buying prices for each range was approximately set to the median for the referring range and the distribution of all ranges was normal. When prices were normalized by the lower value of the range, e.g. 100 for range high, the means did not differ from the means of each other range, ascertained by a factorial ANOVA with the between-items factor range (low, medium, high), $F_{(2,57)} < 1$, $p = .8159$, n.s.

The treatment consisted of two different instructions aiming to evoke different risk behavior. In both instructions, our participants were told that they had invested 70,000 Euros in stocks. For instruction "hard work" the participants were additionally told that they have achieved this money through hard work, for instruction "legacy" the story was respectively worded as that they have achieved this money by a legacy from a close relative who had appointed them as their exclusive heir due to deep friendship (Table 1).

Procedure

The experiment consisted of three phases: treatment, trading game and questionnaire.

Treatment: Participants were first instructed with one of two different treatment stories: "hard work" or "legacy" (Table 1).

Trading game: Afterwards, the participants were asked for each stock separately to set the selling limits for the case of rising or sinking prices by typing real numbers. The order of the asked stocks was randomized for each participant. To minimize transfer or anchoring effects, the order of the question on the rising ("profit") or sinking ("loss") scenario was fixed for the first 30 stocks in a row and alternated for the following 30 stocks. The initial order was randomized across participants. After having typed in both selling prices of a referring share, the next trial started automatically.

Questionnaire: Finally, the participants were asked for their trading experience in terms of number of trades per year and how long they have already traded at the stock market to verify the correct qualification of being a novice in the field of trading shares.

The whole procedure lasted about 30 minutes on average.

Results and Discussion

On average, participants failed to set their selling points in 1.5% of the cases. In some cases, they obviously set unreasonable selling points (e.g., higher selling point than buying point for the loss scenario), leading to a drop of additional 1.6% of data. Participants in the hard work group showed high reliabilities for the loss as well as the profit scenario of all 60 stocks indicated by Cronbach's alphas of .90 and .95, respectively, whereas participants in the legacy group showed only acceptable reliabilities (.64 and .73). Thus, the hard work scenario seemed to have activated a more consistent schema.

Treatment	Instruction (translated)	Instruction (German original)
hard work	"The needed money [you want to invest] stems from your extreme effort and personal commitment you made by extra work for the last 4 years"	„Das Geld hierfür[für das Investment]haben Sie in den letzten 4 Jahren unter extremen Mühen und enormen persönlichem Einsatz durch Mehrarbeit erwirtschaftet"
legacy	"The needed money [you want to invest] stems from a suddenly died, very close, relative. His last will was that you are the exclusive heir as you we de facto his only true friend"	"Das Geld hierfür haben Sie von einem plötzlich verstorbenen, sehr nahen Verwandten, geerbt. Sein letzter Wille war, dass Sie als einziger Erbe vorgesehen werden, da sie de facto der einzige wirkliche Freund Ihres Verwandten waren"

Table 1: Translated and original versions of the treatments given to the participants as instruction what the source of the money was. Preliminary they were always told: "Imagine, you would like to invest € 70,000. -- in shares".

For the following analyses, the selling points were recoded as absolute deviations from the buying prices in relation to the buying prices, e.g. when a selling point of 7.0 would have been set for the loss scenario of a stock bought at 10.0, the recoded value would be 30%. We first analyzed the selling points for the three price range groups in order to get a first impression of different risk behavior for the profit and loss scenarios. As shown in Figure 1 the selling points, in terms of percentage of the initial buying price, increased substantially the lower the price range was. For the selling points in the profit scenario, there was a steep increase from the medium to the low price range group, whereas a more linear trend was obtained for the loss scenario (Figure 1).

