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The Impact of Robo-Advising on Individual Investors' Behavioral Biases: A Behavioral Finance Review

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Abstract

With the penetration of financial technology, artificial intelligence and big data into wealth management, robo-advising has been one of the useful instruments for individual investors. This review discusses whether robo-advisors can mitigate behavioral biases of individual investors from a behavioral finance perspective. Through a review of relevant literature on robo-advising, modern portfolio theory, prospect theory, disposition effect, overtrading and limited attention, this paper finds that robo-advisors may enhance investor behavior via risk profiling, diversified asset allocation, automatic rebalancing and rule-based execution. These mechanisms could reduce overconfident trading, chasing returns, concentration of holdings and emotional decisions. Nevertheless, robo-advising is unable to completely eradicate irrational behavior. Its efficacy is subject to the validity of risk questionnaires, algorithmic transparency, platform incentives, investor financial literacy and regulatory scrutiny. Inspired by The Man Who Solved the Market and A Man for All Markets, this review also contends that the value of models does not reside in delivering returns, but in fostering probability thinking, discipline and risk control. Finally, this paper proposes enhancements in transparency, risk disclosure, investor education and conflict-of-interest regulation.

Keywords

robo-advising, behavioral finance, individual investors, fintech, asset allocation

1. Introduction

Financial technology has grown fast in recent years and artificial intelligence, big data and algorithmic models have been increasingly applied in wealth management. The most obvious use of fintech in investment management is robo-advising. It may offer advice on asset allocation based on the risk tolerance of an investor, investment goals, and time horizon of investments, as well as it can manage portfolios by automated systems and rebalancing rules. In contrast to traditional human financial advisors, robo-advisors tend to offer services at lower costs, have lower thresholds of investment, standardized procedures, and are more accessible. D'Acunto, Prabhala, and Rossi demonstrate that robo-advising instruments can provide diversification recommendations to individual investors, but they come with significant restrictions and risks [1].

Robo-advising is a new phenomenon because the individual investors are not rational, and they can be biased in their decision making. According to the behavioral finance, it is not rational to make decisions of an investor as they are influenced by loss aversion, overconfidence, attention, herd behavior and emotional responses. Prospect theory developed by Kahneman and Tversky demonstrates that people value losses differently than gains and tend to react more emotionally to the former than to the latter [2]. This also contributes to the explanation of why some investors may have been aggressive in the purchase when the market has been up, sell out when the market goes down, trade too much or fail to liquidate on losers and sell winners too early in the financial markets.

This review considers three research questions. Firstly, via which channels could robo-advising mitigate behavioral biases of individual investors? Secondly, how has the previous literature assessed the impact of robo-advisors on asset allocation, trading discipline and investor protection? Thirdly, what novel issues or limitations might emerge when algorithmic advice is implemented on commercial financial platforms? In order to address these questions, this paper combines literature from robo-advising, behavioral finance, portfolio theory and quantitative investment case studies.

2. Theoretical Background

2.1 Wealth Management Model

Robo-advising or automated financial advice is a model of the wealth management, where the online platforms and the financial institutions offer their clients the services of portfolio recommendations, asset allocation, automatic rebalancing, and investment management. The process of robo-advising usually starts with an initial questionnaire on risk profiling. This will be followed by a suggested portfolio based on the level of risk and goals of the investor. When the portfolio is created, the system can change it in response to changes in the market that result in the assets being weighed differently than they are supposed to be.

2.2 Modern Portfolio Theory

The main theoretical concept of robo-advising is the modern portfolio theory. According to Markowitz, it should not be only in terms of the expected returns on assets that investors should consider them but rather how various assets can interact with each other within a portfolio [3]. The diversification has the effect of lowering the risk in the event of non-correlation between the assets. This is done by robo-advisors through investing in equities, bonds, mutual funds, exchange-traded funds, cash equivalents or any other category of assets. It is important to the common investor because the majority of the people would tend to put their money into one or two stocks they know well, sector fund, and high-risk investments.

