



Psychological mechanisms of investors in Chinese Stock Markets

Xiao Lu Wang^{a,b,*}, Kan Shi^{a,b}, Hong Xia Fan^c

^a *Institute of Psychology, Chinese Academy of Sciences, Datun Road 10A, Chaoyang District, Beijing, PR China*

^b *Graduate University of Chinese Academy of Sciences, Yuquan Road 19A, Shijingshan District, Beijing, PR China*

^c *Institute of Labor and Industrial Relation, University of Illinois at Urbana and Champaign*

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Abstract

The study investigated the psychological mechanisms of risky investment behaviors in Chinese Stock Markets. A 42-item questionnaire was developed and distributed to 1547 individual investors recruited by stratified random sampling from Nan Fang Bond Company. A speculative orientation and a low level of risk perception among Chinese investors were revealed. The results also showed that investors were deficient in investment knowledge and skills. Structural equation modeling was used to generate a risk perception-mediated model for investment behaviors. We found that information from organizational/institutional level can precipitate low risk perception and policy-oriented speculation of investors, which could be accounted for by the collectivistic culture in China and may not be beneficial to risk management in Chinese Stock Markets. Suggestions were made regarding the further development of stock markets in China.

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* Corresponding author. Address: Institute of Psychology, Chinese Academy of Sciences, Datun Road 10A, Chaoyang District, Beijing, PR China. Tel.: +86 10 6485 4436/4350; fax: +86 10 6487 2070.

E-mail addresses: wangxl@psych.ac.cn, gioecily@yahoo.com.cn (X.L. Wang).

1. Introduction

Since the reform and opening up in 1978, China has gone through a rapid transformation from planned to market economy at the national level, and has been confronted with increasing challenges under the current trend of globalization. Its financial system has been undergoing a radical reform after China became a member of the World Trade Organization (WTO) in 2001. The transformation process however is associated with higher risk and uncertainty in the rapidly changing economic environment. According to the guidelines for future work regarding the Chinese financial sector (Chen, 2002), the Chinese government will put more emphasis on precautions against and reduction of financial risks.

Stock markets in China (e.g., Shanghai Stock Exchange, Shenzhen Stock Exchange, etc.) have been burgeoning remarkably since their establishment at the end of 1990 in response to the efforts of the Chinese government to develop a market-oriented economy. Having developed for ten years, the proportion of the total value of Chinese Stock Markets to GDP of China was up to 45% in 2001 (Huang, Lin, & Liang, 2002). However, compared with the more developed markets such as the New York Stock Exchange (NYSE) and the Tokyo Stock Exchange (TSE), Chinese Stock Markets are still in the elementary stage of development with an array of problems.

Firstly, Policies from China's Securities Regulatory Commission lack continuity and stability which precipitated severe "policy-oriented" speculation (Cheng, 2003). It is evident from the 26 highest rates of daily return ranging from 8.08% to 28.86% and 25 lowest rates of daily return ranging from -17.91% to -7.41% of the Shanghai Stock Exchange index from 1991 to 2002. These were all caused by policies or information relevant to stock market issued by the government. For instance, the State Council and the Chinese Securities Regulatory Commission decided to implement the "three market-saving policies". This piece of policy-oriented information accounted for 28.86% of return of the Shanghai Stock Exchange index the day after (Wang, 2003). Secondly, most listed companies have evolved from formerly state-owned enterprises. To ensure the state holding dominant shares, the percentage of liquid shares of list companies is commonly constrained to less than 50% so that the function of stock market becomes mainly on raising money from investors for state-owned companies rather than estimating the value of listed companies and improving the efficiency of capital use and allocation, causing a functional bias of stock markets. Thirdly, the benefits of investors have always been ignored and impaired. On the one hand, with respect to the dividend policies, listed companies in Chinese Stock Markets are generally implementing a non-distributive dividend policy (Song, 2003). The proportion of listed companies following non-distributive dividend policy was 59.8% in 1999. Only 7.44% of listed companies had distributed dividend continuously from 1997 to 2000. On the other hand, the performance of listed companies lacks continuously developing potential. For example, the average return on net asset of all listed companies had decreased from 15% in 1993 to 7.61% in 2000. In addition, there were only two listed companies suffering financial loss in 1994 which accounted for 0.68% of listed companies, but when it came to 2000, the amount of listed companies at a loss had increased to 96, accounting for 8.5% of listed companies. Therefore, in this sense, the non-distributive dividend policy might not be a good sign here showing the firm's capacity to generate new business but a sign revealing harm to investors' benefits. Last but not least, the annual turnover rates of Shanghai Stock Exchange and Shenzhen Stock Exchange ranged from 341% to 760% and 265% to 950% respectively from 1992 to 1998. The average P/E ratios in Shanghai Stock Market and

Shenzhen Stock Market were 58.22 and 56.03 respectively in 2000, which were significantly higher when compared with the average of 15 in developed markets (Song, 2003). The above evidence consistently indicated a short-term speculative orientation which currently prevails among investors in Chinese Stock Markets when compared with developed markets such as those in the US and Japan.

