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A Study of Overconfidence Behavior Patterns Based on Risk Game Theory Perspective

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ABSTRACT: Behavioral finance is a relatively new field in finance theory. In economic downturns, people might make more effort on their own wealth management. People always want to be rich with speculation instead of working hard so gambling is the easiest way to get rich. However, gambling is still developing and becomes legalized. We also found that people really like gambling activities, such as lottery, sport lottery, mahjong etc. Through the wide variety of gambling activities, we might find out some specific human behaviors which will affect individual's decision-making, even the investment decision-making. These behaviors may bring good or bad results. Overconfidence always make people disregard the risk factors when making a decision. Few people will consider the long term effect of that behaviors. Hence, the results would be difficult to expect. This research focused on gambling to define the effects when risk enthusiasts were in an overconfidence/underconfidence status. Under the same circumstance, we can compare the difference between overconfidence status or underconfidence status in order to analyze the procedures of decision-making.

Key words: RiskGame Theory, Overconfidence, Behavior Pattern

I. INTRODUCTION

In recent years, the research of behavioral finance has sprung up, which has stepped into economics and psychology, and has a powerful force in exploring people's behavior. As game behavior is gradually legalized and more and more gamers are interested, the research on such probability and psychological behavior has also been explored. Therefore, this study will take game enthusiasts as the object of discussion. Through research and analysis, the research model of economics and psychology will be introduced to explore whether the relationship between people's thinking mode and behavior in the game has influence, and this study intends to explore whether the relationship between people's thinking mode and behavior in the game has influence. This paper explores the behavioral patterns that may influence the wrong decision-making when people make decisions, so it takes the influence of the psychological factors "overconfidence and underconfidence " that game enthusiasts may produce as the main focus of this study.

Behavioral finance is a popular subject in recent academic circles. In the economic downturn, people attach more importance to the value of money. People don't want to rely on labor but want to get rich overnight by means of small

and big speculation. However, game is the fastest way to get rich. As a result, game is slowly rising and legalized, and game has become one of the leisure and entertainment of the public. And there are also many related studies on probability, reward rate, profit analysis and psychological impact judgment, to explore the relationship between psychological thinking mode and decision-making behavior when people have enough external information for the servant. In the game, the thinking mode of risk enthusiasts will affect the follow-up development of their gambling game, and psychological factors have a strong impact on decision-making. In the past two decades, many psychological studies on probability judgment have shown that people often make incorrect judgments about the possibility of an event, and tend to overestimate it in comparison with the actual occurrence of the event. Overconfidence is the result. (Kahneman and Riepe, 1998) It is believed that people are often too optimistic, underestimating risks and overestimating their ability to solve problems. For human beings, this study will focus on the impact of overconfidence and lack of self-confidence on game enthusiasts.

II. LITERATURE REVIEW

1. Overconfidence

Behavioral finance is a very popular subject in recent years, and "overconfidence" is a topic of great concern to many behavioral finance scholars. In the past two decades, many psychological studies on probability judgment have shown that people often make incorrect judgments about the possibility of an event, and tend to overestimate it in comparison with the actual occurrence of the event. This situation is called overconfidence. (Lichtenstein, Fischhoff and Phillips, 1982). Overconfident judgment may lead to wrong decision-making, resulting in significant loss of life and property. Over-Confidence means that people often over believe in the correctness of their judgments, and when people feel they have control over the outcome of things, their tendency to overconfident will be more obvious. In human economic behavior, overconfidence often leads people to overestimate their knowledge, exaggerate their ability to control events, and thus underestimate the possible risks. If people are too confident in their judgment, they will not realize that their judgment ability is inadequate; whether they have a preference for information collection, in this case, people will often lose the opportunity to correct or improve the judgment, resulting in bad results.

