



Analysis of investor financial behavior based on Behavioral fluctuations with Delphi approach

Mohammad Reza Zolghadr Nasab

Ph.D candidate of Accounting, Qazvin Branch, Islamic Azad University, bander anzali, Iran
Mohammadzolghadr59@gmail.com

Sina Kheradyar

Assistant professor, Department of Accounting, Rasht Branch, Islamic Azad University, Rasht, Iran.
(Corresponding author)
Sinakheradyar@gmail.com

Fazel Mohammadi Nodeh

Department of Management, Lahijan Branch, Islamic Azad University, Lahijan, Iran

Aiyuob Ahmadi Moosa Abadi

Assistant professor, Department of Accounting, Lahijan Branch, Islamic Azad University, Rasht, Iran.
aiyuob151@yahoo.com

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ABSTRACT

Traditional financial theories describe investors as rationalist entities but the speculations experienced cannot be explained by existing theories. Behavioral finance argues that individual investors do not make rational financial decisions and that they are affected by their prejudices while making financial decisions. The aim of this study is to identify the components that effect on financial behavior of investors. Delphi was used to achieve the research goal. In this method, the financial and behavioral components of investors were examined by asking questions among the qualitative researches. To achieve the goal of the research, after reviewing the literature in both domestic and foreign domains, a semi-structured interview was conducted with experts using Delphi method and the components affecting investors' financial behavioral fluctuations in four Delphi periods were identified such as optimistic behavior, overconfidence behavior, risk aversion behavior and emotional behavior. In this study, we tried to use Delphi's approach to gain better knowledge and finally for dimension with forty components were introduced.

Keywords:

Behavioral Finance, Investment, Individual Investors, Delphi.

1. Introduction

The relationship between investors' perceptions and financial behaviors has been strongly established in developed markets with the data collected from lab, survey and brokerage records (Kuhberger et al., 2002; Nasic and Weber, 2010; Weber et al., 2013; Hoffmann et al., 2015; Kaplanski et al., 2016). The underlying mechanism of psychological biases, particularly stable biases which are difficult to overcome without its understanding, is especially crucial to investigate in investments. Stable psychological biases can easily dampen investors' rational trading and risk taking behaviors. As a result of irrational overtrading and unwarranted risk taking, investors are likely to experience lower returns and greater variability of portfolio indicating worrying sign (Barber and Odean, 2000; Nasic and Weber, 2010).

Although there are several definitions of financial behavior, there is no significant agreement between them. Thaler described the financial troubleshooting as "simply intellectual finance and argued that "sometimes it is necessary to consider the possibility of finding a solution to an empirical (financial) conundrum and pay attention that economics does not behave rationally always (Thaler, R. J. 1999).

Olsen (1998) states that "financial behavior does not seek to define rational behavior or to make the decision to wrong label, but to understand and predict the financial market based on psychological decision-making processes. It is noteworthy that there is currently no comprehensive financial and behavioral theory. Olsen points out that most of the emphasis in the literature is on "identifying behavioral decision-making characteristics that are likely to have systematic effects on financial market behavior".

Lintner (1998) argues that financial behavior studies how individuals interpret and act on information to make structured investment decisions. According to the above definitions, behavioral finance can be defined as follows:

Financial behavior is the integration of classical and financial economics with the sciences of psychology and decision-making.

Financial behavior is an attempt to describe the reasons for the exceptions in financial literature.

Financial behavior studies show that how investors make systematic errors in their judgments, or in other words, how they fall in mental errors.

If we look at the different definitions of financial behavior (Table 1), we will see that everyone agrees that financial behavior is a combination of psychology, financial management, and investment. However, Fama (1998) points out that irregularities in capital market are randomly and in markets we can see all kind of behavior. There are also rising trends in the market after the announcement of profits (generally news with information) as much as the ^{Price Reversal}. So these irregularities do not undermine the efficiency of markets.