Given the above speculative investment environment, risk management plays an essential contributory role in the stability and further development of the emerging Chinese Stock Markets. Even though the developed markets such as NYSE have established an advanced credit and market regulation system to manage risk, they are still fragile to the risk of stock crisis, which is evident by the stock market crashes taking place in 1929, 1987 and 2000 in the US. Risk management has therefore emerged as an intensive research area in finance.

Unfortunately, theories of neoclassical Finance derived from developed markets have become gradually insufficient to guide investors in coping with related risks. Finance researchers in western countries have observed more and more market anomalies since the end of the 1970s (De Bondt & Thaler, 1985; Friedman, 1953; LeRoy & Porter, 1981; Mehra & Prescott, 1985; Shiller, 1981) which violated basic principles of neoclassical Finance such as the Efficient Markets Hypothesis (EMH). Accordingly, strategies and tactics such as diversification and indexing, contrarian and momentum, stop-loss tactics and portfolio insurance were developed to manage and reduce market risk (Wärneryd, 2001). The use of these strategies and techniques per se implies a violation of the efficient-market theory.

The decisions of investors were not found to be as unboundedly rational as the theories of neoclassical Finance hypothesized. Simon (1986) proposed that humans have fundamental limitations on their information processing capacities, which explains why investors sometimes behave irrationally. Kahneman and Tversky (1979, 1982) suggested that cognitive limitations compelled people to employ various heuristics (e.g., availability, representativeness and anchoring, etc.) so as to ease the burdens of processing complex and ambiguous information when making judgments and decisions in an uncertain environment. However, these heuristics may meanwhile lead to faulty judgments which are known as cognitive biases. They also posited prospect theory which rendered them Nobel Prize Laureates in Economics in 2002. It suggested that risk attitudes under profit and loss situations are somewhat opposite, thus violating the consistent risk attitude hypothesis in neoclassical Finance. In response to the difficulties faced by the traditional paradigm of neoclassical Finance, researchers have developed a new “behavioral” approach to investigate financial markets. Behavioral Finance aims at analyzing the aggregate market phenomena on the basis of the psychological mechanisms of investment behaviors (Barberis & Thaler, 2002).

Behavioral Finance has provided a better understanding of some financial phenomena by using models of not fully rational agents (Barberis & Thaler, 2002). Because of the imperfect market regulations and policies in Chinese Stock Markets, the prevailing speculative and irrational investment behaviors may have a relatively larger impact on the market. Given this, the Behavioral Finance approach seems to be particularly applicable to the emerging Chinese Stock Markets.

The present study purports to construct a psychosocial model which may be used as the theoretical foundation for investigating the psychological mechanisms of investment behaviors in Chinese Stock Markets. This study also aims to provide psychological and managerial suggestions in risk management of stock markets and contribute to the establishment of a national psychological precautionary system during stock crises (Shi, 2003).

1.1. A model of psychological mechanisms of investment behaviors

Based on the classical information processing theory and the stimulus–organism–response (S–O–R) theory, we investigated the psychological mechanisms of investment behaviors from three different angles: external stimuli, psychological cognitive processes, and responses.

The Efficient-Markets theory stipulates that stock price moves up or down as a consequence of new information. Underlying this market phenomenon, investment decisions vary with investor expectations based on new information available (Wärneryd, 2001). Accordingly, various kinds of information flooding the stock markets serve as external stimuli to investors which have an impact on their investment decisions. A plethora of research efforts have been put on investigating the impact of different information on stock price (e.g., hidden information or public knowledge) and on expectation formation of investors (Wärneryd, 2001). However, little is currently known about the effects of information type, which is defined as various kinds of information concerning different risk sources, such as policies relevant to stock market, interest rate and listed companies. Our research attempts to address this neglected area by considering information type as an independent variable. There are three kinds of subjective risk factors in Chinese Stock Markets: investment intentions of market maker/banker, pursuing up-going stock, and excessive speculation. Objective risk factors include interest rate, commodity price, policies relevant to stock market and listed companies (Song, 2003).

Besides, information asymmetry (i.e., the condition that information is known to some, but not all, participants) is a salient characteristic of information in Chinese Stock Markets due to the imperfect regulations of information disclosure (Cheng, 2003). Taking into account its potential impact on irrational investment decision, we include it as another independent variable in this study. The information influencing the value of stock can be categorized into two risk sources: subjective risk and objective risk. Subjective risk is derived from investors' risky behaviors and objective risk comes from the investment environment.

The basic risk-return profile implies that an investment decision is made in terms of the expectation that the investment will become less risky and generate a higher level of return (Bodie, Kane, & Marcus, 2001). This indicates the key role of risk perception as a mediating variable in the cognitive process of investment decision-making. Perception of risk is a subjective or sometimes intuitive judgment of the probability of an undesirable event. It may or may not be consistent with actuality due to the influences of many psychological, social, situational and cultural factors (Douglas & Wildavsky, 1982; Slovic, 1987; Vlek & Stallen, 1981). Slovic (1987) proposed a psychometric model of risk perception and contended that people assess all kinds of risky events mainly from two orthogonal dimensions of “controllability” and “familiarity”. In this Cartesian coordinate system, every risky event is located at a point which could directly exhibit human perceptual features of risk. This psychometric model was used to measure the risk perception of Chinese people during the SARS outbreak and was shown to be valid in the Chinese context (Shi, 2003). The present study adopted this two-dimension psychometric model as a measure of risk perception for investors.