(1) Most of the errors of decision makers are due to overconfidence

In decision-making, the degree of acceptance and response to information is enough to influence the amount of reward a gambler receives. Therefore, once he only believes in the correct information he has decided and cannot accept the true correct information, the loss of reward is inevitable. When they can't judge whether they have enough information, most of them will choose to believe their own judgment. Once they choose to believe their own judgment, although the content of the information is the same, the difference of the information will increase through each investor's self-judgment. Kahneman and Riepe (1998) argue that people are often overly optimistic, underestimating risks and overestimating their ability to solve problems.

(2) Overestimating one's abilities or judgments

Overconfidence may also be manifested in the interpretation of information, rather than information itself, that is, investors believe too much in their interpretation of information, which involves people usually have too high evaluation of themselves. Most people think they are better than half of the people, and most people think highly of themselves than others (Taylor and Brown, 1988). People generally believe that their ability is better than their peers, and they are too confident in their judgment. One simple explanation for why people tend to be overconfident in their judgments is that we don't like to think we are wrong. Sternberg (2003) believes that people understand their abilities by observing the

results of their actions. However, most people tend to attribute success to their own abilities, but blame failure on bad luck or other factors, which leads to overconfidence of investors. Finally, hindsight helps investors construct a plausible explanation for past decisions, makes people proud of their decision-making abilities, and also contributes to overconfidence. Some scholars believe that the cause of overconfidence is that people overestimate their abilities in order to maintain self-esteem and reduce anxiety, so that they have overconfidence.

(3) Excessive Optimism

People often hold unrealistic optimism about future outcomes or simple probability events, such as lottery, and think that they are always luckier than others. Excessive optimism will make investors produce higher expected utility than reality. Overoptimism and overestimation of one's abilities are both positive illusions. Another question is: Who is more overconfident? Griffin and Tversky (1992) found that people are prone to overconfidence in answering medium to difficult questions. Odean (1998) believes that many investors trading in the market aim to earn a higher rate of return than other similar assets, which is particularly difficult for novices, so novices will be more overconfident than experienced investors. Gervais and Odean (2001) argue that experience helps investors understand their abilities correctly, so the growth of experience reduces overconfidence. But Griffin and Tversky (1992) also point out that when predictability is very low, experts may rely too much on theories and models and even be more overconfident than novices. In addition, successful investors survive through the process of market selection. If they tend to overestimate their contribution to success, they will also contribute to their overconfidence (Kyle and Wang, 1997).

2. Behavior Patterns

(1) Gambling Behavior

From a sociological point of view, gambling is a game originating from human society. Besides the function of leisure and entertainment, divination and gambling are also indistinguishable behaviors in the initial society. And gambling, on the psychological level, also meets the need for adventure and stimulation in human nature. Before the outcome of gambling is revealed, people hold hope for victory, which brings a little excitement and dream to ordinary people's ordinary life. Since "gambling" and "pursuit of interests" are human nature, and everyone is gambling in life, why should we restrict gambling with moral norms and criminal law? This sense of contradiction is manifested in our mentality. When we are bystanders, we think that other people's gambling is bad, corrupt and illegal; but when we are the actors of gambling, we think that what we do is just a recreational leisure activity, with money as a bet, just to increase the excitement and fun of the game, but we don't think that we do it ourselves. His gambling behavior is against morality and law.

(2) Rational Choice Behavior

Coleman (1990) adopts individualistic methodology. In fact, rational choice theory is not a theory of explaining action, but a theory of explaining and explaining the function between social system and economic system. It points out that the main task of social science is to explain the action of social system. In his view, there are two main explanatory modes in the history of sociology: holism and individualism. Holistic methodology focuses on sample analysis of the same behavior of different systems or on the analysis of different behaviors of a system in a specific period, thus ignoring the internal level of the system, especially the individual action level and lacking explanatory power. Methodological individualism uses different components of the system (such as individual behavior) to explain system behavior. It can choose a satisfactory level of interpretation according to the specific questions to be answered. Therefore, he believes that he has chosen the individualist methodology, which he calls "the internal analysis of systematic action".