2.3 Behavioral Finance

Another theoretical foundation of the value of robo-advising is behavioral finance. The traditional finance usually assumes that investors are capable of processing information in a rational way and making optimal decisions. In practice, systematic biases are often shown by investors. According to Shefrin and Statman, disposition effect refers to the tendency of investors to sell winning assets prematurely and retain losing assets too long [4]. Barber and Odean discover that the more frequently an individual investor trades, the worse he performs, which suggests that trading too much can hurt wealth [5]. These results indicate that investment errors are not accidental but associated with repeated psychological patterns.

2.4 Limited Attention Theory

The topic also involves limited attention. Barber and Odean demonstrate that the personal investors tend to purchase those assets which catch their eye by news, unusual trading volume or significant price fluctuations [6]. Rankings, push notifications, short-term performance indicators, and popular portfolio labels on online investment platforms can be equally effective. When robo-advisors move the focus of investors away from specific products to long-term objectives of a portfolio, they might decrease the level of attention-based trading. Nevertheless, in case the platforms employ robo-advising primarily as a tool to sell popular products, the same technology could strengthen the attention bias.

3. Literature Review

3.1 Robo-Advising and Asset Allocation

The first part of the research paper is about the role of robo-advising in asset allocation. The previous studies have shown that the most important thing with the help of which a robo-advisor can be beneficial is not its capacity to predict any changes in the market, but rather its ability to offer the same advice on portfolio at a low price [1]. This role fits well into the modern theory of portfolios and diversification and risk vs. return trade-off [3]. The lack of technical barriers in portfolio building is a major advantage of the robo-advisor among individual investors who do not have much knowledge of finance. An investor who may not make a choice on funds on the basis of performance over the past or rankings of platforms may be given a diversified portfolio suggestion.

The literature of portfolio allocation is the evolution of a single-asset maximization in terms of its return to an overall concern about risk on the whole portfolio. The importance of the contribution by Markowitz lies in that he demonstrates that the risk associated with a portfolio does not only depend on the level of risk of each of the assets but also depends on the interrelationship between the assets [3]. Robo-advisors make this theory practical: they assess the risk of a person, construct the target distribution and adjust the distribution when the weights of the stocks are not at the target. This process may be more systematic and less influenced by the emotional aspect than human advice.

Asset allocation is not a way of risk elimination. The historical data and questionnaires on the risk and model assumptions are used to create the portfolios of robo-advisors. In case of very bad market conditions, the past relations between assets can be altered, and investors will realize that they have less tolerance towards risks than what was given in their questionnaire. Thus, it is necessary to consider the value of robo-advising as an aspect of risk management but not a promise of returns. It is also significant because there is a temptation to sell robo-advisors as clever devices which will provide more profit, whereas the theoretical background behind the concept of robo-advising is more conservative.

3.2 Robo-Advising and Behavioral Biases

The second type of research is on the impact that robo-advising can have on the biases in behavior. The personal investors tend to be overconfident, chasing returns, disposition effect, concentrated and not paying much attention. The investors are prone to the overconfidence bias as they believe that they can read information and time the market. They will therefore trade too often. It has been proved by Barber and Odean that it is risky to invest in a frequent manner, since it involves high transaction cost and poor timing, which lowers the net profits [5]. This problem can be minimized through robo-advising, where part of the decision-making process is assigned to a rule-based system.

Prospect theory can be used to explain the difference in the reaction of investors to gains and losses. Kahneman and Tversky demonstrate that individuals are usually loss averse, i.e., they feel more pain when they lose than gain [2]. This may result in an inclination to retain losing assets with the expectation of breaking even and selling winning assets too soon in investing. According to Shefrin and Statman, this pattern is referred to as the disposition effect [4]. Robo-advising does not have the ability to directly alter the emotions of the investor, though it has the capacity to decrease the frequency of instances where the investors make emotional decisions on individual assets.

Automatic rebalancing is especially pertinent here; if an asset class has risen such that it is too large within the portfolio, the system may sell off part of it; if an asset class has fallen to less than its target weight, the system may purchase more. This is contrary to the intuitive behavior of riding winners and shunning losers. In this way, robo-advising can institutionalize a form of discipline which many individuals struggle to uphold for themselves. It can also mitigate the impact of regret avoidance, since the adjustment adheres to a pre-determined rule rather than an impulsive emotional decision.