As responses to relevant information and risk perception, both reinvestment intentions and investment satisfaction were taken as dependent variables due to their crucial roles in ensuring the continuous and stable development of emerging Chinese Stock Markets.



Fig. 1. Risk perception centered model for psychological mechanism of investment behavior.

Given the above, we constructed the psychosocial model as illustrated in Fig. 1 which acted as the conceptual framework for this study.

We had three major objectives in this research. First, we aimed at discovering the risk perception features of different information types, and how they subsequently affected the reinvestment intention and the investment satisfaction through risk perception. Second, due to the collectivistic cultural background in China, we also attempted to examine the effects of institutional factors on risk perception, such as the policies issued by China's Securities Regulatory Commission and the dividend information issued by listed companies, which may contribute to explaining the prevailing policy-oriented speculation among Chinese individual investors. Third, we examined the effect of information asymmetry on risk perception of Chinese investors.

In terms of the conceptual framework, we formulated four hypotheses as follows:

Hypothesis 1: Information type (i.e., different kinds of information concerning different risk sources) will have significant impact on risk perception.

Hypothesis 2: The information from the organizational/institutional level will reduce the risk perception of investors.

Hypothesis 3: Information asymmetry will increase risk perception of investors.

Hypothesis 4: Lower risk perception will lead to stronger reinvestment intention and higher investment satisfaction.

2. Method

2.1. Subjects

We targeted at individual investors of Chinese Stock Markets. 46 Sales departments were selected by stratified random sampling from Nan Fang Bond Company which is a famous nationwide stock brokerage firm in China. Forty individual investors were then randomly recruited from each of these departments. This procedure resulted in 1840 individuals who constituted the sample of this study. In total, 1547 validly completed questionnaires were returned indicating a response rate of 84.1%.

2.2. Instrument

In our earlier collaboration with Nan Fang Bond Company to assess its business needs, we developed a questionnaire consisting of two main sections: psychological and financial. In this study, we used the psychological section of the original questionnaire. The following section elucidates the development of the psychological section of the original questionnaire.

Based on the hypothesized conceptual framework of the psychological mechanism of investment behaviors described earlier, a list of 25 relevant questions was generated which served as guide for a semi-structured interview. We used this interview guide to probe information as to how individual investors evaluated risk associated with different information types and information asymmetry when making investment decisions, and what other factors such as demographic variables of investors may influence the process of risk evaluation and investment decision-making. Semi-structured interviews were conducted with a sample of 20 individual investors randomly recruited from 20 departments of Nan Fang Bond Company. Results of the semi-structured interviews substantiated the hypothesized conceptual framework that risk perception played a key role in the cognitive process of investment decisions. In addition, we established seven pieces of representative information for the seven risk sources as information types. For instance, as improper management was regarded as representative information related to the risk source of listed company, we took “improper management of listed company” as one of information types.

In terms of the results obtained from the semi-structured interviews and the hypothesized conceptual framework of the psychological mechanism of investment behaviors, we constructed a preliminary questionnaire of psychological and behavioral characteristics of Chinese individual investors for this study. This preliminary 42-item questionnaire consisted of four major sections. The 15-item first section comprised the importance of different information types (7 items), the influence of information asymmetry (1 item), and the satisfaction with information disclosure and yield reallocation of listed company (7 items). The second section included 14 items to measure the risk perception on different information types. The third section consisted of 4 items relevant to investment behaviors involving investment satisfaction, reinvestment intention, and investment performance. The fourth section included 9 items on individual characteristics of the respondents such as investment cycle, investment knowledge, gender, age, and educational level.

A pilot study to validate the preliminary questionnaire was then conducted using 54 individual investors randomly recruited from the Nan Fang Bond Company with a response rate of 100%. Good reliabilities and validity of the preliminary questionnaire were demonstrated. The Cronbach's alpha coefficients ranged from 0.72 to 0.88. Due to the insufficient sample size for a meaningful Exploratory Factor Analysis, we however calculated the multivariate correlations between the familiarity and controllability dimensions to examine the validity of risk perception scale. The correlation coefficients ranged from 0.01 to 0.41 which showed poor to moderate correlation between these two dimensions. This essentially implied a two-dimensional psychometric model of risk perception.

The above favorable psychometric properties of our preliminary questionnaire suggested that all items of the questionnaire could remain unchanged. As ceiling effects were indicated in the Likert scale items, we extended the original 5-point to 7-point Likert scales in the final version of questionnaire to increase the sensitivity of the items. The final version of the questionnaire is included in [Appendix](#).