(3) Decision-making Behavior

Behavioral decision-making has been called an independent research discipline at this stage, and has been expanding in the fields of economy, finance and management. The research object of behavioral decision-making theory extends to all stages of decision-making process: information stage, design stage (including judgment), decision stage and implementation stage. This paper explores how people accomplish this stage concretely in each stage of decision-making behavior, and achieves abundant research results. It can be said that most of the "decision-making bias" deviating from the traditional optimal behavior discussed in behavioral decision-making theory was found in this period. It is noteworthy that behavioral decision-making theory has begun to establish a descriptive row decision-making model based on people's actual decision-making behavior at this stage. Kahneman and Tversky (1979) the Prospect Theory proposed descriptive decision-making framework is a representative model, which has changed a lot from the traditional decision-making model. Combined with this model, they used psychology to make bold innovations in traditional economics, revised the basic assumptions of traditional economics, and opened up a new field of behavioral economics research. After a lot of experiments, they found many decision-making deviations from the traditional optimal behavior. Such phenomena as Certainty Effect, Reflection Effect, Anchoring Effect, Regret Theory and Overconfidence, etc. Based on the summary of the experimental results, the prospect theory which fully demonstrates the complexity and uncertainty of human decision-making behavior is put forward.

III. RESEARCH METHOD

The purpose of this study is to explore the behavioral patterns of game enthusiasts' overconfidence and underconfidence in the game, which are summarized as research hypothesis, variables and design. Firstly, we mainly understand the relationship between overconfidence and underconfidence of game enthusiasts and the influence of behavior patterns in game. The assumptions are as follows:

H1:The excessive self-confidence of risk enthusiasts has significant differences in gambling behavior patterns.

H2:The excessive self-confidence of risk enthusiasts has significant difference in the rational choice behavior pattern in the game.

H3:The excessive self-confidence of risk enthusiasts has significant difference in the decision-making behavior pattern in the game.

Secondly, the research variables include age, occupation, average monthly income and education level of game enthusiasts to analyze the excessive self-confidence of risk enthusiasts, and the gambling behavior, rational choice behavior and decision-making behavior pattern in the game. Finally, according to the research purpose, the question hypothesis adopts quantitative research, using questionnaire design survey method to analyze the decision-making of risk enthusiasts in several situations of game. The target group is risk enthusiasts who like game, and collects research information for research analysis. The number of questionnaires was 300 and 233 were recovered, with a recovery rate of 78% and 223 valid questionnaires.

IV. THE RESULTS OF EMPIRICAL ANALYSIS

1. Overconfidence Aspect in Hypothesis Verification of Behavior Model Research

Regression analysis was used to explore the predictive power of each behavioral pattern of the outcome variables, and to observe whether it reached a significant level. The structure of overconfidence was used as the predictive variable,

and the behavioral pattern was used as the indicator variable. Enter was used to test the causality of the variables through the establishment and test of regression equation, and the coefficient R^2 was used to determine whether there was a causal relationship between the variables. Verify the overall explanatory power of predictive variables to benchmark variables.

Table 1 Regression Analysis of Overconfidence on Gambling Behavior

Model	Unstandardized coefficient		t	Standardization coefficient	Sig
	Beta estimates	Standard error		Beta distribution	
constant	1.319	0.068	19.407		0.000**
Overconfidence	0.094	0.041	2.315	0.154	0.022*
F Vaule			5.359		
R^2			0.024		

*p<.05 **p<.01

From Table 1, the overall R^2 of overconfidence on gambling behavior is 0.024, which shows that the explanatory power of overconfidence in predicting gambling behavior is 2.4%, and the F value is 5.359 to a significant level ($p < 0.05$). In other words, overconfidence has a significant explanatory effect on the prediction of gambling behavior.

