

The Trader Interaction Effect on the Impact of Overconfidence on Trading Performance: An Empirical Study

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This article extends previous research on how overconfidence affects trading performance in two ways. First, we examine whether the degree of impact is different between an electronic trading market (as in a stock market) and an open outcry environment (as in a futures market). Second, we examine the impact of overconfidence from the perspective of miscalibration, market confidence, the better than average effect, and risk attitudes. The significant findings (5%) indicate that higher overconfidence leads to poorer trading performance generally. However, the degree of impact is higher in an open outcry environment, where there are visual, verbal, and emotional interactions between traders, than in an electronic trading environment, where a trader operates primarily in an isolated setting. Likewise, the traders who choose to trade in an open outcry environment are generally more overconfident than those who trade in a more isolated setting. The contribution of our study is therefore to highlight the importance of interactions between traders in the studies of overconfidence on trading performance. Our findings are based on the trading performance of a sample of 159 tertiary students in a simulated trading environment over six weeks.

keywords: Overconfidence, Interaction between traders, Trading Performance

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Introduction

People tend to be called rational in traditional finance, but normal in behavioral finance. Rational people have perfect self-control and are not confused by cognitive errors; normal people are subject to cognitive errors such as overconfidence. Past research has shown that overconfident traders tend to have relatively poorer performance in securities trading.

Barber and Odean [2000], among others, show that overconfidence can explain the high trading levels and the resulting poor performance of individual investors. However, that study was limited to only one form of trading environment, stock investment.

Biais et al. [2002] note that overconfident traders are expected to suffer from the winner's curse and earn relatively lower trading profits. However, their definition of overconfidence did not cover the aspect of market confidence, which is arguably just as important in influencing trading behavior.

The objective of our study is to extend previous research on how overconfidence affects trading performance in two ways: First, we attempt to ascertain whether traders who operate in an open outcry environment (such as futures trading), where visual, verbal, and emotional interactions with other traders are common, tend to be more confident and have poorer performance than traders who operate in an electronic stock trading environment, with no interactions with other traders at all.

Second, we examine four aspects of overconfidence—miscalibration, market confidence, the better than average effect, and risk attitudes—in order to provide a more comprehensive and more focused analysis on the impact of overconfidence on trading performance.

We conduct our experiment in a controlled, simulated environment to minimize the impact of experience and investment horizon, which would affect overconfidence and trading performance. The participants in our experiment are tertiary students with similar backgrounds and no prior trading experience. Our experiment lasted for six weeks, thus all participants had the same investment horizon. To create an incentive, we offered lucrative cash rewards (at least from the students' perspective) for the top performers.

The remainder of our paper is organized as follows. The second section provides a literature review

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of relevant findings and issues. The third section describes the methodology in our research. The fourth section discusses our findings, and the final section gives our conclusions.

Literature Review

In the microfoundations of behavioral finance, DeBondt and Thaler [1995] state that “perhaps the most robust finding in the psychology of judgments is that people are overconfident.” Overconfidence is therefore one of the most common human characteristics. It reflects the very prevalent tendency for people to overestimate their own abilities, their own prospects for success, the probability of positive outcomes, the accuracy of their own knowledge, and to perceive themselves more favorably than they perceive others.

Overconfidence Traits

Overconfidence manifests itself in many different ways, such as miscalibration (Biais, Hilton, Mazurier, and Pouget [2002]), the tendency to overestimate the accuracy of one’s own information. In a financial market context with asymmetric information, Benos [1998], Odean [1998], and Daniel, Hirshleifer, and Subrahmanyam [1998] show theoretically that miscalibration leads to excessively aggressive trading strategies and poor performance. The best-established finding in the calibration literature is that people tend to be overconfident when answering questions of moderate to extreme difficulty (Fischhoff, Slovic, and Lichtenstein [1977]), Yates [1990], Griffin and Tversky [1992]), and underconfident when answering easy questions. They also tend to be well calibrated when predictability is high, and when performing repetitive tasks with fast, clear feedback.

Overconfidence can also take the form of overestimating one’s own abilities relative to others, also known as the “better than average” effect (Taylor and Brown [1988]). This can lead to unrealistic positive self-evaluations (Weinstein [1980]). Camerer and Lovo [1999] describe the better than average effect as “competitive blind spots.” Decision makers fail to appreciate their competitors’ abilities and often overconfidently think that they will succeed while others will fail.