The final questionnaire showed psychometrically acceptable reliability and validity among subjects in the main study ($n = 1547$). The Cronbach's alpha coefficients ranged from 0.84 to 0.92. Exploratory factor analysis was used to examine the construct validity of

Table 1
Exploratory factor analysis on risk perception

Items	Factor 1	Factor 2	Mean	SD
Familiarity on pursuing up-going stock	0.74	−0.06	4.39	1.10
Familiarity on investment intention of market maker/banker	0.71	0.01	4.03	1.15
Familiarity on variation in policies related to stock market	0.68	0.07	4.17	1.20
Familiarity on excessive speculation	0.67	0.02	4.28	1.25
Familiarity on improper management of listed company	0.63	0.07	3.69	1.33
Familiarity on fluctuation of interest rate	0.59	0.11	4.23	1.18
Familiarity on fluctuation of commodity price	0.46	0.22	30.64	1.12
Controllability on variation in policies related to stock market	−0.04	0.77	3.00	1.41
Controllability on improper management of listed company	0.05	0.68	2.80	1.40
Controllability on fluctuation of interest rate	0.11	0.67	3.42	1.42
Controllability on fluctuation of commodity price	0.16	0.61	3.34	1.25
Controllability on investment intention of market maker/banker	0.45	0.41	3.65	1.21
Controllability on excessive speculation	0.49	0.29	4.10	1.37
Controllability on pursuing up-going stock	0.52	0.27	3.99	1.23
% of Variance	28.15%	14.54%		
Total	42.69%			

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

risk perception, and the results (see Table 1) indicated our data was moderately accounted for by a two-factor model comprising controllability and familiarity. It could be ascribed to the way in which risk perception was measured. Both controllability and familiarity were measured by a similar set of item questions (e.g., information about fluctuation of interest rate, information about variation in policies related to stock market) but with two different response scales (see Appendix) such that two dimensions of risk perception could be differentiated from each other.

2.3. Procedure

Copies of the final questionnaire were mailed to the departments of Nan Fang Bond Company. On the same day previously determined by researchers, staff members in different departments who were trained by the researcher beforehand administered these questionnaires to the individual investors after closure of the stock markets. All subjects participated as volunteers. Verbal informed consent was obtained before they completed the questionnaire anonymously. The completed questionnaires were then mailed to the Institute of Psychology at the Chinese Academy of Sciences for analysis.

2.4. Data analysis

Our analysis focused on the items of the questionnaire which were relevant to the risk perception characteristics of Chinese investors and their psychological mechanisms underlying investment decisions.

Frequency statistics was computed for the demographic data and responses to the questionnaire. Means and standard deviations were calculated to assess respondents' familiarity and controllability scores concerning different information types. The scores were plotted in a Cartesian coordinate system to represent the risk perception feature for each information type (Shi, 2003; Slovic, 1987). Repeated Measures ANOVA was used to investigate differences among the seven information types as to risk perception. Structural equation modeling (SEM) via Amos 4.0 was adopted to construct and verify the hypothesized conceptual framework of the psychological mechanisms of investment behaviors.

3. Results

3.1. Demographic characteristics of subjects

Of the 1547 individuals, 61.6% were males and 38.4% were females. 18.0% of the participants aged 20–29, 31.6% aged 30–39, 25.9% aged 40–49, 15.3% aged 50–59, and the remaining 9.2% of participants aged above 60. 9.1% of participants completed junior high school or below, 31.5% completed high school, 34.5% completed junior college, 21.9% completed undergraduate level, and 3.0% were at graduate level or above.

3.2. Duration of investment cycle

Results show that the majority of investors (76.3%) spent less than half a year on one investment cycle which is defined as the time from stock buying to stock selling. Some 27% of the investors' investment cycles were even shorter than one month. Only a small number of the respondents (7.3%) had investment cycle longer than one year.

3.3. Investor's self-estimation about investment knowledge

83.9% of respondents thought that they had some investment knowledge. Only 28.2% of them believed that they had an expertise in technical analysis. 12.5% of respondents admitted that they had a limited amount of investment knowledge. 3.6% of respondents did not even know that stock selection should be based on fundamental and technical analysis.

3.4. Importance of information types for investors

Mean importance scores investors gave to the seven information types when making investment decisions are presented in Table 2. The table suggests that the sequence in descending importance order was information about variation in policies related to stock market, information about improper management of listed company, risk existing in pursuing up-going stock, investment intention of market marker/banker, fluctuation of interest rate, risk existing in excessive speculation, and fluctuation of commodity price.

Table 2
Importance of information types

Item	Mean	SD
Variation in policies related to stock market	5.66	1.52
Improper management of listed company	5.52	1.33
Risk existing in pursuing up-going stock	4.78	1.19
Investment intention of market maker/banker	4.66	1.66
Fluctuation of interest rate	4.15	1.14
Risk existing in excessive speculation	4.12	1.32
Fluctuation of commodity price	3.56	1.21

3.5. Risk perception of investors

Based on Slovic's two-dimension model of risk perception, the descriptive statistics of respondents pertinent to their risk perception concerning familiarity and controllability are presented in Table 1.