Table 2 Regression Analysis of Overconfidence on Rational Choice Behavior

Model	Unstandardized coefficient		t	Standardization coefficient	Sig
	Beta estimates	Standard error		Beta distribution	
constant	1.201	0.081	14.839		0.000**
Overconfidence	0.171	0.048	3.528	0.231	0.001**
F Vaule			12.444		
R^2			0.053		

*p<.05 **p<.01

From Table 2, the overall R^2 of overconfidence on rational choice behavior is 0.053, which shows that overconfidence has 5.3% explanatory power in predicting choice behavior, and F value is 12.444 to a significant level ($p < 0.05$). In other words, overconfidence has significant explanatory power in predicting choice behavior.

Table 3 Regression Analysis of Overconfidence on Decision-making Behavior

Model	Unstandardized coefficient		t	Standardization coefficient	Sig
	Beta estimates	Standard error		Beta distribution	
constant	1.060	0.095	11.163		0.000**
Overconfidence	0.216	0.057	3.799	0.248	0.000**
F Vaule			14.432		
R^2			0.061		

*p<.05 **p<.01

Table 3 shows that the overall R^2 of overconfidence to decision-making behavior is 0.061, which shows that overconfidence predicts decision-making behavior with 6.1% explanatory power and F value of 14.432 reaches a significant level ($p < 0.05$). In other words, overconfidence has significant explanatory power in predicting decision-making behavior.

2. Analysis of the Differences in Aspects

(1) Difference Analysis of Overconfidence, Gambling Behavior, Rational Choice Behavior and Decision-making Behavior among Risk Enthusiasts of Different Ages

Table 4 Differences in ANOVA of different age groups in different dimensions

Model	Classification	Frequency	Average	Standard Deviation	F Vaule	Sig
Over-confidence	Under 20 years	40	1.6028	.50755	0.407	0.844
	21~30 years	120	1.6463	.31028		
	31~40years	29	1.6054	.20911		
	41~50years	15	1.6593	.26383		
	51~60years	16	1.7292	.22940		
	Over 61 years	3	1.5926	.51320		
Gambling Behavior	Under 20 years	40	1.4542	.23339	2.050	0.073
	21~30 years	120	1.4590	.21607		
	31~40years	29	1.5546	.15634		
	41~50years	15	1.5111	.12936		
	51~60years	16	1.4115	.12718		
	Over 61 years	3	1.6667	.28868		
Rational Choice Behavior	Under 20 years	40	1.3972	.26734	4.082	0.001**
	21~30 years	120	1.4750	.24613		
	31~40years	29	1.4559	.20648		

	41~50years	15	1.6741	.24655		
	51~60years	16	1.5417	.18088		
	Over 61 years	3	1.7778	.19245		
Decision-making Behavior	Under 20 years	40	1.3875	.31496	1.130	0.346
	21~30 years	120	1.3958	.28547		
	31~40years	29	1.3966	.31705		
	41~50years	15	1.5167	.29073		
	51~60years	16	1.5156	.26566		
	Over 61 years	3	1.5833	.14434		

*p<.05 **p<.01

Form Table 4, the study examined the differences in gambling behavior, rational choice behavior and decision-making behavior among different age groups. The results of one-way ANOVA showed that there were significant differences between different age groups in the choice behavior dimensions.

(2) Difference Analysis of Overconfidence, Gambling Behavior, Rational Choice Behavior and Decision-making Behavior among Risk Enthusiasts of Different Occupation

Table 5 Differences in ANOVA of different occupation groups in different dimensions

Model	Classification	Frequency	Average	Standard Deviation	F Vaule	Sig
Over-confidence	Commerce	15	1.6593	.23558	0.456	0.840
	Public servant	13	1.6410	.28019		
	Workman	7	1.4762	.26227		
	Services	59	1.6497	.26488		
	Flexible job	23	1.7005	.29858		
	Student	98	1.6315	.41193		
	Other	5	1.5833	.21207		
Gambling Behavior	Commerce	15	1.5944	.20380	2.889	0.010**
	Public servant	13	1.4936	.19971		
	Workman	7	1.6905	.21362		
	Services	59	1.4647	.20715		
	Flexible job	23	1.4746	.19042		
	Student	98	1.4379	.20070		
	Other	8	1.5208	.17107		
Rational Choice Behavior	Commerce	15	1.6593	.24295	7.040	0.000**
	Public servant	13	1.4017	.25067		
	Workman	7	1.7778	.15713		
	Services	59	1.4670	.23865		
	Flexible job	23	1.6473	.23843		