Overconfidence is also apparent in one’s confidence in the market. Shiller [1999] has demonstrated that market confidence influences trading decisions. Bearish traders may decide not to trade even if they have great self-confidence in their own trading skill. Excessive market confidence can also be seen as “irrational exuberance.” This term, popularized by Federal Reserve Chairman Alan Greenspan, describes the soaring valuation of an enormously expanding stock market.

Several indexes also provide measures of investor confidence, such as the Yale School of Management Stock Market Confidence Indexes, the University of Michigan Consumer Sentiment Index, and the Barron’s Confidence Index.

Odean [1998] says that an overconfident trader makes biased judgments that may lead to lower returns. Overconfident traders may choose riskier portfolios than normal, and expect to be rewarded for risk-bearing with greater returns.

Hsee and Weber [1999] investigate how people predict the risk preferences of others using three hypotheses: risk-as-value, risk-as-feelings, and stereotype hypothesis. Under the risk-as-value hypothesis, risk is perceived as a value and an admirable characteristic. People perceive themselves as more likely to possess these desirable characteristics than others.

Hsee and Weber did not, however, examine the form and amount of risk traders are willing to accept. Answering these questions is especially relevant today, as investments in new economy-based initiatives are often high-risk in terms of probability and magnitude of loss. Our definition of risk is neither mathematically tractable nor dependent on the mean-variance capital asset pricing model of risk that is well entrenched in finance theory. Our paper focuses solely on the psychological aspect of risk inherent in our respondents.

We examine the four psychological traits of overconfidence (miscalibration, market confidence, the better than average effect, and risk attitudes), how they affect trading performance, and how they differ between stock and futures traders.

Overconfidence and Trading Performance

The most robust effect of overconfidence is that trading volume increases when price-takers, insiders, or market makers are overconfident. Statman and Thorley [1999] find empirical evidence that high returns can make traders overconfident, and that overconfident traders increase their trading.

Odean [1998] also proves that overconfidence leads to greater trading. In a bull market, aggregate overconfidence increases, resulting in increases in trading volume. The converse is true for a bear market. Odean also finds that overconfident traders trade more than rational traders, and that when objectively measured, overconfident traders have lower expected utilities. Hence, greater overconfidence leads to greater trading and lower expected utilities. In addition, overconfident traders do not tend to hold well-diversified portfolios because they believe so strongly in their stock picks. When information is costly and traders are overconfident, informed traders fare worse than uninformed traders.

Gervais and Odean [2001] demonstrate that experience and learning can eliminate overconfidence.

With more experience, people develop better self-assessments. Since it is believed that traders become overconfident through success, the combination of success and inexperience are the most likely to lead to overconfidence.

Stock and Futures Trading

Our study focuses on stock and futures trading because of their relative importance in the financial marketplace. Stocks and futures are two of the most actively traded instruments worldwide. Moreover, the stock and futures markets are good places to look for behavioral anomalies.

Warneryd [2001] describes the stock market as highly “emotional.” The psychological concept of investor emotions, overreactions to information, feelings of optimism, and self-confidence are highly prevalent in the stock market, and these factors play an important part in driving investor behavior. Another motivation for our study is that stock markets are thought to be the most efficient of all markets. Anomalies found there are less likely to be attributable to transaction costs or market failures.

Furthermore, the growing divergence of real-world stock market performance from fundamental financial theory has been of increasing interest to researchers. Warneryd [2001] points out that investor expectations may be heterogeneous, which does not reconcile with the theory of efficient markets. Investors’ cognitive errors, risk, and risk attitudes have been key constructs in explaining investor decision-making behavior. Therefore we seek to obtain a greater understanding of the psychological aspects of stock trading to guide investor behavior and hopefully lead us to a truly “efficient” market.

The futures market is also a good place to look for anomalies. Pit trading is physically demanding, emotionally draining, and intensely competitive. Futures traders need to keep their senses sharp through hours of tumult, noise, yelling, negotiating, and general confusion. They need to have skill, knowledge, persistence, motivation, and, especially, control of their emotions in order to remain psychologically rational amid the chaos that results from split-second trading.