As the metric of both scenarios is different (the profit scenario is open up to higher values, whereas the loss scenario is limited to 100% coinciding with a total loss of the), we employed two independent mixed-design Analyses of Variance (ANOVA) containing both times the between-subjects factor treatment ("hard work" or "legacy") and the within-subjects factor range (low, medium, high). For the profit scenario, treatment had no influence on the selling points, neither as a main effect, $F_{(1, 29)}<1$, $p=.7659$, n.s., nor as an interactive effect, $F_{(1, 29)}<1$, $p=.6599$, n.s. In contrast, range had a medium-up-to-large significant effect on the selling point, $F_{(2, 58)}=6.75$, $p=.0023$, $\eta_p^2=.19$. For the loss scenario, treatment had again no main effect on the selling points, $F_{(1, 29)}<1$, $p=.8129$, n.s., although the interaction
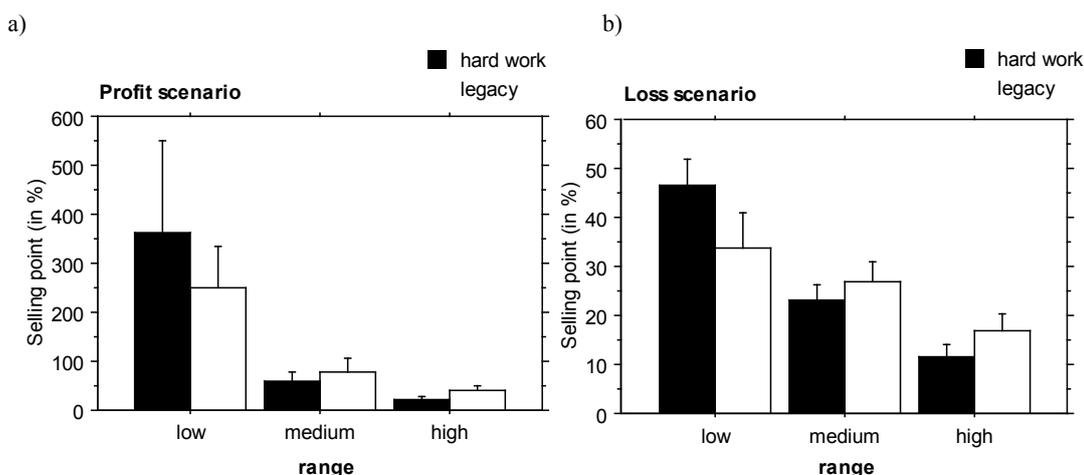

Figure 1: Selling points (as percentages related to the buying price) for the three levels of range (low, medium, high) under (a) the profit and (b) the loss scenario. Note: the range of the scales, and the inner logic of the scales itself, is different.
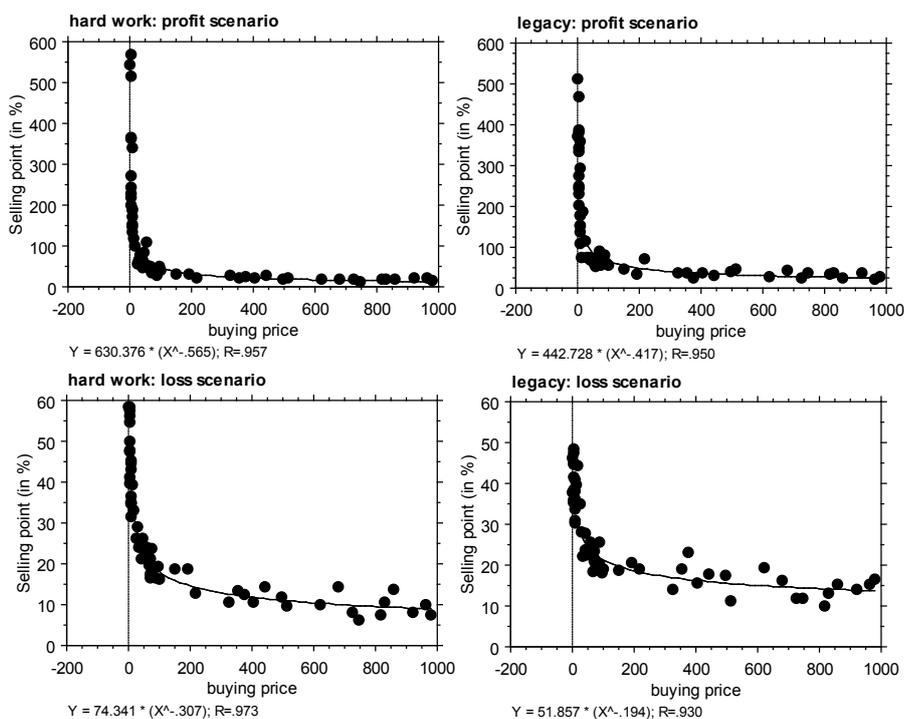