However, these irregularities lead to the inefficiency of financial markets does not preclude psychological biases in the decision-making process. That's why Micheal M. Pompian (2006) divides financial behavior into two parts:

Behavioral Finance Micro (BFMI): which deals with the study of investors' behavioral trajectories, the most famous of which are overconfidence, mental accounting, the effect of snake bite, or House Money. Behavioral Finance Macro (BFMA): A study of market irregularities and phenomena that indicate the inefficiency of financial markets. In fact, issues such as Overreaction & Underreaction, price bubbles, calendar effects, Herd Behaviors, the effectiveness of accelerated and reverse strategies, etc. cluster into this category. In fact, financial behavior challenges two basic standard financial assumptions. The first is the discussion of the economically wise man and the second is the discussion of rational markets and efficient markets. Microfinance examines the challenges facing the first assumption, and macrofinance deals with the challenges of the second assumption.

Table 1: several definition of Behavioral finance

row	researcher	Definition
1	Thaler(1993)	Behavioral finance refers to an open minded approach to financial knowledge and studies the psychological effects on individuals in financial markets.
2	Swell(2003)	Behavioral financial knowledge is the study of the psychological effects on investor behavior and subsequent market behavior
3	Lintner G(2005)	Behavioral financial knowledge means the study of how humans react to information in order to make informed decisions.
4	Merton(2008)	The basis of behavioral financial theory is the study of behavioral factors in the allocation and arrangement of resources, in terms of time and space in an uncertain environment
5	Olsen, R(2009)	Behavioral financial knowledge seeks to understand and predict the results of psychological decision-making processes or to seek the impact of psychological processes on decision-making.
6	Shefrin(2009)	Behavioral Financial Knowledge is a study of how psychology affects financial decisions and financial markets.

2. History

Mehrabanpour et al. (2009) examined the effect of financial inflexibility on value anomaly. The purpose of this study is to determine the effectiveness of value anomaly of financial inflexibility. According to the research literature, three sources related to financial inflexibility were identified and a hybrid index of financial inflexibility was formed based on the variables of return on investment, total leverage and financial constraint. Due to the compensation of financial inflexibility risk, in comparison with development companies, they gain more future returns and finally, the positive relationship between financial inflexibility factor and inflexible portfolios and the negative relationship between financially flexible.

Jamshidi et al. (۲۰۰۹) examined the behavioral biases and investors performance in the Tehran Stock Exchange. The present study examines metacognitive biases, indicators, and the effect of inclinations among real investors in the Tehran Stock Exchange. The purpose of the study is to investigate the extent to which these biases are common among investors and how they may relate to the investors performance. The results show that ^{Overconfidence} bias, indicator and desire effect are more or less common among investors. There is also a significant relationship between meta-empirical and observational biases and investors' performance, while this relationship is not significant for the effect of tendencies. Specifically, investors with higher portfolio turnover as well as a more centralized portfolio have higher returns. Investors who have bought stocks in the past have also averaged higher returns. Behavioral exchange among investors is more or less common, and these biases can affect investors' performance.

The High Holidays: Psychological mechanisms of honesty in real-life financial decisions was the study done by Doron Kliger and Mahmoud Qadan (2019). Research in psychology has established that activation of religious ideas affects individuals' behavior. They hypothesize that religious and honesty mechanisms activated on the High Holidays, the ten days before Yom Kippur, when people seek repentance, amplify people's anxiety and affect their financial decision-making. They show that returns during the High Holidays are abnormally low; implied volatility, measured by VIX and VXO, as well as realized volatility estimates, are abnormally high; and the abnormal increase in implied volatility overshoots future volatility. Using these results, we devise a simple trading rule that investors may consider to maximize returns during the High-Holidays period.

Mahmoud Qadan(2019) in the " Risk appetite, idiosyncratic volatility and expected returns" examines the variations in idiosyncratic volatility in stock returns over time, and evaluates the role of investor sentiment in explaining these variations. This study uses Fama and French's (2015) 5-factor model to calculate the idiosyncratic volatility with data from the Center for Research in Security Prices (CRSP) for 1980–2016, and analyzes the effects of investors' risk appetite reflected by market-based, press-based, and survey-based proxies for investor sentiment on the relationship between expected returns and idiosyncratic volatility. The findings show that risk appetite plays a significant role in explaining and predicting variations in this relationship over time. Specifically, when risk appetite increases, there is a shift from safer to more speculative stocks that is translated into positive effect on the relationship between expected returns and idiosyncratic volatility. In contrast, a lack of appetite for risk has the opposite

effect. The results are robust using different subsamples and econometric procedures.