Finally, much research has focused on the irrationalities of futures traders (Harlow, Stone, and Teweles [1977], Glick [1957], and Smidt [1965]). These efforts confirm that the behavioral anomalies of stock and futures traders are a worthy area of research.

Simulation Trading

We study the impact of overconfidence on trading behavior and performance not by examining trading

statistics (see, e.g., Lewellen, Lease, and Schlarbaum [1979]), but through a simulated financial trading environment. The methodology of using an organized, simulated game to study trading performance (behavioral game theory approach) has been adopted by several researchers (see, e.g., Camerer and Weber [1998] and Bordia and DiFonzo [1997]). Simulation games have successfully reproduced some of the interactive complexity and dynamism rarely found in laboratory studies, but they retain a high level of control rarely found in field studies. The use of simulation games allows researchers to measure the trading performance of each individual, rather than making inferential assessments of aggregate data.

One common criticism of this approach, however, is that it does not document real market phenomena. We feel that the advantages of being able to study trader behavior in a controlled environment and to identify meaningful cause and effect relationships outweigh this concern. Additionally, it can be quite difficult to obtain conclusive results from real-world data because when an effect is found at the aggregate level there are often competing plausible hypotheses to explain otherwise. As Mook [1983] argues, the aim of a study should be to test a theoretical idea in a given setting with a given sample. External validity is not the main intent; it is not the setting or the sample that needs generalizing but the idea itself.

Methodology

Theoretical Framework

To examine the impact of trader interactions on overconfidence and trading performance, we first explain the four traits of overconfidence. We then explain the interactions between traders in an open outcry trading environment, and contrast it with an electronic trading environment.

Overconfidence Traits

Miscalibration is the tendency to overestimate the accuracy of one’s own information and probability of success. Excessive confidence in one’s information may reduce the extent to which one is willing to heed market signals. Overconfident traders may fail to adjust their beliefs and strategies accordingly, leading to poorer trading performance.

Market confidence, an excessively optimistic view of the market, gives traders the illusion of market robustness. They may thus enter into trading earlier and trade more frequently. Market confident traders are bullish. They place high valuations on stocks and commodities and expect favorable economic trends to continue. This may result in a longer holding period and a reluctance to realize losses during periods of economic

downturn, consequently leading to poorer trading performance.

The better than average effect refers to the overestimation of one's abilities relative to others. Overconfident subjects rate their abilities and their prospects higher than those of their peers. This positive view of oneself leads to unrealistic optimism about the chances of experiencing positive outcomes (i.e., making profits), and may cause excessive trading.

The risk aspect of overconfidence can be considered as the decision-makers' psychological frame of reference relative to gains and losses. A more risk-seeking trader will tend to choose a portfolio with greater volatility, representing greater probabilities of gains and losses. Overconfident traders may therefore have a greater tendency to choose riskier portfolios for higher returns. This can lead to excessive risk-taking, failure to diversify, higher than necessary trading volume, and poorer trading performance.

Trader Interactions

The solitude and digital anonymity of electronic stock trading, along with the intense sensory input of the open outcry futures trading pit, provide an almost ideal contrast to understand how confidence and its consequence on trading performance are affected by trader interactions. The solitude of electronic stock trading does not provide any visual components. The isolation provides an environment where traders can analyze information at their own pace before making trades. Intuitively, they should make better decisions.

On the other hand, the organized chaos of the trading pit often overwhelms futures traders. They are exposed to intense sensory stimuli all day: They hear the cadence and emotion of other traders' voices, they hear the prices and amounts being bid and offered, and they can easily seek insights into the thoughts and actions of other traders. With all these distractions on the trading floor, we hypothesize that futures traders will have poorer trading performance compared to stock traders.

Another impact of trader interaction on confidence can be explained by the digital anonymity of electronic stock trading. In futures trading, traders compete face-to-face in the pit, and there is a natural tendency to outperform others. A confident trader can achieve psychological and competitive advantages over a less confident trader in terms of prices and trading volume. In order to be seen as a successful futures trader (whether justified or not), one needs to behave like a successful futures trader. Futures traders would therefore be more vulnerable to the better than average effect – the illusion that one is better than others – and tend toward overconfidence.