Repeated Measures ANOVA was respectively conducted on investors' feelings of familiarity and controllability. There were significant differences among investors' familiarity ($F(6, 1258) = 96.09, p < 0.001$) and controllability ($F(6, 1260) = 126.15, p < 0.001$) on the seven information types. The investors' feeling of familiarity towards the seven information types in descending order was: pursuing up-going stock, excessive speculation, fluctuation of interest rate, variation in policies related to stock market, investment intention of market maker/banker, improper management of listed company, and fluctuation of commodity price. Post-hoc multiple comparisons using Bonferroni's test revealed that the investors' familiarity with pursuing up-going stock was significantly higher than with other information types ($p < 0.05$), and investor's familiarity with fluctuation of commodity price and the improper management of listed company was significantly lower than with the other five information types ($p < 0.05$). As to controllability, the investors' feelings towards the seven events in descending order was: excessive speculation, pursuing up-going stock, investment intention of market maker/banker inappropriately, fluctuation of interest rate, fluctuation of commodity price, variation in policies related to stock market, and the improper management of listed company. Post-hoc Bonferroni analysis showed that with the exception of fluctuation of interest rate and commodity price there were significant differences among investors' feelings of controllability towards the other five information types ($p < 0.05$). This implied that the investors had the strongest feeling of control on excessive speculation. They believed that they were able to handle the risk brought by excessive speculation. However, investors felt that they had the lowest control over risks from improper management of listed company. Based on the above results, we then constructed a Cartesian coordinate system of risk perception according to Slovic's theory (Fig. 2).

Fig. 2 shows that investors' risk perception was generally located in the upper right quadrant of the Cartesian which belongs to the area of being familiar and controllable. This demonstrated the belief of Chinese individual investors that these risk sources represented by information types were familiar and under their control.

However, among these seven information types, the information on improper management of listed company and variation in policies related to stock market were in the area of being familiar but not controllable. This suggested that investors would consider improper

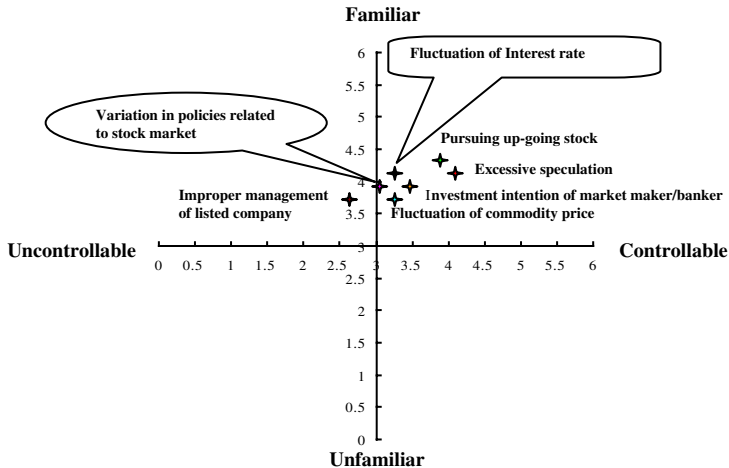


Fig. 2. Risk perception distribution of investors.

management of listed company and variation in policies related to stock market the two biggest sources of risk which were not under their control. As to the other five information types which were all located in the quadrant of being controllable and familiar, it seems that investors had relatively lower risk perception on the latter three subjective risk factors. The above evidence supported our first hypothesis that information type has significant impact on risk perception.

3.6. Structural equation modeling of psychological mechanisms of Investor's Behaviors

Structural equation modeling (SEM) is currently the most widely-adopted method to explore causal relationships in a complex theoretical model (Hoyle, 1995). According to Fig. 1, three relevant information types (i.e., variation in policies related to stock market, satisfaction with information disclosure, and satisfaction with yield reallocation) and information asymmetry were adopted as exogenous variables in the structural equation modeling. Reasons for choosing these three information types are specified in the following two paragraphs. Besides, risk perception was regarded as the mediating variable. In the structural equation modeling, a mediating variable is considered an endogenous variable. To facilitate understanding, we converted risk perception scores here such that higher scores indicate higher risk perception. We used the two means of controllability and familiarity respectively as two observable indicators of risk perception. We included investment performance, reinvestment intentions and investment satisfaction as endogenous latent variables. The former two variables were each measured by a single item; the latter variable was measured by two items (see Appendix). As the original scoring method of investment performance and reinvestment intentions could elicit misunderstanding, we converted the scores of these two subscales too such that higher scores indicate higher performance and stronger intention to reinvest on the stock market.

Based on the results we obtained regarding the importance and risk perception of the seven information types, we selected variation in policies related to stock market and improper management of listed company as representative information types due to their

highest importance and highest risk perception to investors, and included them in the structural equation model as exogenous variables to investigate their effects on investment behaviors through risk perception. Meanwhile, we tested the hypothesis that information from the organizational/institutional level, such as variation in policies related to stock market, reduces risk perception of investors.

Investors often regarded improper management on information disclosure and yield reallocation of listed companies in Chinese Stock Markets as risk factors. We therefore further divided the information type of improper management of listed company into these two aspects and treated them as exogenous variables in the structural equation modeling. In operational terms, they were measured respectively from “satisfaction with information completeness, transparency, authenticity, and timeliness” and “satisfaction with dividend and bonus reallocation, allotment of shares and increase issue in stocks” following a seven point Likert scale with 1 meaning “totally unsatisfied” to 7 meaning “totally satisfied”.