Figure 2: Regression analyses with power functions for selling points in relation to the buying price. The top row shows the profit scenarios for hard work and legacy; the bottom row shows the loss scenarios.

between treatment and range was significant, $F_{(2,58)}=3.87$, $p=.0264$, $\eta_p^2=.12$. Most importantly, range had a very large effect on the selling points, $F_{(2,58)}=6.75$, $p<.0001$, $\eta_p^2=.48$. Bonferroni-adjusted post hoc comparisons for both scenarios indicated significant differences between all levels of range, p's<.01.

As a second step, to get deeper insights into the mechanisms of risk tolerance, we analyzed the selling behavior by relating each averaged selling point with its referring buying price by a regression analysis utilizing a power function. Usage of the power function is known to be highly fitting for many psychophysical tasks [14].

$$y=k\cdot x^{-n}$$

Note: y stands for the selling point and x for the buying price, while k and n are to be estimated parameters (Figure 2).

We obtained extremely high curve fits ranging between R=.930, $F_{(1,59)}=370.60$, $p<.0001$, and R=.973, $F_{(1,59)}=1044.54$, $p<.0001$, which means that more than 86% of the variance of selling points could be explained purely on the basis of the buying price of the referring share (Figure 2).

To be able to better compare the impact of the buying price on the selling points of the profit and the loss scenario, we must foremost analyze the psychological phenomenon of calculating losses. In this realm it is important to note that humans perform rather weakly in comparing the differential impact of gains and losses [15]. For instance, many participants assumed that if they lose 33% of their invested capital, it would take a gain of 33% to recover their losses [16], which would need a much higher gain of 50%. This general fallacy seems to be not so substantial within low ranges of losses as in the given example; but it counts the stronger the higher the losses are. As illustrated in Figure 3, needed gains increase by an exponential function with given losses, making it highly unrealistic to get back the buying price when fundamental losses are reached. For instance, losing 90% of the initial value means that one needs a gain of 900% to reach the initial level, which means people underestimate the resulting impact of this specific loss by one decimal power—quite fatally, if they indeed want to come

back to the profit zone again. It seems that persons do not estimate such loss-gain scenarios on an elaborated mathematical model but on the mere dominance of absolute numbers with reflexively assuming that if "A is X% greater than B", then "B is X% less than A" [15]. This means that people utilize percentages as absolute amounts of losses just as if a loss of X% would be equal to a loss of X units (Figure 3).

Interestingly, this fallacy seems not to be in action within the given paradigm. If we diligently inspect the results shown in Figure 2, we can see that the riskiest trades in the loss condition are below 60%. This means that the stock must gain 100%/~60% * 100% ≤ 167% to compensate for the losses so far, which is much lower than the maximal risks taken in the profit scenario. To increase comparability among both scenarios, Figure 4 shows the losses in an alternative way by calculating the profit needed to reach the initial buying price (Figure 4).

Also with this alternative illustration of losses (expressed as the profit needed to reach the initial buying price again), we found an intimate relationship between the buying price and the behavioral consequences. Explained variances were 94.9% and 86.3% for the hard work and the legacy treatments, respectively. It is also noteworthy that the treatment for the source of the money available for trading did not have a substantial influence on the trade behavior.