There is also the limited attention study. According to Barber and Odean, the investors will tend to purchase attention-grabbing assets more than other people [6]. This is a very important piece of information when it comes to online investing services. It is a competition for investor attention between rankings, news feeds,

social media, as well as short-term performance graphs. When an automated advisory system focuses on long-term plans, risks and suitability of the portfolio, this can make the investors less reliant on the salient yet incomplete data. In case it stresses on hot portfolios and short-term returns, then it might be nothing but a repetition of the same bias in attention by making it more technological.

These strands of literature are complementary. The disposition effect and the prospect theory are used to describe why investors can react irrationally to gains and losses [2, 4]. Studies on overtrading indicate that these biases may be converted into worse investment performance [5]. Research on limited attention describes why the structure of information spaces influences investment decisions [6]. Robo-advising research then inquires whether technology is able to transform that decision environment. The main idea is that robo-advisors do not necessarily make investors rational, but they can decrease chances of irrational behavior by limiting impulsive choices, promoting diversification and automating portfolio discipline.

3.3 Quantitative Investment Cases and Their Implications

Despite the fact that robo-advising is an idea which has been created to serve the needs of regular investors and not professional hedge funds, there are two books on quantitative investing that can be helpful. In his book The Man Who Solved the Market, Gregory Zuckerman explains how James Simons and Renaissance Technologies have established a system of investments that rely on mathematical calculations, big data analysis and computerized trading [7]. It is not necessary to follow the example of Renaissance Technologies in every aspect as it is the main lesson here but one should learn to control himself by using some systems and not rely on market gossip, gut feeling and impulsive feelings. This is applicable to the concept of robo-advising.

The book A Man for All Markets by Edward O. Thorp focuses on the concept of probability thinking, expected value, and risk management [8]. In blackjack as well as in securities markets, Thorp was interested in odds, position sizing and capital protection. The given perspective can be applied to risk profiling and asset allocation in robo-advising. An effective robo-advisor must not merely inquire the amount of return that investors desire. It ought to make them realize the chances of loss, potential drawdowns and whether they are psychologically and financially able to withstand such losses.

Meanwhile, these books also caution against the blind belief in models. Simons and Thorp did not succeed because they believed in a formula once and for all but rather experimented, modified and managed risk. This is a significant caution to robo-advising. Algorithms have the potential to minimize emotional interference, yet they may introduce new risks when their assumptions are unacknowledged, their data is low quality or their recommendations are driven by incentives on the platform. Thus, model-based advice needs to be integrated with transparency, monitoring, and investor education.

4. Key Findings

In general, there are three bases of this review that the literature offers. To begin with, modern portfolio theory clarifies the rationale behind the focus on diversification and asset allocation by robo-advisors [3]. Second, behavioral finance can be used to explain why individual investors are prone to overtrading, disposition effect and attention bias [2, 4, 5, 6]. Third, according to research on robo-advising, algorithmic advice might enhance diversification and trading discipline, yet its impact is not unconditional [1]. All these studies in combination demonstrate that robo-advising is not a technical product. It is a financial service that is ingrained into the psychology of investors, platform design, and market regulation.

The literature that is reviewed in this paper indicates that the use of robo-advising can minimize the behavioral biases in four primary ways. To begin with, there will be a risk of concentration due to asset allocation. The personal investor tends to choose an investment in which he or she is familiar or a product that is popular and as such may have undiversified portfolios. Robo-advisors invest their money on various classes of assets based on the risk level, and this would help to mitigate the influence of any particular market or industry. Second, rebalancing automatically may decrease chasing returns. As long as the weights of the assets are not in the desired level, they are corrected by rules. This action may drive investors into buying at the relatively low and selling at the relatively high, the same way as most emotional trading activities do.