We also postulate that futures traders have greater risk appetites, partly because of their vulnerability to overconfidence, and partly because of the leveraged

nature of futures trading. We perceive that both futures and stock traders have similar degrees of market confidence, as they have similar backgrounds.

In summary, we hypothesize that futures traders are more overconfident than stock traders, primarily because of their interactions during trading. As suggested by previous findings, we expect futures traders will have poorer trading performance than stock traders.

Experiment Design

Sample Selection

Our sample for the simulated trading games consists of 300 tertiary students from various academic institutions in Singapore. From this group, we selected 159 subjects for our study, for two reasons. First, we only selected subjects without prior trading experience to ensure we would have a similar pool of subjects and that experience level would not affect overconfidence and trading performance. Second, we eliminated non-response and response errors in the questionnaires. Of the 159 remaining valid respondents, 50 participated in the electronic stock game, and 109 participated in the futures game. This sample represents a response rate¹ of 50% for the stock games and 54.5% for the futures games.

Note that some researchers believe it is inappropriate to use students as research subjects (Friedman and Sunder [1994], Cunningham, Anderson, and Murphy [1974]). However, because of the nature of our research, we considered them more suitable than professional traders. As we noted, studies have shown that overconfidence can be eliminated through experience and learning (Gervais and Odean [2001]). Therefore, our experiment was specifically designed to remove differences in experience so that we can study the overconfidence effect in isolation.

Simulated Financial Games

Our simulated financial trading experiment is comprised of two games: an electronic stock trading game and an open outcry futures trading game. The former is a real-time online stock investment game; the latter takes place in the pits of the Singapore Exchange (SGX-DT). The games span six weeks. At the end of the games, the trading performance of the participants was evaluated based on their net worth accumulated during the games.

Simulation games have been criticized on the grounds that they may not be applicable to real-world experiences (Aronson and Carlsmith [1968]). Unlike real trading activity, there is nothing actually at stake, so participants may not be motivated to behave in their actual manner. We address this concern in various ways: 1) We provide cash incentives to the top

performers at the end of the sixth week to induce serious optimizing behavior and motivate participants to maximize their returns, 2) we note that participation is voluntary and thus assume that participants were motivated for financial reasons and/or their own interests, and 3) we observed during the games that most participants engaged intensely in their experimental task, thus providing what we believe is a high degree of experimental realism. Participants occasionally displayed intense emotions such as anger and frustration, which bolstered our confidence in the internal validity of the study (Aronson and Carlsmith [1968], Berkowitz and Donnerstein [1982]). It appeared our respondents became fully involved in the experiment; thus our findings truly reflect the psychological aspects of these respondents.

The fixed investment horizon² of six weeks is another important feature of our experiment that enhances its validity. Studies have shown that traders who differ in terms of investment horizon will evaluate the attractiveness of their portfolios differently. They also value the opportunity and frequency of rotating their portfolios differently. Traders with short-term horizons rotate more often; traders with long-term horizons are more likely to plan low portfolio turnover and care less about switching. Cespa [2002] proposes that, when facing the need to liquidate their positions, short-term investors anticipate fewer opportunities to exploit mispricing. Consequently, they are more likely to generate high trading intensity equilibrium, and are more likely to be risk-seeking.

The impact of investment horizon on trading implies that the use of an actual real-world portfolio would not have been suitable for our research. This is because in an actual investment portfolio, investors may have planned for different investment horizons and used different investment strategies, resulting in difficulties evaluating actual portfolio performance. Also, gains or losses may not be as significant to investors with long investment horizons. They may adopt a “wait-and-see” attitude and trade less frequently.

Questionnaire Design

We used a self-administered questionnaire to investigate the overconfidence level of individual respondents. Respondents were not told about the actual purpose of the research (i.e., analysis of overconfidence) so as to ensure truthful responses and unbiased judgments.

The questions are designed to be relevant but not to depend greatly on respondent financial or general knowledge. This is to ensure that differences in intelligence levels and knowledge will not affect our findings. Intelligence level is likely to affect one’s level of calibration. High intelligence and knowledge of a

particular subject may result in low miscalibration and thus negate the overconfidence effect.