General Discussion

In the present study, participants (laymen) had to set selling points for fictive stock shares varying by their initial buying prices. All participants showed a systematic bias in increasing risk tolerance for shares with smaller prices. We would like to term this systematic effect the "share price neglect".

By curve fitting the mean relative selling points with the buying price, a clear relationship expressed by a power function was documented. The fitting function continuously explained more than 86% of the variance. This is quite remarkable as other influential factors linked with the company's performance itself were not taken into account. Beside such fundamental performance factors, additional factors were explicitly excluded by the chosen experimental design.
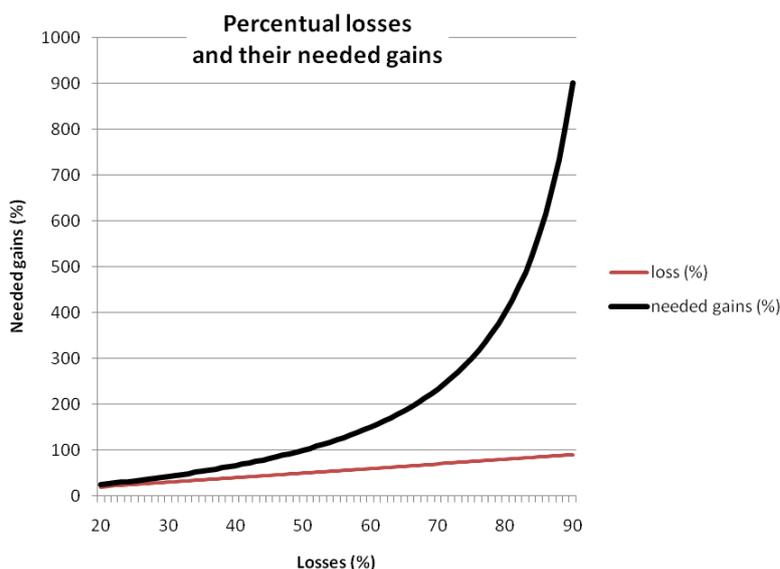

Figure 3: Illustration of the exponential growth of needed gains with given losses.
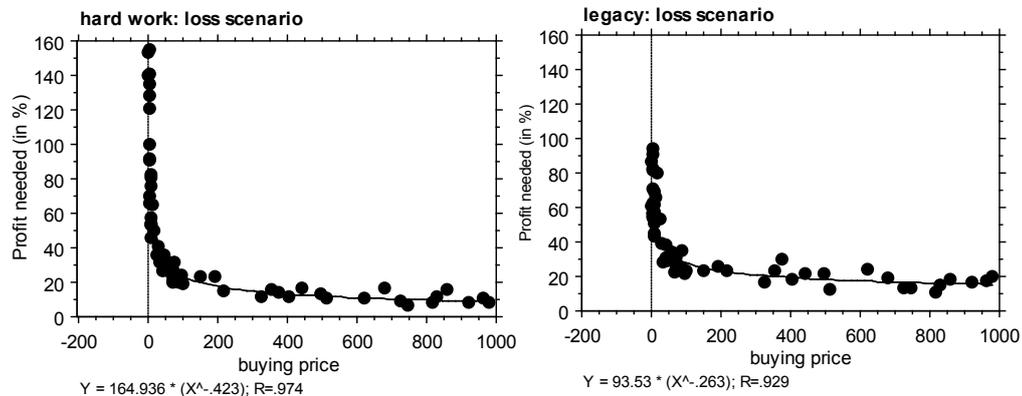
Figure 4: Regression analyses with power functions for the profit needed (in %) to reach the initial buying price of the referring shares in this study The left side shows the loss scenarios for hard work and legacy.

For instance, Alter and Oppenheimer [17] showed that the fluency of a share's name has positive short-term effects on the performance of the share development from the time when pronounceable (=fluent) vs. non-pronounceable (=influent) ticker codes were offered. Although all these factors were not integrated into the present experimental design, the explained variance was still very high.

