Robo-Advisors in Investment Management

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Abstract*: One of the important contributions of the fourth industrial revolution is the introduction of robo advisors as alternates to conventional mutual funds. Robo advisors are mechanized platforms that use automated algorithms to provide financial advice to investors. This study compares the risk adjusted performance of these automated advisors to the conventional funds that were based in the US between the years 2016 and 2019. Our results show that on average, robo advisors demonstrate superior performance as compared to equity, fixed income, money market and hybrid funds. They also out performed three prominent equity indices, and the results remained robust for different specifications of the risk to reward models. The findings demonstrated that robo advisors not only provide easy access and cost effective advice, but also dominate in the risk adjusted performance.*

Keywords: Robo advisors.

I. INTRODUCTION

The technological innovations are on the forefront of the fourth industrial revolution. The pace of the disruption that has been brought forward by the Industry 4.0 is so high that some economies have increasingly found it challenging to keep up with the progress . The introduction of new technologies is not only impacting the management of the businesses, but also the organizational structures of the organizations. The financial services offered are among those segments of the economies which are experiencing significant challenges, thus resulting in new opportunities and dynamic risk factors that can be put forth by this revolution. However, the adaption and diffusion of technology in the financial services available is accelerating at an immense pace, with a shift from conventional to more innovative financial products that are being developed (Marszk and Lechman, 2018).

Investment management through funds is the process of professional asset management, in order to achieve specified financial goals. Benefiting from skilled managers, mutual funds are likely to adapt to trading strategies and investment screening that results in the superior performance of the financial institutions (Berk and van Binsbergen, 2015). Therefore, these funds provide the retail investors an opportunity to optimize their investments, by offering financial vehicles that consist of varying risk classes. Moreover, these services come with a fee loading that is passed on to the investors, and are in the form of transaction costs, advisory fees, marketing and distribution expenses etc. The participation costs are sometimes related to the past performance of the financial institution, with the investors willing to pay a higher advisory fee for the past winners. However, these costs result in a drag on the net returns for the investors, and there is a natural preference given to the larger funds, considering the scale of their advantage, that results in lower transaction costs.

Industry 4.0 has introduced automation in the mutual fund industry. This is in the form of robo advisory services that have been evolving rapidly in the last five years. The robo advisors are online automated financial advisors that employ technology in order to aid the investors in optimizing their investment objectives. They have largely adopted algorithms from machine learning, and also taken aid from artificial intelligence by using the vast amount of data that is available for various investing possibilities. Although, some of the conventional funds have adopted digital methods to manage investments, the robo advisors differentiate themselves by providing solutions, ultimately through automation and technology. This would mean very minimal human intervention that offers two prime benefits. Firstly, it provides retail investors with an access to financial advice that has not been the case previously. Secondly, it is much more cost effective than conventional setups. Brenner and Meyll (2020) noted that robo advisors are perfect substitutes to human advisors, as they offer very easy account setup, robust financial planning, portfolio optimization, as well as customized customer services. Fig. 1 illustrates the flowchart of a typical robo advisor.

Many studies have documented the performance of mutual funds, as well as the possible drivers of this performance. Andreu et al. (2018) suggested that the performance of mutual funds is largely dependent on the market timing ability, that itself is a function of the size of the funds available. Muñoz et al. (2014) focused on the clientele effect, and attributed it as a possible performance driver. The findings suggested that funds' management is ultimately affected by profit-seeking investors. Andreu et al. (2019) attempted to relate the managers' demographics with the performance. They pointed that the demographics are a vital determinant of the risk tolerance of the funds. Moreover, Fang et al. (2017) assessed the funds' performance during recessionary periods, and indicated regarding the influence of herding during the bearish markets. These studies point towards the involvement of fund managers in the performance, which can

vastly vary based on the geographical location, investor demographics, skill sets, investment styles, etc. In this context, the automated Robo advisors are likely to be free from such influences, and given the algorithmic process based on artificial intelligence, big data, etc. the performance that they exude should be arguably superior to that coming from the performance of the conventional funds. Finally, since every investor in a fund will have access to similar automation, unlike the traditional funds where various managers handle different investors, there will be no performance differentials when it comes to the performance on the robo advisors. Therefore, it makes an interesting case to observe how these automated funds are performing, their traditional counterparts.

The conventional funds differ from robo advisors, especially when it comes to their expense structure. In this regard, Babalos et al. highlighted the relevance of the burden of mutual funds' expenses on the performance of the financial institutions. They pointed out that the expense structure is a central determinant of flow of the funds. In short, these findings tend to attribute expenses as an essential aspect of the traditional funds' management. Moreover, as the transactional expenses are very minimal for the automated funds, it reflects a significant difference in the performance. Therefore, this validates a vital gap in the research, especially when it comes to comparing the performance of the funds that differ in their expense structure.

Despite the popularity and outreach of the robo advisors, there is scant empirical evidence on their comparative performance, vis-àvis the other mutual funds. In this paper, we attempt to fill this gap by providing some insights on the performance of robo advisors. As most of the robo advisors are concentrated in the United States, we use conventional funds that operate out of the US. While the conventional funds can be segregated into different types, owing to their investment styles, such detailed dissemination of information is not available for robo advisors. Therefore, without any investment discrimination, our study includes all the fully automated funds in the robo category. Moreover, we are using multiple criteria for the comparative assessment. These include the adjusted Sharpe Ratio, Reward to Risk Ratio and, Jensen's Alpha. Our findings suggest that the robo advisors have outperformed other mutual funds, as well as some of the prominent equity indices. Moreover, these results remained robust for various specifications of the risk to reward, the capital asset pricing model, the Fama and French size, the value factors models, as well as the momentumbased extensions. Keeping these findings in mind, the rest of the paper is organized as follows. Section 2 introduces the data and methodology, while Section 3 presents our results and the discussion. Lastly, Section 4 concludes the findings of this study.

II. RESEARCH METHODOLOGY AND DATA

In order to evaluate the comparative performance of the robo-advisors and the conventional funds, we employed different measures that have been presented below. The relevance of these methods, in order to gage the funds' performance measurement, have been well documented in the literature by Christiansen et al. (2020), Coudert and Salakhova (2020), Naqvi et al. (2018), Krishna Reddy et al. (2017).

III. RESULTS AND DISCUSSION

The robo advisors are evolving rapidly in the last five years, and have been popular amongst the retail investors. Table 1 presents the value weighted average returns for the funds that have been included in this study, from the years 2016 to 2019. This period has been marked by progressions in the markets, so we have had a chance to observe positive returns across all the categories. Among the stock indices, the DJIA has outperformed its counterparts with a 13% average return, as compared to a

IV. CONCLUSION AND POLICY SUGGESTIONS

The technological innovations have resulted in many disruptions in the financial services industry, and fund management is also one of them. In the last five years, we have seen rapid evolution of fully automated investment management funds, known as the robo advisors.

These virtual advisors offer many benefits to the investors, over their conventional counterparts. The primary factor here is the ease of access, and how many more retail investors can access financial advice through online

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