3. Methodology

Delphi is a communication tool between a group of experts that facilitates the collection and analysis of group votes. The Delphi method is a study led, supervised, and guided by a group of supervisors and includes several stages. This study is conducted using a group of experts who are unfamiliar with each other and whose goal is to reach a consensus among a group of experts based on their intuitive and mental cognition. After each step or round, a statistical feedback from the group's comments is provided to the members (Turoff & Linstone, ۲۰۰۳; ۳۶). Delphi is a method designed to create a proper and independent debate about people's personalities. Delphi is one of the major methods of brainstorming that seeks the consensus of experts on a particular issue. This method is used to achieve the best option when the opinion of the people involved in the issue is important (Ludwig and Starr, 2005; 67).

The use of the Delphi method is mainly aimed at discovering creative and reliable ideas or providing appropriate information for decision making. Delphi method is a structured process for collecting and classifying existing knowledge in a group of experts and specialists, which is done by distributing questionnaires among these people and controlled feedback of responses and opinions received (Adler & Ziglio, 1996; 23). Delphi is not a rigid statistical method for predicting the future. The lack of sampling, the uncertainty of future events, and the lack of clear processes defined to conduct Delphi studies are just a few of the things that distinguish Delphi from controlled scientific methods. But Delphi's study is particularly valuable for issues that do not require precise analytical techniques: for example, when the data is inadequate or uncertain, or when there are no real examples, or when it is difficult to gather people and discuss difficult issues. As Delphi's technique relies on anonymity, controlled feedback, and statistical group response, and avoids the influence of prominent individuals in group discussion or pressure groups to conform, this technique use to gain credible consensus from experts (Klein Allen, (2000;53).

One of Delphi's most important applications is when, due to lack of information, the subject under study cannot be studied by statistical analysis methods,

and the judgment of experts on that subject is the only tool for cognition (Bakli, ۱۹۹۴; ۱۸). There is always uncertainty and relatively incomplete knowledge about the content of Delphi studies. Otherwise, more efficient methods can be used for decision making.

Delphi as a research tool can be used in the process of theorizing to achieve various goals. If the Delphi process is done very carefully, researchers will have more confidence in the results of the research that has used this method. Managers also confidently make their decisions based on the results of these studies. Delphi's method is performed in several rounds, the first period is devoted to the production of new suggestions and ideas, and the information obtained is used to organize and design questions in subsequent periods (Brown, 2007).the steps for performing the Delphi method are as follows:

- Explaining the research problem, nature, dimensions, determining research questions, feasibility study of research by Delphi method
- Forming a team to implement, guide and monitor Delphi's performance
- Identify and select home members (experts, stakeholders or respondents) to collaborate in Delphi
- Develop an initial Delphi questionnaire and test it in a pilot study
- Questionnaire test to select the appropriate words (to remove unknown items and ambiguities)
- Send the first round questionnaire to Delphi panel members
- Analysis of the answers received in the first round
- Prepare a second round questionnaire
- Send a second course questionnaire to members of the Delphi panel
- Analyze the answers received in the second round
- Determining the level of agreement between the members of the Delphi panel
- Repeat the steps of compiling, analyzing and sending the questionnaire to order the desired agreement
- Report preparation by the analytics team

In Delphi's study, as in other studies, special attention should be paid to partial planning and

effective implementation of the study. There are four main activities in Delphi's planning and implementation:

- 1) Defining the research problem
- 2) Determine the size of the panel>Select panel
- 3) Holding Delphi courses

Elements of Delphi Method This study can be classified as follows:

- Delphi Design, Implementation and Monitoring Team (Sender)
- Participants in Delphi (Recipient)
- Data collection and analysis tools (message content and how to send and receive it)

Finally, after examining and identifying experts, 25 experts selected as samples in this study. The initial questionnaire was conducted as a semi-open interview by researcher. Members of the Delphi group were selected as non-probable directional sampling. Also, formal validity was used in this study; for this reason, members of the Delphi group will be asked about the content of the questions. Cronbach's alpha coefficient method was also used for internal consistency to evaluate the reliability of the research. In each Delphi round, this coefficient was calculated for the questionnaires, and their reliability was ensured. The calculated size of Cronbach's Alpha is as follows.