When comparing the selling points for the profit and the loss scenarios, we found stronger deviations from the buying price, i.e. increased risk behavior, for the profit scenario. This was quite a surprise, because the disposition effect— the tendency to sell assets that have gained value too early and to hold assets that have lost value for too long a time— would predict the opposite trading risk behavior [18,19]. However, there is evidence that the disposition effect is bounded to market-capitalization of the stock [20]. The evaluation of trading records of 78,000 discount broker clients showed a concentration of the disposition effect primarily in large-cap stocks and a reverse disposition effect in lower market-capitalized stocks. Concretely, the lower the market-capitalization, the stronger the tendency to keep the winners and realize the losers. The larger the market-capitalization of the company, the more likely traders are to realize their gain and to hold their loss. As market-capitalization seems to be positively correlated with share price (Table 2), the results of our study give support to these empirical finding and offers an explanation approach based on the mere share price level (Table 2).

Although persisting long positions of gaining profits seems favorable to increase the return of investment, we should not forget that the "positive side" of stock trading—desperately yawing for profit—is also a sign for risk-seeking behavior. To realize 600% profit seems of course to be a very good deal, when actually realized; but most times, such gains are also highly unrealistic —and, therefore, risky. In the end, losing the proper exit point of a share ownership might lead to fundamental loss of money, because share prices might fall after a long period of market rise. Most of such persistent keeping of shares can be explained by the classic theory of cognitive dissonance [21] proposing that people have a strong motivational basis to reduce dissonance of contradictory ideas. Dissonance can, for instance, be reduced or even be dissolved by justifying the current strategy (e.g., holding the shares), selectively collecting information [22] or denying counter-facts (e.g., changed indicators for predicting the shares fate). For the given case, it seems that effects of cognitive dissonance for decisions on profits were even stronger than for decisions on losses.

This could indicate the operation of additional cognitive effects such as participants' overconfidence of gaining even more profit or the tendency for developing greed, mainly observed in people who gained money in a sequence of trades [23]. Shareholder's behavior oscillates between greed and fear [24], often leading to a zone between unrealized greedy gains that turn to feared, but realized losses.

The revealed participants' behavior was also in accordance with the loss aversion tendency proposed by decision or prospect theory [2]. Within this theoretical framework, two functions characterize human choices: the value function $\upsilon(x)$ and the decision weighting function $\pi(p)$, which transforms probabilities into decision weights. The value function is defined by three characteristics:

1. It is not defined for final asset positions, but over gains and losses—in the current case: the deviation from the buying price.

2. It has an asymmetrical sigmoid shape, concaved for gains and convexed for losses (Figure 5).

3. The loss function (negative value function) is steeper than the gain function (positive value function), $\upsilon(x) < -\upsilon(-x)$, indicating human's general attitude of loss aversion (Figure 5).

Taking these characteristics together simulates the observed participants' loss aversion very well. The value function proposed by Kahneman and Tversky [2] is also capable of predicting the share price neglect revealed by the present study. As illustrated by Figure 5, this neglect can be modeled by assuming a value function which decreases its steepness the lower the share price is. Based on this idea, trading risk increases the lower the price level is because the value function becomes flatter which in return lowers the psychological absolute value of gains as well as losses. This model is also capable of explaining the multiplied increase of risk behavior for the gain compared with the loss scenario, which is by far so susceptible for the share price fallacy. As also shown in Figure 5, the concaved and flatter value function for the domain of gains increases the trading risk more when taking the same size of the risk tolerance zone for gains and losses. The exit point for gains of shares on a low price level (L+) deviate from the initial buying price more than that for losses (L-) (Figure 5).

