

Behavioral Finance in the Context of Digital Finance

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Abstract:

Common biases in behavioral finance, such as overconfidence, loss aversion, and conformity, may take on new forms or intensify in the context of digital finance. With the rapid development of financial technology, investor behavior and decision-making patterns are also influenced by more external factors, especially the popularity of information technology, social platforms, and digital investment tools. By combining the biases of traditional behavioral finance with emerging technologies, social media, and platform mechanisms in the digital finance environment, this study delves into how these biases become more complex and exacerbated in the digital, automated, and information-based environment. This provides a new perspective for understanding modern investor behavior and important theoretical basis for the application of related technologies and market regulation.

Keywords: Behavior finance, Digital finance, Irrational phenomenon, Behavioral bias

1. Introduction

In the digital finance environment, digital finance has reshaped the operational logic of financial markets through technologies such as big data and artificial intelligence. Investors may face problems such as information overload and excessive reliance on algorithm recommendations for decision-making, which provide richer scenarios and data support for behavioral finance. Traditional behavioral finance mainly focuses on the impact of psychological biases (such as overconfidence, loss aversion, etc.) on investment decisions, while in the digital finance environment, the interaction between technological tools (such as robo advisors, algorithmic trading) and user behavior may give rise to new biases or correct the effects of

traditional biases. For example, investment advice driven by large models may exacerbate the psychological dependence on algorithms. Therefore, the combination of the two can promote the updating and improvement of behavioral finance theoretical models.

The significance of this study lies in providing new theoretical support and practical guidance for the field of digital finance, helping academia, market regulators, and fintech companies better understand and respond to investor behavior biases, thereby enhancing market stability, transparency, and efficiency. At the same time, this study also promotes the innovative development of behavioral finance in the new era, which has important academic value and practical application significance.

2. Evolution of behavioral bias in the digital financial environment

Digital finance is inherent in the digital age and is a financial format that adapts to the development of the digital economy. After nearly 20 years of development, the use of technologies such as big data, blockchain, and artificial intelligence has significantly improved the efficiency of digital finance in reducing service costs, reducing information asymmetry, and enhancing risk management (Zhang Xun et al., 2019)[1]. Digital finance not only includes the digitization of traditional financial businesses such as payments, lending, insurance, and investment, but also covers emerging fields such as blockchain, cryptocurrency, and digital currency. These technologies have promoted the popularization and innovation of financial services, making financial products and services more convenient, fast, and cost-effective to global users, especially those who previously had no access to traditional banking services. Behavioral finance is a discipline that studies how psychological and sociological factors influence individual and group decision-making in financial markets. Its emergence is a supplement and revision to traditional financial theory, which is mainly based on the assumption of rational economic agents, believing that market participants always weigh all information rationally and make optimal choices when making decisions. However, the actual situation shows that investors and market behavior are often influenced by irrational factors such as emotions, biases, and cognitive errors, and behavioral finance attempts to explain these biases and irrational market phenomena.

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3. The core theory and development of traditional behavioral finance

Traditional behavioral finance is based on psychology and challenges the assumption of a “rational person” in traditional finance, revealing systemic biases in investors’ decision-making. Its theoretical foundation includes:

Prospect theory (Kahneman&Tversky, 1979) proposes concepts such as “loss aversion” based on the combination of psychology and economics[2].

Bounded rationality (Simon, 1955): emphasizes that decision-makers are limited by cognitive resources and are unable to process information rationally, leading to heuristic biases (such as anchoring effects)[3].

Market Inefficiency Hypothesis (Shiller, 1981): By analyzing market foam and collapses, it is pointed out that investor sentiment and group behavior are important driving forces of market volatility[4].

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3.1 The impact and expansion of digital finance on behavioral finance

With the popularization of digital financial technologies such as big data, blockchain, and robo advisors, the manifestations and mechanisms of traditional behavioral biases have undergone significant changes. Domestic and foreign research has focused on the following directions.

3.1.1 domestic research progress

Technology driven behavioral biases are exacerbated: Chen Hongyan (2010)[5] pointed out that information overload and algorithm recommendations on digital financial platforms may amplify overconfidence, such as high-frequency trading tools inducing investors to ignore systemic risks.

Localization case analysis: Data from platforms such as Ant Financial reveals that the convenience of mobile payments exacerbates the tendency towards “instant gratification”, affecting risk appetite and repayment behavior.