Estimation results of the model constructed above showed good fit to the data observed as shown in Fig. 3 ($\chi^2/df = 1.33, df = 24, p > 0.05$; GFI = 0.99; AGFI = 0.97; CFI = 0.99).

Fig. 3 shows that “variation in policies related to stock market” had a significant and suppressant effect on risk perception (path index = $-0.23, p < 0.05$). This suggested that despite there existing great variation in policies related to stock market, policies as the source of information at the institutional level still could reduce risk perception which in fact substantiated our hypothesis 2 that information from this level reduces risk perception of investors. However, information asymmetry was inversely related to risk perception either (path index = $-0.15, p < 0.05$), which is contrary to what we had expected. This indicated that investors’ risk perception was not increased by information asymmetry although they knew that information asymmetry would greatly influence their decision. This finding did not support our hypothesis 3 which will be discussed in the following section.

Fig. 3 further shows that satisfaction with information disclosure of listed company had a significantly negative effect on risk perception (path index = $-0.76, p < 0.05$), which implies that good quality of information disclosure (e.g., transparency, timely release, integration and authenticity) could reduce investors’ risk perception. Nevertheless, the path

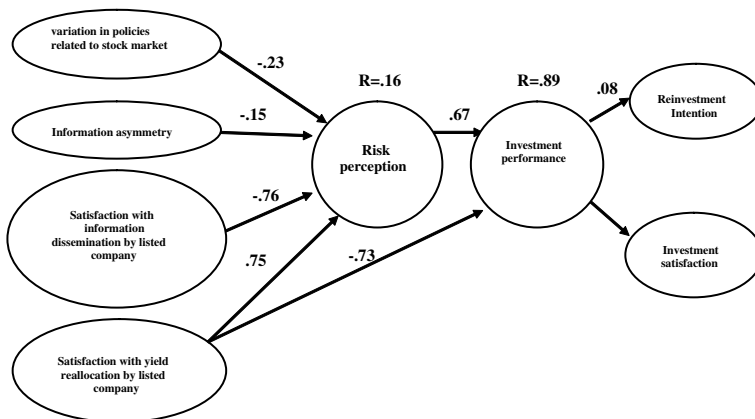


Fig. 3. Predictive model of investment behaviors.

index from satisfaction with information about yield reallocation to investors' risk perception was 0.75 ($p < 0.05$). It propounds that investor's risk perception could not be reduced by the information of yield reallocation even though they were satisfied with the reallocation.

Structural equation modeling also revealed a positive relationship between risk perception and investment performance with path index being 0.67 ($p < 0.05$), which indicates a higher risk perception might lead to higher investment performance. It also confirms that investors' reinvestment intentions and investment satisfaction could be predicted by risk perception through investment performance. The coefficients for the effects of investment performance on reinvestment intentions and investment satisfaction were 0.08 ($p < 0.05$) and -0.39 ($p < 0.05$) respectively. It implies investors tended to reinvest despite having a high risk perception of the stock market, and lower risk perception was confirmed to be associated with higher investment satisfaction. Hypothesis 4 was therefore partially supported here.

4. Discussion

4.1. Speculative atmosphere in Chinese Stock Markets

Our results are consistent with Song's stipulation (2003) that short-term speculative investment behaviors are currently prevailing in Chinese Stock Markets. It is evident in the short investment cycle of Chinese individual investors which was usually shorter than half a year and the tendency of individual investors to reinvest despite having a high risk perception towards stock markets, especially with the fact taken into account that most of Chinese individual investors lacked investment knowledge and skills. This can be ascribed to their high risk perception on the continuous development of listed companies' performance in the long term, revealed by the positive relationship between satisfaction with yield reallocation by the listed company and risk perception. Besides, they however tended to underestimate investment risks. It was demonstrated by our result that most of the investment risks were located in the first quadrant of being familiar and controllable of risk perception. This reflected their overconfidence with their short-term speculative investment behaviors (Wärneryd, 2001).

4.2. Orientation of Chinese investors on different investment risks

As shown in Fig. 2, we further identified that subjective risk, when compared with objective risk, was underestimated. The lowest perceived risk concerned pursuing up-going stock and excessive speculation, which again demonstrated the prevailing price-oriented and speculative behaviors among Chinese individual investors. It could also be attributed to investors' deficiency in advanced investment knowledge and strategies such as fundamental and technical analysis, and hedging.

Judging from the location of different information types on the risk perception map, improper management of listed company seemed to be the main objective source of risk for Chinese individual investors. Although individual investors were familiar with this kind of objective risk, they considered it uncontrollable. It implicates the lack of confidence of individual investors to manage the risks from improper management of listed company, which may further reinforce their price-oriented speculative behaviors. This could be

related to the investors' deficiency in investment skills such as fundamental analysis or lack of confidence in the performance of listed companies. We recommend that education and training on investment knowledge and skills for Chinese individual investors be provided by Security-relevant organizations such as the Chinese Securities Regulatory Commission or securities companies, which could be established as a way of risk management of Chinese Stock Markets.

4.3. Psychological mechanisms of Chinese investors

Risk perception, as shown in the structural equation model in Fig. 3, played a key role in the psychological mechanisms of behaviors of Chinese individual investors. Approaches to managing and controlling investors' risk perception are therefore important for the stable and continuous development of the Chinese Stock Markets.