	Student	98	1.4161	.23027		
	Other	8	1.4306	.12511		
Decision-making Behavior	Commerce	15	1.4167	.26163	4.180	0.001**
	Public servant	13	1.2500	.27003		
	Workman	7	1.7143	.17252		
	Services	59	1.4195	.31637		
	Flexible job	23	1.5870	.30719		
	Student	98	1.3622	.26164		
	Other	8	1.5000	.29881		

*p<.05 **p<.01

Form Table 5, the differences in gambling behavior, rational choice behavior and decision-making behavior among different occupational groups are examined by one-way ANOVA. The results show that there are significant differences in gambling behavior, rational choice behavior and decision-making behavior among different occupational groups.

(3) Difference Analysis of Overconfidence, Gambling Behavior, Rational Choice Behavior and Decision-making Behavior among Risk Enthusiasts of Different Average Monthly Income

Table 6 Differences in ANOVA of different income groups in different dimensions

Model	Classification	Frequency	Average	Standard Deviation	F Vaule	Sig
Over-confidence	Less than 2,000 RMB	100	1.6278	.41224	1.146	0.337
	2,001~4,000	51	1.6906	.26880		
	4,001~6,000	40	1.6667	.25287		
	6,001~8,000	15	1.6593	.18529		
	8,001~10,000	6	1.5741	.12989		
	10,001~12,000	6	1.4444	.12172		
	More than 12,001 RMB	5	1.3778	.47532		
Gambling Behavior	Less than 2,000 RMB	100	1.4342	.20729	1.547	0.164
	2,001~4,000	51	1.4788	.20939		
	4,001~6,000	40	1.5167	.16035		
	6,001~8,000	15	1.5056	.20036		
	8,001~10,000	6	1.5139	.23224		
	10,001~12,000	6	1.5833	.18257		
	More than 12,001 RMB	5	1.5833	.38640		
Rational	Less than 2,000	100	1.4342	.20729	2.771	0.013**

Choice Behavior	RMB					
	2,001~4,000	51	1.4788	.20939		
	4,001~6,000	40	1.5167	.16035		
	6,001~8,000	15	1.5056	.20036		
	8,001~10,000	6	1.5139	.23224		
	10,001~12,000	6	1.5833	.18257		
	More than 12,001 RMB	5	1.5833	.38640		
Decision-making Behavior	Less than 2,000 RMB	100	1.3525	.25647	3.659	0.002**
	2,001~4,000	51	1.5098	.32000		
	4,001~6,000	40	1.4625	.31292		
	6,001~8,000	15	1.4500	.33004		
	8,001~10,000	6	1.1667	.20412		
	10,001~12,000	6	1.2500	.00000		
	More than 12,001 RMB	5	1.6500	.22361		

*p<.05 **p<.01

Form Table 6, this study examines the differences in the aspects of overconfidence, gambling behavior, rational choice behavior and decision-making behavior among different income categories. The results of one-way ANOVA show that there are significant differences in rational choice behavior and decision-making behavior between different income categories.

