



Research on the Development of Robo-Advisor Under the Background of Fin-Tech

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Abstract. Fin-tech has promoted the development of robo-advisor and subverted people's perception of the traditional financial industry. The robo-advisor platform uses a combination of investment algorithms to provide customers with suggestions to enable non-professional investors to enter the financial network. However, issues such as identification of customer needs, single investment advisory products, and regulatory risks hinder the development of China's robo-advisor to a certain extent. Based on the analysis of robo-advisor theory, technical basis, development status and existing problems, this article puts forward feasible suggestions for the development of robo-advisor and helps the rapid development of robo-advisors in China's financial market.

Keywords: Fin-Tech · Robo-Advisor · Asset Allocation

1 Introduction

Robo-advisors use a series of artificial intelligence machine learning algorithms, portfolio optimization and other theoretical models, and provide users with intelligent online investment advice, asset allocation and other value-added according to investors' risk tolerance, income goals and preferences. Specifically, the theoretical basis of robo-advisors is based on the modern portfolio theory model represented by the Markowitz mean-variance model and the Black Litterman model [2, 9]. Driven by the development of financial technology innovations such as big data, cloud computing, and artificial intelligence, robo-advisors have emerged and have been widely used, and the future prospects are better.

Compared with traditional investment advisors, robo-advisors are different in terms of service groups, investment thresholds, service models, and management costs. Robo-advisors solve the problem of high cost, small coverage, and difficulty in meeting the growing medium and low levels income groups wealth management needs of traditional investment advisory services [6], details are shown in Table 1.

With the advancement of interest rate marketization and the increase of residents' income, customers' demand for financial asset management has gradually increased [12]. In financial asset management, robo-advisory products can provide targeted services to meet customers' personalized asset allocation needs. According to the differentiated characteristics of customers, Robo-Advisor screens out preferences, mining and creation

Table 1. The difference between manual-advisor and robo-advisors

Features	Manual-advisor	Robo-advisor
Customer Scope	For high net worth clients	Cover most types of investors including high-net-worth clients, mainly ordinary investors
Investment Threshold	Relatively high, foreign countries generally require that the net assets other than the owner-occupied property be higher than 250,000	Very low, zero threshold can be achieved
Service Model	Offline one-to-one service	Mainly online, providing limited or no manual services
Service Content	Comprehensive and multifaceted services covering asset allocation, tax advisory, estate planning, etc.	Focus on asset allocation and automation investment
Asset Types	Basically cover all investable asset type	Underlying assets multiple ETFs and over-the-counter funds
Investment Method	Fundamental investment	Quantitative investment
Fee Level	High, the average fee rate is 1%–3%, and there may be excess income rewards	Low, the average rate is 0.25%–0.5%, no excess reward fee is charged
Risk Control	There may be behavioral errors	Control risk based on current portfolio theory and data model
Monitoring Efficiency	Relying on manual labor, unable to achieve real-time monitoring throughout the process	High, can reach 7/24 h monitoring
Source of Income	Alpha and Bate earnings	Mainly Bate income
User Experience	The process is more cumbersome	Simple and convenient

needs, and uses big data to create an ecosystem of products, customers, and institutions to strengthen consulting capabilities and enhance customer trust. Therefore, the robo-advisor business has broad prospects both in depth and breadth. However, after China has experienced rapid development from 2015 to 2018 as an emerging product, there are also obstacles in terms of investor trust, regulatory risks, and technological risks.