Table 2: Cronbach's alpha coefficient table in Delphi method

Round	Cronbach's Alpha
First round	0.8444
second round	0.862
third round	0.761
Fourth round	0.778

3.1. Consensus scale

In this study, Kendall's coordination coefficient was used to determine the level of consensus among panel members. Kendall's Coefficient is a scale for determining the degree of coordination and agreement between several categories of N-object or individual rank. In fact, using this scale, it is possible to find a rank correlation between K rankings. The value of this scale is equal to one at the time of full coordination or agreement and zero at the time of complete lack of coordination. Schmidt provides a statistical criterion for deciding whether to stop or continue Delphi periods. This table criterion determines the consensus among panel members based on the value of the Kendall coordination coefficient. Table 3 shows how to interpret the various values of this coefficient.

The statistical significance of the W coefficient is not sufficient to stop the Delphi process. The high growth of this coefficient in two consecutive rounds will indicate the continuation of the Delphi method. The persistence of this coefficient or its slight growth in two rounds shows that there has been no increase in the agreement of the members and the process should be stopped.

Table 3: Interpretation of various values of Kendall Coordination Ratio

confidence in the order of factors	Interpretation	W value
No exist	Very Low consensus	0-0.19
low	Low consensus	0.2-0.9
moderate	Medium to moderate consensus	0.4-0.9
strong	strong consensus	0.6-0.9
Very strong	Very strong consensus	0.8-1.0

Table 4 Numerical value of Kendall coefficient of Delphi steps. In this study, the Delphi method was performed in four rounds.

Round	Kendall's Coefficient
First round	284/0
second round	421/0
third round	757/0
Fourth round	803/0

4. Findings

At the beginning of the analysis, the results of the fourth round of Delphi implementation and its identified components are presented.

It should be noted that at this stage (fourth stage) after classifying the components of the study - including the forty factors of their subdivisions - to the nomination of the emerging component through consultation with

esteemed professors and distinguished experts. In fact, one of the aspects of innovation in this research for Contribution of Knowledge is to present the components of the quadruple model of financial behavioral fluctuation under the headings of optimistic behavior, overconfidence, risk aversion behavior and emotional behavior.

Table 5: The results of Delphi's fourth round of behavioral fluctuations

Components affecting behavioral flux	Samples	Response Average	rank
Orienteering judgments	25	4.84	1
Stubbornness against certain criteria	25	4.68	2
Judgment based on false criteria	25	4.63	3
Failure to review complete information	25	4.60	4
Trust your judgment	25	4.57	5
Excessive confidence	25	4.56	6
Not accepting the opinion of others	25	4.45	7
Advise others to follow him	25	4.36	8
Not accepting information contrary to your opinion	25	4.35	9
Suspicion of information he does not believe	25	4.33	10
Orient to your accepted information	25	4.22	11
Stubbornness against new information	25	4.22	12
Repeated mistakes in decision making	25	4.21	13
Loss of opportunity	25	4.20	14
Memory in transactions	25	4.16	15
Being a sequel	25	4.14	16
Lack of financial planning	25	3.93	17
Failure to review records	25	3.92	18
More investment	25	3.89	19
Do too much trading	25	3.89	20
Excessive search	25	3.67	21
Doubts about the situation	25	3.66	22
Review people's opinions	25	3.65	23
Great importance for the past and ignoring the present and the future	25	3.65	24
Belonging to your information and experiences	25	3.58	25
It's too late to make a decision	25	3.21	26
A lot of patience in buying and selling	25	3.16	27
Protecting personal interests and assets for profit	25	3.12	28
Resistance to change	25	3.01	29
Act independently	25	2.98	30
Self-magnifying nose	25	2.91	31
High self-esteem	25	2.88	32
External factors are to blame	25	2.86	33
The reason for success	25	2.63	34
Thinking positive	25	2.56	35
Optimism in trading	25	2.51	36
Positive attitude to stock market events	25	2.25	37
Importance to the events of the day	25	2.05	38
follower	25	1.55	39
Pay attention to new events	25	2.15	40

Table 6: Indicators obtained in different stages of Delphi implementation

Round	emotional behavior	Risk avoidance	overconfidence	Optimistic	total
First round	6	5	3	22	8
second round	6	5	5	25	9
third round	8	6	5	29	10
Fourth round	9	10	10	40	11

Radar chart is also known as spider diagram, which consists of several polygons and some axes starting from the circle center. Each axis in the radar chart denotes an indicator, while each concentric circle (or polygon) represents a certain indicator level. Radar chart comprehensive evaluation model is a kind of indicator value aggregation method based on the

extraction of feature variables of radar chart. Radar chart comprehensive evaluation model is a combination of graphical evaluation method and digital evaluation method, which is greatly suitable for an entire and overall evaluation of complex multi-attribute structure, and much more intuitive, as well as comparison of Delphi steps is shown in Figure 1.