(3) Difference Analysis of Overconfidence, Gambling Behavior, Rational Choice Behavior and Decision-making Behavior among Risk Enthusiasts of Different Education

Table 7 Differences in ANOVA of different education groups in different dimensions

Model	Classification	Frequency	Average	Standard Deviation	F Vaule	Sig
Over-confidence	Junior high school	38	1.6696	.30510	1.754	0.139
	Seniorhigh school	36	1.5370	.25268		
	Junior college	30	1.6593	.25924		
	University	113	1.6676	.38072		
	Graduate	6	1.4259	.30510		
Gambling Behavior	Junior high school	38	1.4759	.33727	2.099	0.082
	Seniorhigh school	36	1.4514	.23161		
	Junior college	30	1.3861	.19454		

	University	113	1.4993	.17709		
	Graduate	6	1.5417	.20091		
Rational Choice Behavior	Junior high school	38	1.4532	.31993	1.332	0.259
	Seniorhigh school	36	1.5123	.19204		
	Junior college	30	1.5630	.31553		
	University	113	1.4612	.20852		
	Graduate	6	1.4259	.35428		
Decision-making Behavior	Junior high school	38	1.3816	.27715	1.284	0.277
	Seniorhigh school	36	1.5000	.31623		
	Junior college	30	1.4500	.36789		
	University	113	1.3916	.26279		
	Graduate	6	1.3333	.37639		

*p<.05 **p<.01

Form Table 7, the study shows that there are no significant differences in overconfidence, gambling behavior, rational choice behavior and decision-making behavior among different educational level categories. The results of one-way ANOVA show that there are no significant differences in overconfidence and behavior among different educational level categories.

V. CONCLUSIONS AND SUGGESTIONS

1. Conclusions

Through questionnaire survey and analysis, the results show that, as shown in Tables 1 to 3, overconfidence has the greatest significance for gambling behavior, rational choice behavior, decision-making behavior and other behavior patterns, followed by choice behavior and gambling behavior, namely decision-making behavior > choice behavior > gambling behavior. Tables 4 to 7 show that the variables in this study are significantly related to age, income and occupation in terms of overconfidence, gambling behavior, rational choice behavior and decision-making behavior. Among them, different ages have the greatest significance in terms of choice behavior compared with other behavior dimensions, while different incomes have the greatest significance in terms of decision-making behavior compared with other behavior dimensions, and different occupations have the greatest significance in terms of decision-making behavior. Choice behavior is the most significant than other behavior dimensions, while education level does not affect overconfidence, gambling behavior, rational choice behavior, decision-making behavior and other dimensions.

Studies have shown that when gamblers are overconfident, they tend to think less about the outcome of gambling than those who are underconfident. Overconfident gamblers think that their chances of winning are high, so they are accustomed to putting eggs in the same basket. Such a concept can easily lead to a situation of losing or winning, whether in gambling or in choosing behavior. All of them belong to high-risk and high-profit people. When choosing investment, most of them only focus on immediate profits, and the level of consideration will not pass through rigorous thinking. Overconfidence gambling enthusiasts will influence gambling behavior and choice behavior. When different results are obtained, of course, it will also change gambling enthusiasts' decision-making behavior. Therefore, overconfidence is

closely related to gambling behavior, choice behavior and decision-making behavior. Gambling is a game of betting on something valuable to win or lose. Studies show that although many people regard gambling as an entertainment, or even a means to earn income. But gambling involves neurochemical changes that can make some people addicted. The purpose of this study is to provide risk enthusiasts with more wise choices in gambling decision-making through the analysis of questionnaires.

2. Suggestions

When making any investment, the investment funds should be based on the premise of not affecting life, avoiding the conflict between family members and the impact of living environment. No matter win or lose, we should treat the game as a kind of entertainment. It is suggested that over-confident risk enthusiasts should think carefully and make rational decisions in the face of all kinds of decisions, rather than make wrong decisions because of over-confident, resulting in irreparable consequences. Although the game-loving risk-takers with insufficient self-confidence are more conservative in their decision-making behavior, they are less confident in the scope of winning or losing. Therefore, in all game activities, they should examine their own economic situation before playing the game and regard it as a psychological game of leisure and entertainment in life. And there are risks in any game, so don't hold the idea of speculation to win big money. It is more likely that there will be real estate in serious cases.

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