2 Theoretical Basis and Technical Conditions of Robo-Advisor

2.1 Theoretical Basis of Robo-Advisor

Robo-advisor is based on the modern investment portfolio theory model represented by the Markowitz mean-variance model. Markowitz (1952) proposed a mean-variance model, using expected returns and market fluctuation risks to construct investment portfolios, laying a theoretical foundation for quantitative asset allocation. Since the Markowitz mean-variance model assumes that historical situations will repeat itself as a prerequisite, and then builds an optimal investment portfolio through historical returns and market fluctuation variance, various asset returns and variances may be different from historical data. Therefore, it is necessary to adjust and modify the market equilibrium allocation weight of the model to optimize the investment portfolio to obtain greater returns. In view of the defects in the Markowitz mean-variance model in the market equilibrium allocation weights, Black and Litterman (1992) used the Bayesian method on the basis of the Markowitz mean-variance model based on historical data to add subjective opinions of investors to the model. And proposed the Black Litterman model, which makes the asset allocation affected by both the market equilibrium weight and the subjective expectations of investors. At the same time, the limitations of the Markowitz mean-variance model in terms of market equilibrium allocation weights are corrected. The subjective view of the Black Litterman model only expresses a view on the expected return of assets, but in fact investors may have some indirect views, such as macro factors such as GDP/CPI, and fundamental factors such as PE/ROE. The same factors will also affect asset price fluctuations. Wing Cheung (2009) further proposed the Augmented Black Litterman model (Black Litterman multi-factor expansion model, referred to as the ABL model), which combined the subjective views of the early Black Litterman model Expanding to the factor level that affects market returns has increased the scope of application of the model. However, the difference between the ABL model and the Black Litterman model is that in the calculation process, the ABL model not only adds a factor term to the expected return vector [11]. Moreover, factor items are also added to the covariance matrix, which expands the prediction of only n asset returns in the Black Litterman model to the prediction of n asset returns and f factor returns.

2.2 Technical Conditions of Robo-Advisor

Fin-tech is based on advanced technologies such as big data, cloud computing, artificial intelligence, and block chain. It is embodied in the integration and innovation of finance + technology. The main application scenarios include: payment and settlement, wealth management, credit support, and commercial insurance etc. The development stages of financial technology mainly include: First of all, the financial IT stage. Mainly things refer to the electronic transformation of office business through the application of IT software and hardware, thereby improving financial efficiency. At the financial IT stage, ATM and POS machines are the main representative products. Secondly, the Internet finance stage. Gather users through online platforms on the Internet or mobile terminals, connect asset terminals, capital terminals and other terminals with each other to match the sharing of financial services and financial information. In the Internet finance

stage, Internet fund sales and mobile payment are the main representative businesses. Thirdly, the financial technology stage. Through big data, cloud computing, artificial intelligence, block chain and other advanced technologies, it solves the business pain points of traditional finance and improves the efficiency of traditional financial services [3]. In the financial technology stage, big data credit investigation and robo-advisory are the main representative application scenarios [1]. The chemical reaction of “artificial intelligence + finance” has reconstructed the financial service ecology [8]. Artificial intelligence helps provide standardized, intelligent, and modeled financial services, such as decision-making and early warning, and helps prevent systemic financial risks [5]. The application scenarios of artificial intelligence in finance are very rich, including financial forecasting, anti-fraud, financing and credit decision-making, intelligent investment advisory, voice recognition, portrait monitoring and early warning, etc. [12].

3 The Development Status of Robo-Advisors in China

Robo-advisors took the lead in the rapid development in the United States. As of the end of 2017, the scale of asset management (AUM) based on robo-advisors exceeded \$224.8 billion, with an annual growth rate of 87.3% and an annual growth rate of 47.5% by 2021. The scale of global robo-advisory assets under management will exceed \$1 trillion. In 2015, the concept of robo-advisors began to be introduced into China, and began to be localized under the exploration of Internet finance companies, and robo-advisors achieved rapid development in China. In 2017, the assets under management of robo-advisors in China exceeded 28.8 billion dollars, with an annual growth rate of 87.3%. It is estimated that by 2022, the total assets under management of robo-advisors will exceed 660 billion dollars. The development history of robo-advisors is shown in Fig. 1.