We assessed the questionnaire responses by using a point scoring system. Our validity is improved by setting several questions for each trait, since any given question can have associations or interpretations that deviate from our basic concepts. To further reduce the impact of erratic answers and the magnitude of standard errors, we average the scores over the number of questions set for that trait.

Miscalibration

We determine miscalibration by asking respondents for an upper and a lower limit for sixteen sets of stock and stock index prices so that they were 90% sure the correct answer was between the two. A narrower range reflects more miscalibration.

Market Confidence

To measure the level of market confidence, we asked respondents to estimate the length of time the economy will take to recover and to predict the probability of a catastrophic stock market crash in the next two years. The longer the time period estimated and the higher the probability given, the lower the respondent’s market confidence. Respondents were also asked to predict the direction of a stock price in one day and over six months if stock prices were decreasing for the past one day and for the past six months. If respondents predicted stock prices would increase in the short term and decrease over the longer term, it means respondents “feel” that stock market corrections are to be expected from time to time. This reflects market confidence.

The Better than Average Effect

To determine whether respondents are subject to the better than average effect, we asked them to rate on a scale of 1 (strongly disagree) to 7 (strongly agree) the statements, “I have good foresight,” and “How familiar are you with stock and stock indices?” Respondents who chose 7 are most likely to display overconfidence because they perceive themselves to be superior to their peers, and think they are better than average.

Risk Attitude

To determine an individual’s degree of risk-taking, we asked participants to select their preferred volatility level for their investment portfolios. More risk-averse respondents will choose lower-volatility portfolios than more risk-seeking ones. We also asked respondents to rate on a scale of 1 to 7 the statement “I

like to take risk.” This question measures the subjective value respondents assign to the risk trait.³

Data Analysis Procedures

We analyze our data as follows. First, we compute the mean value of each trait of overconfidence (miscalibration, market confidence, better than average effect, and risk) between stock and futures traders. We are interested in determining which traits prevail in each group. Mean is a central tendency measure that reflects the average sample value. By comparing the mean value, we can determine the dominance of a trait. A higher mean value indicates the trait is more dominant.

This method is similar to that in Biais et al. [2002], which also uses mean to compare respondent overconfidence level. However, mean values only indicate the prevalent level of the traits and not the relationship of the overconfidence traits to trading performance. We also conduct a t-test between the scores of the stock traders and the futures traders to ascertain if the scores are statistically different between the two groups.

Second, to determine the association of each overconfidence trait with trading performance, we conduct a correlation analysis. By looking at the Pearson product moment correlation coefficient (r_{xy}), we know there is a strong negative linear relationship between the two variables (trading scores and overconfidence) if the r_{xy} shows a high absolute figure and a negative sign together with a small level of significance (p -value).

Finally, we conduct a multiple linear regression to determine whether the independent variables fit well in a linear model with the dependent variable as the trading score. When the value R^2 is large and the p -value is close to zero, the proportion of variation in trading scores (the dependent variable) can be largely explained by the independent variables in the regression model.

Several studies use regression in analyzing overconfidence. Biais et al. [2002] analyzes trading performance by regressing trading profits onto the psychological variables overconfidence and self-monitoring and the control variables gender and frequency of trade. Barber and Odean [2001] use the three-factor regression to relate the three risk exposures (risk related to firm size, risk related to markets, and risk related to book-to-market ratio) to individual trading performance.

Analysis of Findings

Stock and Futures Trading

Table 1 summarizes our findings for stock and futures trading. Note first that the scores on miscalibration, market confidence, better than average effect,

Table 1. *Summary of Findings on Stock and Futures Trading*

Variables	Mean	Standard Deviation
(a) Descriptive Statistics on Traders' Confidence and Performance		
(i) STOCK		
Miscalibration	57.1329	19.6153
Market Confidence	40.4932	9.2757
Better Than Average	52.5000	14.6910
Risk	53.6938	11.3813
Stock Trading Score	63.3284	10.2962
(ii) FUTURES		
Miscalibration	48.7428	12.9874
Market Confidence	41.1329	11.4248
Better Than Average	63.0147	17.4746
Risk	61.0074	19.4111
Futures Trading Score	54.2095	25.8317
Variables	t-value	p-value
(b) Statistical Findings on Comparing Stock and Futures Traders		
(i) STOCK		
Miscalibration	15.862	0.000*
Market Confidence	11.225	0.000*
Better Than Average	13.021	0.000*
Risk	18.779	0.000*
Stock Trading Score	20.362	0.000*
(ii) FUTURES		
Miscalibration	21.328	0.000*
Market Confidence	17.924	0.000*
Better Than Average	23.949	0.000*
Risk	26.293	0.000*
Futures Trading Score	30.342	0.000*