Third, rule-based execution may minimize excessive trading. Rather than constantly determining when to buy and sell, investors can use a pre-defined portfolio process. This does not eliminate all mistakes, but it reduces the frequency of impulsive decisions. Fourth, portfolio-level information can reduce limited-attention problems. If a platform presents investment as a long-term portfolio plan rather than a competition among short-term returns, investors may become less dependent on rankings and hot products. These mechanisms show why robo-advising has potential value for ordinary investors.

But in the same work, it is noted that there are certain limitations. The risk profiling can be misleading as investors may misinterpret the question or select a higher level of risk to have a greater expected return. It can also promote overreliance on algorithmic advice. Since robo-advisors seem to be an objective and scientific thing, the investor will not remember that the model is just an assumption and not all market situations can be predicted. Lack of transparency exacerbates the issue. In case of lack of understanding by the investors about how the portfolios are created and why they need rebalancing, then the investors will become nervous in times of volatile markets.

Platform incentives raise another issue. In case the recommended portfolios are associated with fund distribution fees, management fees or partner products, there may be conflicts of interest in algorithmic advice. Besides, the convenience of online platforms can bring about new impulsive behaviors. Despite the fact that a robo-advisor is created to be long-term allocating, frequent push notifications, return updates, or popular portfolio rankings can cause investors to check accounts unnecessarily and change strategies needlessly. Therefore, not only technology but also interface design, regulation, and investor education determine the effectiveness of robo-advising.

Overall, robo-advising could be strongest as a discipline tool. It can reduce impulsive decisions linked to biases. Algorithmic trust is double-edged, so transparency and regulation remain necessary.

5. Discussion

5.1 Research Limitation

There are also some research gaps. The research papers do not give much attention to the fact that robo-advisors have low cost and diversification as a key advantage of this approach, but there is little information about how the behavior of an average investor changes in case he or she uses a robo-advisor. Further empirical data should be conducted regarding whether people who use robo-advisors trade less than others, hold more diversified portfolios, and tend to act more disciplined when it comes to trading in times of market pressure. Also, there is no literature on the issue of algorithmic transparency, conflict of interest between the platforms, and education of investors. In Chinese markets, the robo-advising is usually associated with the fund distribution system, financial institutions, and the online financial application. It can affect what is suggested and how risks are conveyed through incentives of the platform. Thus, future studies will need to focus on the algorithm as well as the business conditions under which the algorithm functions.

There are still limitations of this review. It relies primarily on a narrative synthesis of the literature and does not make use of original account-level data or survey evidence. The future studies may compare robo-advising platforms between countries, particularly China and developed markets. It might also empirically test whether robo-advice alters the trading frequency, portfolio diversification, holding periods, and response to market downturns. Robo-advising can only become more effective in enhancing the behavior of individuals in investing when it is used to allocate long-term assets instead of selling products in the short term.

5.2 Practical Implication

There are several practical implications. The platforms must enhance the validity of risk profiling through scenario-based questions which enable investors to visualize actual losses. They must also enhance algorithmic transparency by clarifying asset weights, major sources of risks and rebalancing rules. Short-term performance rankings must not be in control of the interface. Regulators ought to demand disclosure of fee structures and possible conflicts of interest. Lastly, investor education is still necessary. Robo-advising is not able to

substitute basic financial knowledge; it is only effective when investors comprehend risk, return, diversification and constraints of models.

6. Conclusion

The paper examined the influence of robo-advising on behavioral biases in individual investors based on the principles of behavioral finance. According to the literature, robo-advisors can minimize overtrading, return-chasing, concentrated holdings and emotional decision-making to a certain degree. Their positive impact is primarily due to risk profiling, diversified asset allocation, automatic rebalancing and rule-based execution. Robo-advising could assist investors to focus less on single products and more on portfolio objectives, leading to a more disciplined and long-term investment strategy.

Nevertheless, the behavioral biases are not able to be removed by robo-advising. The lack of transparency in its algorithm, misjudgment in risk profiling, conflict of interests and overdependence on algorithms can make it less effective. The Simons and Thorp cases indicate that there is a need to model since they do not guarantee profits, but rather they help to discipline, think in terms of probabilities and control risks [7, 8]. Thus, the creation of the concept of robo-advising must focus on the protection of investors, disclosure of risks, and education as well as the technological advancements.

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