China’s robo-advisory products started and intensively broke out from 2014 to 2015. At present, there are more than 20 companies that have launched “robotic investment advisory” products. Among them, there are platforms launched by traditional financial institutions, including Ping An One Account, and Huatai Asset Mark. In addition, Internet companies launched JD Smart Investment, Flushing, Baidu Toushitong, etc. There

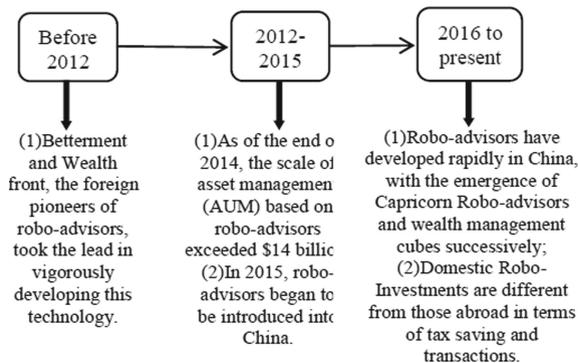


Fig. 1. The development history of robo-advisors

are also independent third-party robo-advisory platforms, including Micai, Blue Ocean Fortune, etc.

In comparison, the main differences between Chinese and American robo-advisors are reflected in three aspects: investor style, financial market maturity, and regulatory environment. Firstly, in terms of investor style, the United States is dominated by institutional investors, accustomed to long-term investment and portfolio risk diversification; China is dominated by retail investors, accustomed to short-term operations, and highly speculative. Secondly, in terms of the maturity of the financial market, there are nearly 1,600 ETFs in the United States. At the beginning of 2017, the scale of assets under management was more than 30 billion dollars and reached more than 100 billion dollars in July. The products include stock indexes, bonds, commodities and other types. While domestic only there are more than 130 ETFs with assets of approximately RMB 100 billion at the end of 2017, and they are dominated by stocks, which cannot diversify risks well. Thirdly, in terms of the regulatory environment, the U.S. pays equal attention to functional supervision and behavioral supervision. Asset management and investment advisory services realize integrated supervision, and the supervision of the robo-advisory industry is gradually clarified. However, China's asset management and investment advisors implement sub-license management, and have not yet issued regulatory standards for robo-advisors. Therefore, China still lags behind in terms of laws and regulations, and needs to make up for shortcomings as soon as possible.

4 Problems in the Development of Robo-Advisors

At this stage, the reason why China's robo-advisors has not penetrated into the hearts of customers is because there are some defects in the robo-advisory platform itself that hinder the development of robo-advisors. The specific points are as follows:

4.1 The Problem of Identifying the Real Needs of Customers

Taking customer wealth management needs as the starting point, the identification of customer asset allocation needs throughout the life cycle is actually very complicated, and it is difficult to get rid of on-site communication and cooperation between people in the short term.

4.2 Data Dilemma, Customer Portraits Are not Accurate Enough

At present, the use of artificial intelligence in robo-advisors is relatively rudimentary. Due to the complicated external data processing, high cost, low efficiency, high standardization difficulty and certain compliance issues, risk assessment is mainly based on customer self-reports and internal data, and the results of risk assessments and actual conditions often exist differences, limited intelligence, and customer portraits are not accurate enough.

4.3 The Product Pool Dilemma

The investment target is relatively single, and there is a lack of standard and effective product evaluation system. Since most robo-advisory platforms currently have great difficulty in obtaining product information, the investment target is single, mostly limited to public funds, and does not cover other asset management products such as bank wealth management, private equity, insurance, deposit products, and cannot achieve true asset allocation, and cannot the risk be fully diversified. At the same time, financial products continue to innovate, with more and more types and more and more complex structures, and the lack of a standard and effective evaluation system for various types of products, which affects robo-advisors in product selection.

4.4 Incomplete Regulatory Policies

First, there is a lack of supervision and regulation. As an emerging industry, robo-advisors are still in a blank state in related laws and regulations [4]. Second, the license management is not clear. Robo-advisor is based on algorithms to build a diversified portfolio of financial products such as stocks, funds, insurance, etc., while China's financial industry implements a sub-license management system, that is, financial institution operating licenses, which have their own license plate for banks, trusts, funds, etc. At present, China's regulatory policy does not clarify whether the robo-advisor industry needs to apply or how to apply for a sales qualification license, and there may be uncertain risks [13].