*Significant at the 5% level.

risk, and trading performance are all statistically different between both groups (Table 1b). Second, the mean score of trading performance and miscalibration is higher for stock traders than for futures traders. The higher miscalibration score (or narrower range of responses) for stock traders probably reflects their higher degree of confidence.

In contrast, futures traders have a higher mean score in the better than average effect and risk (Table 1 a). There is not much difference between the mean score in market confidence between the two groups. The responses are not affected by knowledge because we made sure the respondents had similar backgrounds and no prior trading experience.

Generally, based on the findings for better than average and risk, the futures traders are more overconfident than the stock traders. The leveraged and speculative nature of futures trading could have contributed to their higher appetite for risk, though. This higher degree of overconfidence and risk-taking could explain the poorer trading performance of futures traders.

Again, we note that the trading environment is likely responsible for these results. Futures traders are provided with plenty of visual and verbal cues all day from

interacting with other traders. Because confidence is perceived as an attribute of a successful futures trader in terms of prices and volume traded (but not in terms of profits), it is not unexpected that there would be more overconfident futures traders than overconfident stock traders.

Because electronic stock traders operate primarily in isolation, it is virtually impossible for them to achieve a competitive or psychological advantage over other traders through confidence. Besides facing fewer distractions each day, electronic stock traders are also able to better concentrate and hence make better investment decisions.

Statistical Analysis between Confidence Traits and Trading Performance

Pearson Correlation Coefficient

Table 2 gives a summary of the correlation between the overconfidence traits and trading performance and between the confidence traits themselves. Note first that all four traits of confidence are negatively correlated with stocks and futures trading scores. This rein-

forces our previous analysis that overconfident traders have poorer trading performance.

Second, in terms of the magnitude of the correlation coefficients with trading performance, futures traders have bigger differentials than stock traders in better than average and risk. Again, the findings are consistent with our previous analysis that these are the most important factors in explaining the poorer performance of futures traders. Risk is also the most important factor in explaining the poor performance of both stock and futures traders.

Finally, the correlation coefficients between the four traits of confidence are small and statistically insignificant, indicating no multicollinearity.

Multiple Linear Regression

The regression results on trading performance are given in Table 3. The high values of R , R^2 , and adjusted R^2 , the negative signs of the coefficients, and the statistical significance of coefficients again reinforce our previous analysis. The high R^2 and the fact that all

Table 2. Summary of Correlation Analysis between Traits of Overconfidence and Trading Performance

	Trading Score	Miscalibration	Market Confidence	Better Than Average	Risk
A) STOCK					
Stock Trading Score					
Pearson Correlation	1.000	.	.	.	.
Sig. (2-tailed)	.				
Miscalibration					
Pearson Correlation	-0.712	1.000	.	.	.
Sig. (2-tailed)	0.003*	.			
Market Confidence					
Pearson Correlation	-0.531	0.017	1.000	.	.
Sig. (2-tailed)	0.008*	0.928	.		
Better Than Average					
Pearson Correlation	-0.708	0.031	0.104	1.000	.
Sig. (2-tailed)	0.001*	0.868	0.572	.	
Risk					
Pearson Correlation	-0.762	0.218	0.041	0.023	1.000
Sig. (2-tailed)	0.000*	0.230	0.822	0.901	.
Futures Trading Score					
Pearson Correlation	1.000	.	.	.	.
Sig. (2-tailed)	.				
Miscalibration					
Pearson Correlation	-0.685	1.000	.	.	.
Sig. (2-tailed)	0.002*	.			
Market Confidence					
Pearson Correlation	-0.536	0.022	1.000	.	.
Sig. (2-tailed)	0.005*	0.862	.		
Better Than Average					
Pearson Correlation	-0.809	0.022	0.090	1.000	.
Sig. (2-tailed)	0.000*	0.858	0.466	.	.
Risk					
Pearson Correlation	-0.872	0.006	0.241	0.158	1.000
Sig. (2-tailed)	0.000*	0.960	0.048	0.099	.