Interestingly, when we were talking to a variety of people – participants of our experiments as well as scientists and financial experts – and tried to explain the share price neglect, it seemed to be very difficult for them to grasp the consequences of this investment
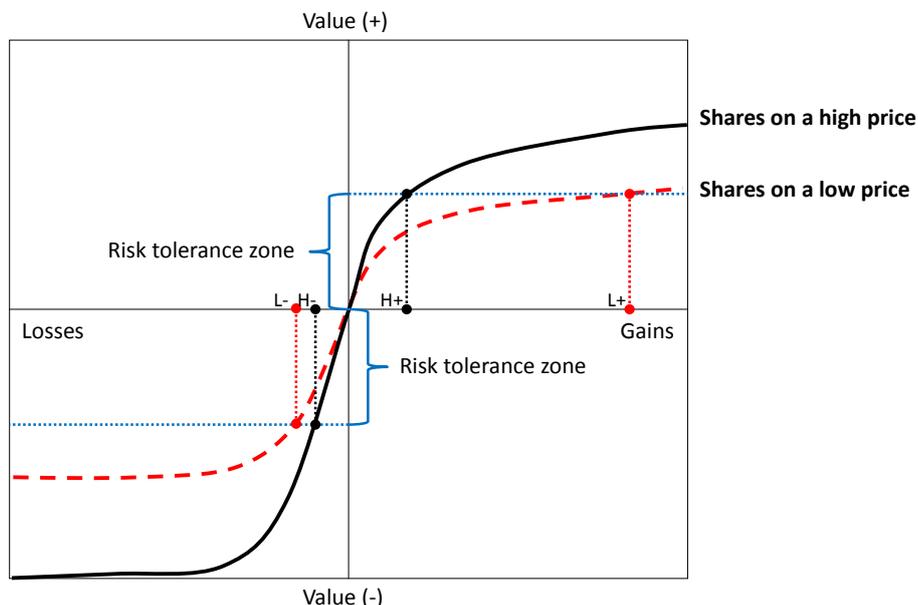
Figure 5: Illustration of the value functions for losses (left part of the graphs) and for gains (right part of the graphs) for different stock price levels. The solid black line shows a typical value function for shares on a high price level, the dashed red line shows a typical, much flatter, value function for shares on a low price level. The "risk tolerance zone" indicates the range of share prices in which the trader holds the risk of trading the share further. This zone creates exit points for losses (-) and gains (+), very differently for high (H) and low (L) level prices.

Categorization	Stock quantity	Percentage share
low	5	12.50 %
medium	28	70.00 %
high	7	17.50 %
Total	**40**	**100.00 %**

Table 2: Top ten listed stock shares by market capitalization of USA, Great Britain, Germany and France dated May 24, 2013 categorized by share price (share price range between 1.00 and 9.99 is called "low", between 10.00 and 99.99 is called "medium" and between 100.00 and 999.99 "high").

phenomenon. To them, it seemed almost impossible to realize, that mere share price information has a significant influence on their readiness to take higher risks, whether in a positive or negative direction. The underlying mechanism is even so strong, that it is possible to quantify the extent of risk tolerance to a certain value range on the initial share price basis. Therefore, we are also referring to it as a "hidden risk tolerance".

To see if professionals are vulnerable to the share price neglect, we tested a group of three trading experts. The experts showed this general trend for risk-seeking trading of small-priced shares, but their overall risk level was still moderate compared with laymen. This indicates their high professionalism probably by utilizing additional cognitive programs to minimize such biases and, thus, to reduce trading risks. Still, their risk behavior for "cheap" shares also increased by factors of three up to five compared with "expensive" shares. Although substantially weakened for experts, the fact that experts were also affected by the share price neglect underlines the general processing of such cognitive biases in humans. It is also in accordance with previous research analyzing the behavior of experts in other domains, such as industrial buyers [25].