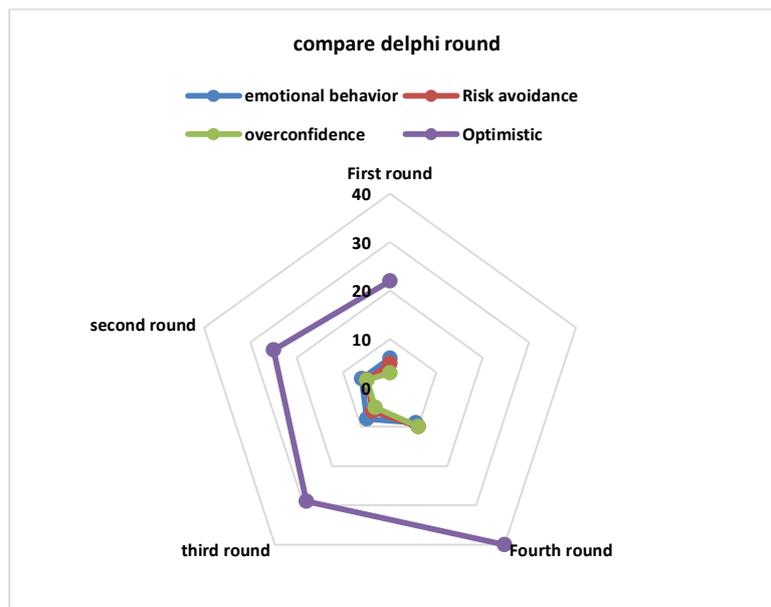


Figure1: Comparison of four rounds of Delphi steps

To mitigate the limitation of individual expert’s knowledge structure and financial experience, and handle the uncertainty and randomness of subjective judgment, a feedback mechanism was introduced in this paper for acquiring more reasonable weight coefficients. The new proposed method, can promote expert opinions to a consensus through a multi-round consultation. In the multi-round consultation, the average sorting of expert group was utilized as

information feedback variable, while the average ordering deviation index based on number of reverse order was defined as loop control variable. In terms of handling the interdependence between indicators, the common method is to ensure the independence between financial behavioral indicators during the development stage of indicator system for behavioral components of investors, or to adjust indicator weights according to their correlations. From the perspective of

comprehensive evaluation model, this paper proposed the improved radar chart to incorporate the consideration of interdependence between indicators.