*Significant at the 1% level (2-tailed).

Table 3. *Summary of Regression Results on Trading Performance*

Variables [^]	Standardized Beta Coefficients	p-Value
A) STOCK; R = 0.959; R ² = 0.892; Adjusted R ² = 0.914		
Miscalibration	-0.713	0.001*
Market Confidence	-0.611	0.003*
Better Than Average	-0.643	0.001*
Risk	-0.695	0.000*
B) FUTURES; R = 0.922; R ² = 0.850; Adjusted R ² = 0.828		
Miscalibration	-0.551	0.001*
Market Confidence	-0.602	0.005*
Better Than Average	-0.703	0.002*
Risk	-0.749	0.000*

[^]Dependent variable: futures trading score.

*Significant at the 1% level.

the independent variables are significant indicate no multicollinearity (Gujarati [1995]).

Conclusion

This study extends previous research on how overconfidence has affected trading performance by first studying the impact of overconfidence from the perspective of miscalibration, market confidence, the better than average effect, and risk attitudes. More importantly, we also ascertain whether interactions between traders influence the impact of overconfidence on trading performance.

Consistent with previous studies, we find that overconfidence generally negatively impacts trading performance. Our findings, significant at the 5% level, also indicate that traders in an interactive environment (such as futures traders in an open outcry pit) are more overconfident and their performance is relatively poorer than traders in an isolated environment (such as electronic market traders). It is possible that face-to-face interactions, including visual, verbal, and emotional cues, can cause futures traders to have a higher degree of confidence and a competitive advantage in prices and volume traded. Confidence is an essential feature in futures trading, thus there are relatively more overconfident futures traders than stock traders. Futures traders' relatively greater appetite for risk, a probable consequence of overconfidence, may be another component of their poorer performance.

Because electronic stock traders operate in a relatively isolated atmosphere, they have no knowledge of their counterparties, and thus cannot gauge the degree of confidence they may display. They also face fewer distractions and may be able to better concentrate when making trading decisions. Hence their trading performance is better than that of futures traders.

Limitations

The strengths of our experimental design could well be the weaknesses of our study. We chose tertiary students as our participants to minimize the influence of age, maturity, and trading experience, which are beyond the scope of this study. Accordingly, our findings may not be applicable to professional or mature traders. The relatively short investment horizon of six weeks, the smaller sample size of 159, and the uneven sample size (50 stock traders and 109 futures traders) may also compromise somewhat the generality of our findings. Future research could attempt to address some or all of these issues.

Notes

1. The response rate is the ratio of the number of respondents to the total number of game participants. The response rate for the stock games is $50/100 = 50\%$. The response rate for the futures game is $109/200 = 54.5\%$.
2. Investment horizon is the time until investors plan to liquidate their portfolios.
3. Our questions are adapted from Busemeyer, Naylor, and Stevenson [1990].

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Appendix A: Demographics of Respondents

The final section of the questionnaire provides demographic information on the respondents. We provide a summary of the demographic characteristics below.

Gender

There were a fair percentage of male and female respondents in both games. In the stock game, 53.8% were male, and 46.2% were female. For the futures

FIGURE 2

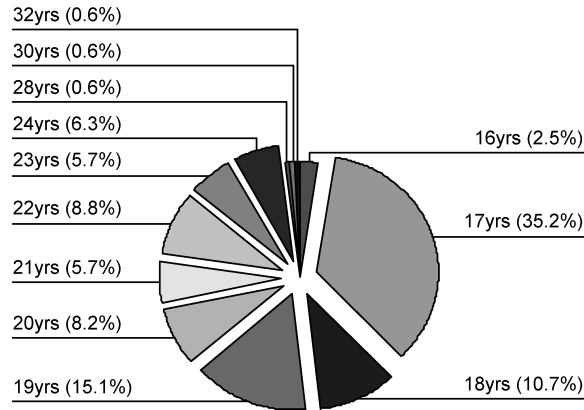
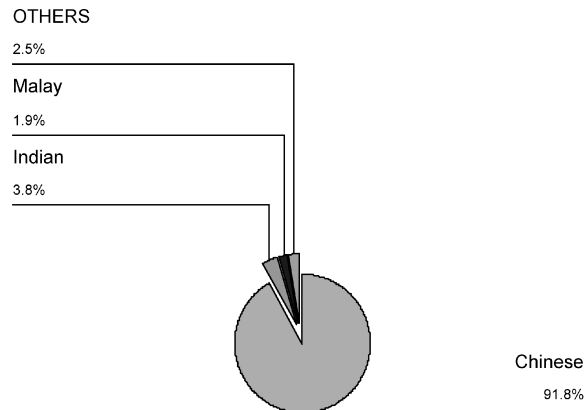