Fig. 3 shows that information about policy had a positive impact on reducing investors' risk perception. However, this may not always be beneficial to the stable and continuous development of Chinese Stock Markets. Due to the collectivistic culture in China (Markus & Kitayama, 1991; Morris, Davis, & Allen, 1993; Spector, Cooper, Sanchez, O'Driscoll, & Sparks, 2002; Weisz, Rothbaum, & Blackburn, 1984), individual investors would be more likely to rely on external forces such as government policy to deal with investment risks. Because of the traditional planned economy and the state-owned nature of listed companies in China, the government often releases information in favor of certain market participants, which deviates from the free competitive mechanism of market economy. In addition, government policies relevant to the regulation of Chinese Stock Markets lack continuity and stability (Song, 2003). As a result, under this collectivistic orientation of Chinese individual investors, the policies used to regulate the stock markets not only reduce the risk perception of investors in an inappropriate way but also promote policy-oriented speculative investment behaviors in stock markets. Wang (2003) described it as the "Policy market" where investors assign more importance to policy than to the intrinsic value of stock when making investment decisions.

Our results did not support the hypothesis that information asymmetry will increase investors' risk perception (Hurley & Shogren, 1998; Healy & Palepu, 1998). This again demonstrated the fact that investors tended to underestimate investment risks. It parallels our earlier observation that Chinese investors were deficient in investment knowledge. This justified the necessity of providing education and training of investment knowledge and skills for Chinese individual investors. This could be an effective means of risk management of Chinese Stock Markets.

As a rule, listed company should take the responsibility of disclosing information on the real value of business investment opportunities and making appropriate return allocation for investors. Good quality of information disclosure could reduce risk perception of investors through the dimension of familiarity, which was confirmed by our result showing a negative relationship between satisfaction with information disclosure of listed company and risk perception. Good return could reduce risk perception (Ganzach, 2002). However, our results indicated that satisfaction with yield reallocation by listed companies in China increased the risk perception of investors. This revealed the lack of confidence of Chinese individual investors not only in the continuous performance growth of listed companies but also in its standpoint regarding the benefits of shareholders. It might be due to the perception that listed companies in China are more concerned with raising money from

stock markets than the benefits of shareholders which is evident from the prevailing non-distributive dividend policy (Song, 2003). Given the above, we further recommend that listed companies in China should release financial information more transparently, timely and authentically through financial statements, management forecasts, and other corporate reports. In order to correct the functional bias of stock markets in China, it is necessary to reduce the state's stake in listed companies and accordingly increase the liquidity of stocks and competitive mechanism in markets, which would be beneficial to the continuous development of Chinese Stock Markets.

Besides, as shown in Fig. 3, higher risk perception led to higher investment performance and in turn stronger aspirations of reinvestment but lower satisfaction with stock markets. It to some extent accounts for the frequent stock-trading behaviors prevailing in Chinese Stock Markets. Given the inequitable relationship between listed companies and individual investors in Chinese Stock Markets due to the state-owned nature of listed companies and the lack of persistence in the growth of stock price, short-term frequent stock trading is always adopted by Chinese individual investors to speculate in the stock markets. This kind of speculative investment behaviors are sometimes a useful way to win in the Chinese Stock Markets (Song, 2003), and in some sense reflects the risk-taking orientation of Chinese people (Lau & Ranyard, 2005; Weber, Hsee, & Sokolowska, 1998). Meanwhile, although investors were rewarded by investment return, the inequitable relationship between them and listed companies could still impair investors' satisfaction with stock markets. Therefore, despite the high risk perception of individual investors on stock markets, they still tend to reinvest in the stock markets by frequent stock trading under the incentive and reinforcement of investment return. On the other hand, the negative relationship between high risk perception and low satisfaction with stock markets is not good for the development of stock markets on a long term basis.

5. Conclusion

This study confirmed a risk perception-centered psychological mechanism to understand the irrational investment behaviors such as short-term speculation and frequent stock trading prevailing in Chinese Stock Markets. It also revealed an underestimation of risk in stock markets by Chinese individual investors. They had lower risk perception on subjective risks such as pursuing up-going stock and excessive speculation than objective risks such as variation in policies related to stock market and improper management of listed companies. This contributed to the speculative atmosphere in the Chinese Stock Markets. In addition, we found that institutional factors such as market policy had a great impact on investment decisions of investors because of the collectivistic culture in China. Based on our findings, we have made a few recommendations for the healthier development of the Chinese Stock Markets in the future. First, education and training on investment knowledge and skills should be given to the Chinese individual investors. Second, China's Securities Regulatory Commission should strengthen the regulation of listed companies on information disclosure and investment yield reallocation so as to increase the investment confidence of investors. Third, in order to rectify the functional bias of stock markets in China, it is necessary to reduce the state's stake in listed companies and accordingly to increase the liquidity of stocks and the competitive mechanism in the markets. Fourth, more emphasis should be given to the risk management of stock markets and meanwhile to keep the continuity and stability of market regulation policies, which in turn

contributes to the establishment of a national psychological precautionary system in stock crisis.