To explain the share price neglect, the fact that the mere price of a share increases the risk of trading them, we should focus on the perceptual bias of the value of a trade. Traders usually invest a specific amount of money to buy as many shares worth that amount. If they have to estimate the development of this trade or want to benchmark the trade with other trades, they base their calculation on the individual price level of one single share. This is highly problematic as a low price or a penny stock most often will deviate from the initial price only by portions of the referred currency. For instance, if a share is bought at € 0.50, an increase of 10% up to € 0.55 will "only" gain a profit of 5 Eurocent. In fact it is still a good deal taking typical alternative returns of investments into account. It might be that the estimation of the overall profit orients towards this marginal gain of some Eurocents establishing an anchor for deciding whether the gain should be realized or not. As we know that such anchoring effects are powerful, especially if the judgment is made under uncertainty, as it is by the given task [26], they should also indirectly influence traders' risk tolerance.

As the present share price neglect increases its effectiveness the lower the initial price of a share is, low price stocks or penny stocks will be the main source of trapping investors for high trading risk behavior. This amplifies already given problems of penny stocks frequently being the target for manipulation of prices. Bartels [9] even concluded: "Penny stock fraud over the Internet potentially presents one of the most serious threats to the stability of U.S. securities markets that has yet been encountered, due to the ease with which penny stock promoters may reach substantial portions of the U.S. population". Here we demonstrated that this is not only true due to the instability and high volatility of the manipulative nature of such penny stocks but even by the mere fact that such shares are inherently traded in a dangerously

risky way, but also in a more successful return of investment rate [27,28].

Conclusion

Participants in the present study were asked to tell their selling points for investments falling or rising in value. Such a scenario to exit an investment without further strategy to come into it later is only one variant among many other possible ones. More complex scenarios such as invest-sell-reinvest-scenarios, where different strategies such as dollar-cost averaging (DCA) or individual saving account (ISA) [29] are employed, would be promising candidates for extending the present paradigm of analyzing human's stock trading behavior. A further extension could be the integration of social comparison Festinger [30] and equity theory Adams [31] to simulate social behavior in stock trading [32]. In addition to this, the share price neglect effect should be reviewed by an ex-post analysis of actual share deposit account transactions. Finally and on current occasion, it would be of great interest to study the influence of the current so-called "Euro Crisis" (excessive contact with large numbers and sums via the media) on the flexibility of individual risk tolerance in stock trading.

Regarding the practical conclusions of this study, it may be advisable—even for professional stock traders—to take into account the mere price of a stock as a potential source of trapping into a fallacy of underestimating the risk of such a trade. Empirical research tells us that stock investors consequently adjust their behavior and thus effectively improve their investment performance al so usable assistance systems should be developed to adequately help them in this process [33]. Assuming that this risk behavior could be optimized shown here by different treatments and observing group s with different expertise in trading, future trading systems should always indicate the relative amount of loss or profit, but not only the mere amount of decrease or increase of the share price. On the other side, interesting opportunities arise for professional traders and technical share analysis to maximize their trading gains and improve their forecast success by taking the consequences of the share price neglect into account. To certain conditions, it seems to be possible to make future trading predictions regarding share price potential and trading volume for single shares on the basis of the initial share price.

References

1. Kahneman D, Tversky A (1973) Psychology of prediction. Psychological Review 80: 237-251.

2. Kahneman D, Tversky A (1979) Prospect theory: Analysis of decision under risk. Econometrica 47: 263-291.

3. Darrat AF, Zhong M, Cheng LTW (2007) Intraday volume and volatility relations with and without public news. Journal of Banking and Finance 31: 2711-2729.

4. Schoenbachler DD, Gordon GL, Aurand TW (2004) Building brand loyalty through individual stock ownership. Journal of Product and Brand Management 13: 488-497.

5. Ana H, Chan KC (2008) Credit ratings and IPO pricing. Journal of Corporate Finance 14: 584-595.

6. Chan LKC, Lakonishok J (2004) Value and growth investing: Review and update. Financial Analysts Journal 60: 71-86.

7. US Securities and Exchange Commission (SEC) (2008) Penny stock rules.

8. Brennan MJ, Subrahmanyam A (1998) The determinants of average trade size. Journal of Business 71: 1-25.

9. Bartels KC (2000) Click here to buy the next Microsoft. The penny stock rules, online microcap fraud, and the unwary investor. Indiana Law Journal 75: 353-377.