FIGURE 3



game, 60% of respondents were male, and 40% were female.

Age

Our sample consisted of tertiary students, so the majority of respondents were in their early twenties. Respondent ages range mainly from seventeen to twenty-four, as shown in Figure 2. This narrow range helps ensure that respondents have similar knowledge and experience levels to prevent significant differences in performance or overconfidence level being due to knowledge and experience disparities.

FIGURE 1

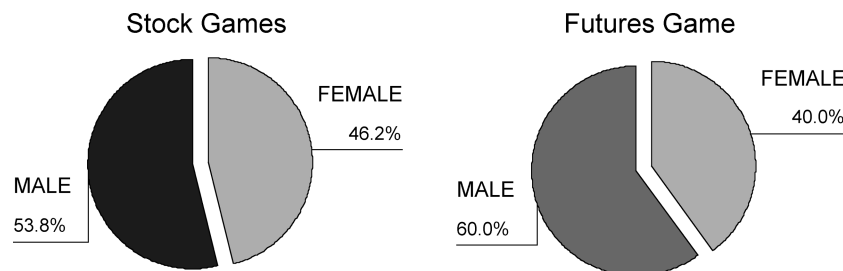
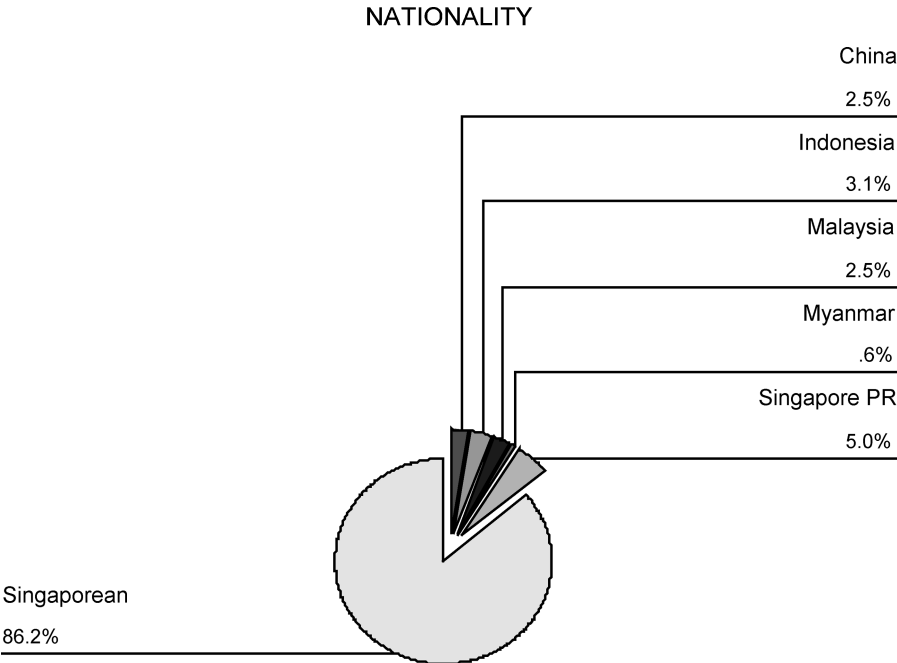


FIGURE 4



Race

The racial composition of our sample contains Chinese, Indians, Malays, and respondents from other races. Among these, the Chinese dominate with 91.8%, followed by Indians with 3.8%, as seen in Figure 3.

Nationality

The nationality of our sample varies. The majority (86.2%) are Singaporean and 5.0% are Singapore permanent residents, there are also a proportion from China, Indonesia, Malaysia, and Myanmar (see Figure 4).

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