The final model of Delphi's implementation is shown in Figure 2

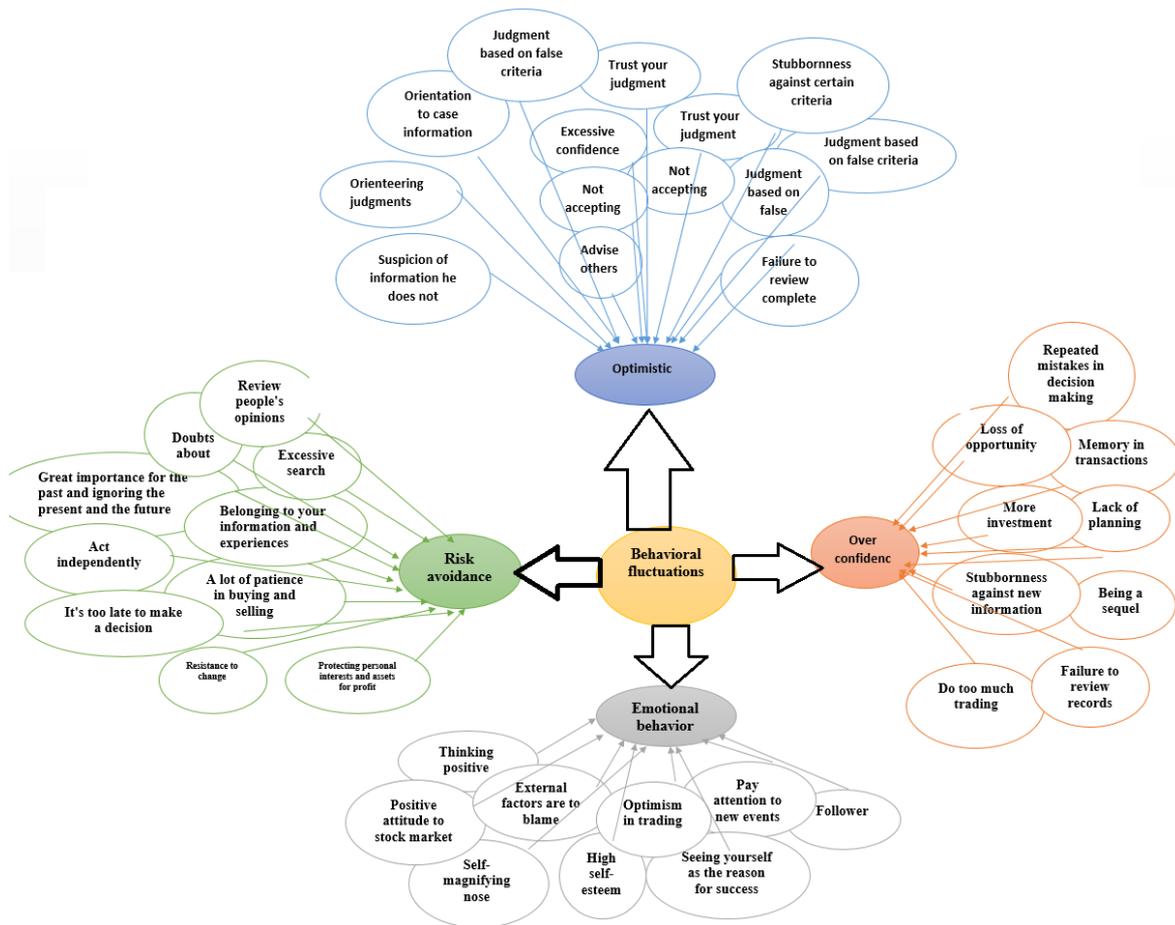


fig2: conceptual model

5. Conclusion

Delphi was used to achieve the research goal. In this method, the financial and behavioral components of investors were examined by asking questions. Based on this, the components of investors' financial behavior were defined in four dimensions: optimistic behavior, overconfidence behavior, risk aversion behavior and emotional behavior. The level of risk-taking of individuals is affected by various factors, so that the study of the relationship between risk-taking and various factors has been the subject of much research. These factors can be divided into two categories:

internal and external factors: The influence of internal factors on risk-taking behavior has a special place. Because it is not easy to study internal factors and psychological structure. Some of the internal factors influencing Behavioral fluctuations are individual characteristics, familiarity with risk, and free choice. Among the external factors, we can mention economic, political, cultural conditions and issues such as the amount of advertising by the stock exchange, issues within the company and family, and so on. Overconfidence is one of the most important financial concepts of modern behavior, which has a special

place in both financial and psychological theories. Overconfidence causes a person to overestimate his or her knowledge and skills and to underestimate the risks, exaggerate his or her ability to control events, and feel that he or she has control over the issues while possible. This is not the case. Psychologists have stated that overconfidence is something to be learned and does not exist in individuals on its own. Most people think they are smarter than they really are and believe they have better information. In most cases, we see overconfidence in individuals, but choosing securities is a difficult task with the highest levels of overconfidence. This is not just for individual investors. Rather, there is evidence that financial analysts are reluctant to reconsider previous estimates of possible future performance, even when there is significant evidence that their current assessments are incorrect. miscalibration which is one of the most common types of overconfidence in financial literature, where people usually estimate their knowledge more accurately and lower the risk and variance of random variables less than they are consider that is one of the types of overconfidence (Lichtenstein et al., ۱۹۸۲). In Better than Average Effect people estimate their skills more than they really are (Greenwald, ۱۹۸۰). Illusion of Control and Unrealistic Optimism cause people think they can control problem or at least could effect on it while this may not be the case, it is more likely to lose their successful (Langer, 1975). Overconfidence and its consequences also include an increase in the volume of transactions or repeated transactions, unfounded beliefs about one's ability to identify corporate stocks for investment, risk of losing capital, lack of portfolio diversification, and reduced returns in long-term.

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