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Appendix A. Questionnaire for psychological mechanism of investment behaviors

A.1. The information section

The First Part: assesses the weight investors give to the information about the seven risk sources when making investment decision and the extent of satisfaction with listed company.

How important is the information about the each of the following seven risk sources to you when making investment decisions?

- 1 not at all important
- 2 unimportant
- 3 moderately unimportant
- 4 neither unimportant nor important
- 5 moderately important
- 6 important
- 7 extremely important

- (1) Information about the fluctuation of interest rate
- (2) Information about the investment intention of market maker/banker
- (3) Information about the fluctuation of commodity price
- (4) Information about the improper management of listed company
- (5) Information about the variation in policies related to stock Market
- (6) Information about pursuing up-going stock
- (7) Information about the excessive speculation

How satisfied are you with the information disclosure about listed Companies?

- 1 not at all satisfied
- 2 unsatisfied
- 3 moderately unsatisfied
- 4 neither unsatisfied nor satisfied
- 5 moderately satisfied
- 6 satisfied
- 7 totally satisfied

- (1) Information completeness
- (2) Information transparency
- (3) Information authenticity
- (4) Information timeliness

How satisfied are you with the yield reallocation of listed Company?

- 1 not at all satisfied
- 2 unsatisfied
- 3 moderately unsatisfied
- 4 neither unsatisfied nor satisfied
- 5 moderately satisfied
- 6 satisfied
- 7 totally satisfied

- (1) Dividend and bonus
- (2) Allotment of shares
- (3) Increase issue in stocks

The Second Part: aims at discovering the impact that information asymmetry may have on the investment decision of investors.

Definition of information asymmetry: *Condition that information is known to some, but not all, participants.*

- (1) What are your opinions on information asymmetry and its impact on your investment decision?
 - ① Information asymmetry does not exist in stock markets
 - ② Information asymmetry is just heard of but is not supported by any evidence
 - ③ Information asymmetry indeed exists in stock market but does not have any impact on investment decision
 - ④ Information asymmetry frequently happens in stock market and has little impact your investment decision
 - ⑤ Information asymmetry has great impact on your investment decision

A.2. Risk perception

This section on risk perception intends to identify the feature of risk perception on the seven information types.

Please evaluate the extent how you feel the following information is familiar and controllable to you.

Familiarity	Controllability
0 totally unfamiliar	0 totally uncontrollable
1 unfamiliar	1 uncontrollable
2 moderately unfamiliar	2 moderately uncontrollable
3 neither unfamiliar nor familiar	3 neither uncontrollable nor controllable
4 moderately familiar	4 moderately controllable
5 familiar	5 controllable
6 totally familiar	6 totally controllable

- (1) Fluctuation of interest rate. **F: C:**
- (2) Investment intention of market maker/banker. **F: C:**

- (3) Fluctuation of commodity price. **F: C:**
- (4) Improper management of listed company. **F: C:**
- (5) Variation in policies related to stock market. **F: C:**
- (6) Pursuing up-going stock. **F: C:**
- (7) Excessive speculation. **F: C:**

A.3. Investment behaviors

This section on investment behaviors consists of three parts: investment performance last year, reinvestment intention, and investment satisfaction.

The First Part: *Investment Performance*

- (1) What was your investment performance last year?
 - 1 profit
 - 2 neither profit nor loss
 - 3 loss

The Second Part: *Reinvestment Intention*

- (2) What will be your investment plan in stock market next year?
 - 1 increasing investment
 - 2 keeping status quo
 - 3 reducing investment
 - 4 withdrawing from stock markets

The Third Part: *Investment Satisfaction*

- (3) How satisfied were you with your investment in stock market last year?
- (4) How satisfied are you with the whole stock markets.
 - 1 totally unsatisfied
 - 2 unsatisfied
 - 3 moderately unsatisfied
 - 4 neither unsatisfied nor satisfied
 - 5 moderately satisfied
 - 6 satisfied
 - 7 totally satisfied

A.4. Individual characteristics of investors

- (1) Generally speaking, how long does your one investment cycle last?
 - 1. one month
 - 2. half a year
 - 3. one year
 - 4. longer than one year
- (2) To what extent do you know about the stock market?
 - 1. can do technical analysis and predict the trend of stock price

2. know a little bit about stock market
 3. has a vague understanding on the stock market
 4. do not know that investment should be based on the present macro-economic environment and technical analysis
- (3) Gender: female male
- (4) Age: ① 20–29; ② 30–39; ③ 40–49; ④ 50–59; ⑤ 60–
- (5) Education level
- (6) Occupation
- (7) Income (RMB): ① –1000; ② 1000–2000; ③ 2000–5000; ④ 5000–8000; ⑤ 8000–
- (8) When did you start stock trading in the stock markets?
① –1996; ② 1997; ③ 1998; ④ 1999; ⑤ 2000; ⑥ 2001; ⑦ 2002; ⑧ 2003–
- (9) The amount of your money invested in the stock markets (RMB):
① –50,000; ② 50–100 thousands; ③ 100–500 thousands; ④ 0.5–1 million; ⑤ 1 million–

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