Policy oriented research: Xie Weiqun (2024)[6] emphasizes the need to build a framework that combines technological empowerment with behavioral regulation, in conjunction with the Action Plan for Promoting High quality

Development of Digital Finance.

3.1.2 International research trends

Intelligent investment advisory and psychological bias: Barberis (2018)[7] found that algorithmic recommendations may strengthen anchoring effects, such as excessive reliance on historical return rate data by intelligent investment advisory users.

Irrational behavior in the cryptocurrency market: Shiller (2020)[8] proposed that “FOMO” (fear of missing out) is the main driving force behind the drastic fluctuations in cryptocurrency prices[9].

The correction potential of technological tools: blockchain transparency reduces information asymmetry and alleviates herd behavior (such as the risk disclosure mechanism of DeFi platforms).

3.2 Research gaps and theoretical challenges

Although progress has been made in research, there are still the following shortcomings:

The limitations of an isolated perspective: Existing literature often focuses on a single technology (such as algorithm recommendation) or a single bias (such as loss aversion), lacking a comprehensive examination of the digital finance ecosystem.

The ambiguity of bidirectional effects: The impact of digital technology on behavioral biases has a “double-edged sword” characteristic, which can both exacerbate (such as the herd effect of social media) and correct (such as the alleviation of choice overload by robo advisors), but the interaction mechanism between the two has not been systematically elucidated.

Lack of localization theory: Although domestic research relies on local cases (such as Alipay and Snowball), the theoretical model mostly follows the western framework, and it is urgent to combine Chinese policies and market characteristics to build an adaptive theory.

4. Theoretical framework: evolution of behavioral bias in the digital financial environment

Digital finance has reshaped the psychological biases in traditional behavioral finance through technological tools such as big data, algorithmic recommendations, and instant feedback. Its evolutionary mechanism can be summarized as a two-way effect of the “technology reinforcement path” and the “technology correction path”. Starting from these two paths, combined with specific technical features and typical cases, this article systematically explains the complex impact of digital finance on behavioral

deviation.

4.1 Technological Enhancement Path: Aggravation and Alienation of Deviation

(1) Self reinforcement of information overload and overconfidence

Mechanism analysis:

High frequency data and decision illusion: Digital financial platforms such as Robinhood and Snowball provide investors with massive information through real-time market updates, news streams, and quantitative signals. Research has shown that information overload can lead to “cognitive bandwidth overload” (Kahneman, 1973), forcing investors to rely on heuristic simplification of decisions, such as over reliance on platform recommended “popular stocks” or “quantitative strategies”. Algorithmic dependence and false sense of control: The algorithmic decision-making tools of robo advisors (such as Betterment), such as automatic position adjustment and risk assessment, make investors mistakenly believe that technology can replace their own judgment, thereby overestimating the accuracy of decisions. Empirical evidence shows that users who use robo advisors have a 30% increase in trading frequency, but their returns have not significantly improved (Barberis, 2018)[10].

Typical case:

High frequency trading trap for retail investors: In 2020, retail investors in the US stock market bought a large number of GameStop stocks through the Robinhood platform. Some investors frequently adjusted their positions due to real-time data stimulation, and ultimately accumulated losses exceeding the market average due to trading costs.

(2) Instant feedback and extreme loss aversion

Mechanism analysis:

The emotion of profit and loss visualization is magnified: digital financial platforms (such as Cai'an and Alipay Wealth Management) provide real-time account profit and loss updates, and investors' perception of losses is changed from low frequency (such as quarterly statements) to high frequency (updated every second). Neuroeconomic studies have shown that immediate loss feedback activates the amygdala (emotional center) of the brain, exacerbating the physiological response of loss aversion (Knutson et al., 2007). The “double-edged sword” effect of leverage tools: Leveraged contracts in the cryptocurrency market, such as Binance Futures, allow investors to amplify their returns with a hundredfold leverage, but also quickly trigger a strong liquidation due to small losses. Investors continue to increase their positions in order to “recoup their capital”, forming a “loss spiral” (such as the chain of individ-

ual investors' liquidation during the LUNA coin crash in 2022).

Typical case:

Unreasonable behavior of Bitcoin holders: During the 2021 Bitcoin price crash, most retail investors refused to cut losses and instead increased their holdings through borrowing, leading to the breakdown of the debt chain. According to blockchain data, over 60% of loss making accounts were forcibly liquidated before the price rebounded.