5 Conclusions and Recommendations

The development of China's robo-advisors has gone from a budding state to a stage of rapid development. As the degree of intelligence continues to increase and the degree of technological empowerment continues to deepen, robo-advisors will provide investors with warm, full-life cycle wealth management services through the "human + machine" model, and gradually cover more long-term wealth management services through the full-intelligence model. It gradually covers more long-tail customers through the all-intelligence model, effectively improving the wealth management level of Chinese residents. Combining with the current development status and existing problems of robo-advisors in China, the following suggestions are made:

5.1 Strengthen the Construction of Robo-Advisory Scenarios and Enrich Product Types

Scenario-based construction can increase positive interactions with customers, increase affinity, and improve customer experience. By inviting investment professionals and authoritative experts to explain their product content and investment logic, and at the same time add certain comics, investment news and other content, or form an online and offline interactive platform. It is necessary to establish an emotional link between investment advisory products and investors, to more effectively increase the conversion

rate of user traffic, to meet the deep needs of investors, to provide diversified products and services, to build an effective product evaluation system, and to establish a one-stop shop for investors automated asset allocation and investment tracking system.

5.2 Subdivide Customer Profile Data to Improve Precision Investment Advisory Service Capabilities

The customer profile module makes full use of the logistic regression in machine learning as the core algorithm, uses customer historical data for training, obtains customer models, and predicts customer label characteristics based on customer models, including academic information, occupational information, industry information, risk tolerance level, past investment preferences, personal income and debt information, family composition and economic conditions, etc. At the same time, the data source of the customer profile module also includes continuously generated real-time data, which is quickly calculated by big data to form a real-time profile, thereby enhancing the service capabilities of robo-advisors.

5.3 Strengthen Investor Education and Protection, Strengthen Information Transparency

There are many investment terminology in robo-advisor business products, which makes it difficult for some customers to understand. With the professionalization and complexity of investment methods, for customers with less experience, continuous improvement of financial expertise is the first choice for investment business. Regulators and robo-advisory platforms need to strengthen investor education and publicity to ensure that investors understand the operating procedures of the platform. The robo-advisory platform should ensure that its algorithms are consistent with investment analysis methods, and appropriately classify customers' risk capabilities. In addition, investors need to change their investment philosophy, improve their investment literacy, correctly understand the robo-advisory platform, and maintain a sense of risk protection during the investment process, so as to achieve long-term and stable investment returns.

5.4 Improving the Regulation of Robo-Advisors

Incorporate robo-advisors into the existing regulatory framework, and stipulate that institutions that provide intelligent services need to obtain the qualifications of securities investment consulting services in order to conduct business legally, and accept the supervision of relevant regulatory agencies. In addition, it is necessary to appropriately relax laws and regulations on the scope of investment advisory business. Learning from the mature experience of developed markets to fill up the regulatory gaps in robo-advisory algorithms as soon as possible. At the same time, strengthen the technical supervision of robo-advisors. The investment advice includes the content that should be covered when collecting customer information, the supervision opinions on algorithm technology, and the establishment of management and supervision of digital investment advice, the specific content such as suggestions on the structure and process of the company, and suggestions on training customers.

In short, while China is drawing on foreign advanced experience, it also needs to be emphasized that robo-advisors are still financial attributes and belong to financial technology. Therefore, both the industry and regulators need to attach great importance to the risks that may arise, and find a balance between development and stability, and between risk and supervision. At the same time, we must pay great attention to the protection of investors' rights and interests and integrate it with the real economy. By focusing and protecting, financial technology and robo-advisors can fully exploit their strengths and avoid weaknesses, and better promote the development of China's financial market.

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