10. Desai AS,Nimalendran M, Venkataraman S (1998) Changes in trading activity following stock splits and their effect on volatility and the adverse-information component of the bid-ask spread. Journal of Financial Research 21: 159-183.

11. Muehlbacher S, Kirchler E, Hoelzl E, Ashby J Berti C, Job J, et al. (2008) Hard-earned income and tax compliance: A survey in eight nations. European Psychologist 13: 298-304

12. Barber BM, Odean T (2001) Boys will be boys: Gender, overconfidence, and common stock investment. Quarterly Journal of Economics 116: 261-292.

13. Thomas M, Simon DH, Kadiyali V (2010) The price precision effect: Evidence from laboratory and market data. Marketing Science 29: 175-190.

14. Carbon CC (2010) Cognitive continental drift: How attitudes can change the overall pattern of cognitive distances. Environment and Planning A 42: 715-728.

15. Kruger J, Vargas P (2008) Consumer confusion of percent differences. Journal of Consumer Psychology 18: 49-61.

16. Dewdney AK (1993) 200% of nothing: An eye-opening tour through the twists and turns of math abuse and innumeracy. John Wiley: New York, USA.

17. Alter AL, Oppenheimer DM (2006) Predicting short-term stock fluctuations by using processing fluency. Proceedings of the National Academy of Sciences of the United States of America 103: 9369-9372.

18. Shefrin H, Statman M (1985) The disposition to sell winners too early and ride losers too long: Theory and evidence. Journal of Finance 40: 777-790.

19. Weber M, Camerer CF (1998) The disposition effect in securities trading: an experimental analysis. Journal of Economic Behavior & Organization 33: 167-184.

20. Ranguelova E (2001) Disposition effect and firm size: New evidence on individual investor trading activity. In: National Bureau of Economic Research.

21. Festinger L (1957) A theory of cognitive dissonance. Stanford University Press: Stanford, Canada.

22. Argentesi E, Lutkepohl H, Motta M (2010) Acquisition of information and share prices: An empirical investigation of cognitive dissonance. German Economic Review 11: 381-396.

23. Thaler RH, Johnson EJ (1990) Gambling with the house money and trying to break even: The effects of prior outcomes on risky choice. Management Science 36: 643-660.

24. Westerhoff FH (2004) Greed, fear and stock market dynamics. Physica A: Statistical Mechanics and its Applications 343: 635-642.

25. Qualls WJ, Puto CP (1989) Organizational-climate and decision framing: An integrated approach to analyzing industrial buying decisions. Journal of Marketing Research 26: 179-192.

26. Tversky A, Kahneman D (1974) Judgment under uncertainty: Heuristics and biases. Science 185: 1124-1131.

27. Banz RW (1981) The relationship between return and market value of common stocks. Journal of Financial Economics 9: 3-18.

28. Goodman DA, Peavy JW (1986) The low price effect: Relationship with other stock-market anomalies. Review of Business And Economic Research 22: 18-37.

29. Mingers J, Parker KT (2010) Should you stop investing in a sinking fund when it is sinking? European Journal of Operational Research 207: 508-513.

30. Festinger L (1954) A theory of social comparison processes. Human Relations 7: 117-140.

31. Adams JS (1965) Inequity in social exchange. In K. Berkowitz (Ed.), Advances in Experimental Social Psychology Academic Press New York, USA.

32. Fox S, Dayan K (2004) Framing and risky choice as influenced by comparison of one's achievements with others: The case of investment in the stock exchange. Journal of Business and Psychology 18: 301-321.

33. Nosic A, Weber M (2010) How risky do i invest? The role of risk attitudes, risk perceptions, and overconfidence.Decision Analysis7: 282-301.