(3) The viral spread of social media and conformity effect Mechanism analysis:

Group identity and information waterfall: Social media platforms such as Reddit's WallStreetBets and Weibo's financial influencers construct information dissemination networks through "like" and "forward" mechanisms, forming an "information waterfall" (Bikhchandani et al., 1992)[11]. Individuals tend to imitate mainstream views in order to gain a sense of belonging to the group, even if they deviate from the fundamentals. Homogenization of algorithm recommendations: Platform algorithms push similar content (such as "popular stock discussions") based on user behavior data, causing investors to fall into an "information cocoon" and further strengthening their tendency towards conformity.

Typical case:

The collective frenzy in the GameStop event: In 2021, Reddit retail investors boosted GameStop's stock price through a series of measures, and hedge fund Melvin Capital suffered losses of over \$6 billion due to short selling. In the event, over 80% of retail investors admitted that their decisions were driven by social media emotions.

(4) Hidden Induction of Interface Design and Framework Effect

Mechanism analysis:

Visual anchoring and cognitive misguidance: Digital financial platforms highlight income information and weaken risk warnings through interface design (such as Ant Wealth's "Yield Ranking" and WeChat Wealth Management's "Red Envelope Reward Pop up"). Experiments have shown that reducing the font size of risk warnings by 50% can increase the probability of users choosing high-risk products by 40% (Sunstein, 2017)[12]. The boosting effect of default options: The platform's default settings (such as "automatic renewal" and "high-risk preference evaluation") utilize user inertia to induce them to accept non optimal strategies.

Typical case:

The framework deviation of Alipay's "help you invest": this function focuses on the promotion of "historical annualized yield of 6%", but puts the risk level description

in the fold column, resulting in 70% of users investing without fully understanding the product risk level..

4.2 Technical correction path: mitigation of deviations and adaptive evolution

(1) Analysis of the Weakening Mechanism of Blockchain Transparency and Herding Effect:

Enhancing the credibility of decentralized information: Blockchain technology (such as Ethereum smart contracts) reduces information asymmetry through public ledgers and tamper proof features. For example, DeFi platforms such as Uniswap provide real-time public liquidity pool data, allowing investors to independently verify transaction pair prices and reduce the possibility of blindly following trends. Rationalization of DAO Governance: Decentralized Autonomous Organizations (DAOs) distribute decision-making power to communities through on chain voting mechanisms, reducing irrational conformity caused by centralized authority (such as MakerDAO's stablecoin regulation proposal).

(2) Analysis of the mitigation mechanism for intelligent investment advisory and selection overload:

Cognitive reduction of personalized recommendations: Intelligent investment advisors (such as Wealthfront) use AI to analyze user risk preferences and financial goals, providing customized asset allocation solutions. Research has shown that users who use robo advisors experience a 50% reduction in choice anxiety and a 35% increase in portfolio diversification (D'Annunzio et al., 2019)[13]. Behavioral constraints of automated rebalancing: The regular automatic position adjustment function can suppress investors' frequent operational tendencies, alleviate overconfidence and disposition effects.

(3) Analysis of the Rational Guidance Mechanism for Big Data Risk Control and Loss Aversion:

Dynamic risk warning system: Digital banks (such as WeBank) monitor users' asset liability ratios and cash flows in real time, and push personalized risk warnings (such as "high leverage ratio, recommended reduction"). Experiments have shown that such interventions can reduce irrational trading by 25%[13]. Nudge strategy for behavioral intervention: The platform uses the default "stop loss line" or "cooling off period" function to guide rational decision-making through loss aversion psychology (such as Coinbase's "price warning" function)..

4.3 Integration model of bidirectional interaction: technology psychological feedback loop

Based on the above analysis, this article proposes a "Technology Psychological Feedback Loop Model" (See Figure 1) to reveal the evolutionary logic of behavioral biases in

the digital financial environment:

Technical input:

Digital tools such as real-time data presentation, algorithm recommendations, and social functions directly affect the psychological state of investors. These tools not only change the way information is presented, but also alter investors' cognitive and emotional responses by providing decision support and interaction design.

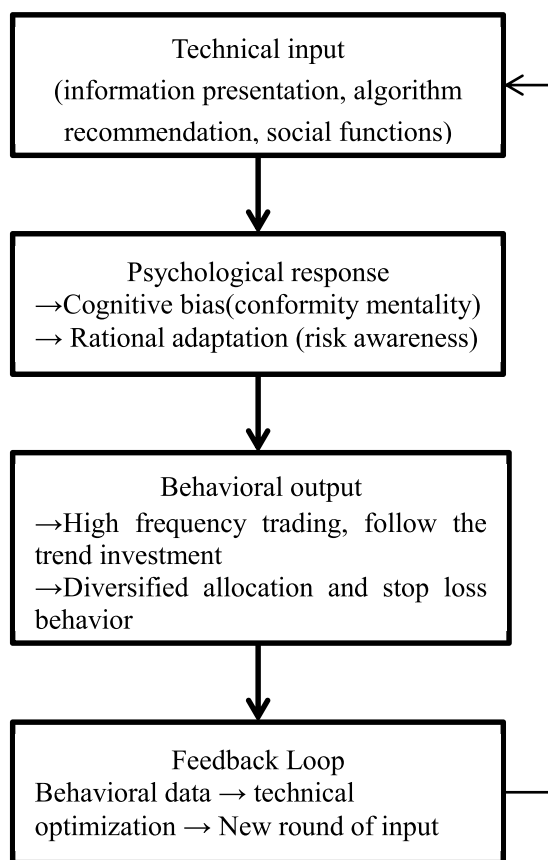


Figure 1 Technology psychological feedback loop model

Psychological response:

Investors' psychological reactions can manifest in two extremes: on the one hand, technology may exacerbate cognitive biases (such as overconfidence, conformity effects, etc.); On the other hand, technology may also promote rational adaptation (such as increased risk awareness). This psychological response is the core behavioral driving force in the digital financial environment.

Behavioral output:

These psychological reactions will be transformed into concrete behaviors, such as deviant investment decisions (such as overtrading, blindly following trends, etc.). And these behaviors themselves will be captured through digi-

tal tools such as transaction data, algorithm analysis, etc., and become part of the feedback mechanism, driving the next round of psychological reactions and forming a positive or negative cycle.

The significance of the model: (1) Bidirectional effect: This model can explain how the same technical tool can both exacerbate and correct behavioral biases. For example, social media may lead to blind conformity among groups by promoting the herd effect, but at the same time, it can also help investors enhance their risk awareness by providing risk education content. (2) Policy design framework: This model provides a framework for regulatory agencies to develop targeted adaptive policies based on different types of biases brought about by technology, such as algorithm dependent biases, social driven biases, etc. For example, for investors who overly rely on algorithms, stricter risk warnings and regulatory measures may need to be established, while for behavioral biases driven by social media, it may be necessary to reduce their impact through education and increased information transparency.

This Technology Psychological Feedback Loop Model provides a systematic framework to help understand the evolutionary mechanisms of behavioral biases in the digital financial environment, emphasizing the dynamic interaction between technological tools and psychological states, as well as the complex impact of this interaction on investor behavior. Based on this model, future research can deeply explore the net effect of different technological paths, and further explore how to optimize the behavior of investors and reduce irrational decision-making modes through the "human-computer cooperation" decision-making mode.

5. Conclusion

Digital financial technology has significantly reshaped the psychological biases in traditional behavioral finance through information overload, algorithm recommendations, and instant feedback mechanisms. Its impact presents a distinct "two-way" pattern: on the one hand, high-frequency data push and social media dissemination exacerbate overconfidence, loss aversion, and conformity effects. Typical cases include irrational trading by retail investors in the GameStop event and leverage traps in the cryptocurrency market; On the other hand, the transparency of blockchain, personalized recommendations from intelligent investment advisors, and big data risk control tools also provide possibilities for correcting behavioral deviations. The "Technology Psychological Feedback Loop Model" proposed in this study reveals the dynamic interaction logic between technology and behavior in the

digital environment, that is, technology tools may not only trigger market fluctuations by reinforcing cognitive biases, but also promote rational decisions by optimizing information transparency and decision support functions. Based on this, it is recommended that regulatory agencies establish a transparent algorithm and dynamic behavior monitoring system, while fintech companies need to practice ethical design principles and reduce interface induced information. Future research needs to further quantify the net effect of technology on bias, and explore the behavioral evolution laws in emerging scenarios such as metaverse finance and DAO governance. At the same time, combining neuroeconomics and computational sociology methods to deepen micro mechanism analysis, providing more solid theoretical support for financial stability and innovation in the digital age.

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