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Robotic Financial Advisors: Regulatory Interactions to an Emerging Alternative to Investment Provision

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Abstract

Robotic financial advisors (robo-advisors) have emerged as a purported low-cost and low-hassle alternative to traditional investment advisers and broker-dealers. This type of advisor assists financial institutions in employing asset-allocation models and algorithms to invest client portfolios, typically in exchange-traded funds. In this paper, we focus on reviewing the current state of the art in the provision of financial advice and discuss how regulatory agencies have interacted with aspects of robo-advising.

Keywords: Robotic Financial Advisors (Robo-Advisors); Regulatory Interactions; Traditional Investment Advisers; Asset-Allocation Models; Regulatory Agencies; Investment Provision; Financial Advice

Abbreviations: FINRA: Financial Industry Regulatory Authority; ESAs': European Supervisory Authorities; MPT: Modern Portfolio Theory; CAPM: Capital Asset Pricing Model; SEC: Securities and Exchange Commission's; OIEA: Office of Investor Education and Advocacy; FINRA: Financial Industry Regulatory Authority; DSM: Digital Single Market; EU: European Union; ECMH: Efficient Capital Markets Hypothesis

Introduction

Apart from lending, an alternative path to seek funds is through investment-participating in the capital markets. Investment provisions changed after the global financial crisis, and mistrust was cultivated, with Fintech emerging and challenging the dominant models of business. The rise of investment Robo-Advisors, web-based insurance exchanges, online credit comparison sites, and automated personal financial management services offered new possibilities and risks, systematically unassessed. The scale of automation provides higher quality and more transparent financial advice to more people at a lower cost than human financial advisors [1,2]. Specifically, U.K. financial services regulators are encouraged to take steps to promote the development of automated financial advice to increase access to financial advice, as presented in -infra Part III (discussing the cost-effective structure and components of Robo-Advisors and the unique challenges regulators face) listing many good governance practices for FINRA members to employ concerning digital investment advisors, all or most of which could also form the basis for external evaluation [3,4].

There are various forms of investment services. The most important and dominant in the market form of provision of investment services is investment advice, defined[1] as the provision of personal recommendations to a client concerning one or more transactions relating to financial instruments [5,6]. The person/entity providing the service of advisory is responsible to the client in terms of providing information about the investment, collecting information about the client's financial capability, estimating its

[1]Definition according to article 4.4 of the DIRECTIVE 2014/65/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 15 May 2014 [5] on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU, known as MiFID II. Also, the US legal system see SEC Staff, Study on Investment Advisers and Broker-Dealers, As Required by Section 913 of the Dodd-Frank Wall Street Reform and Consumer Protection Act, at 36 (January 2011) ("Under the Advisers Act, an adviser is a fiduciary. This fiduciary standard applies to the investment adviser's entire relationship with its clients and prospective clients, imposes upon investment advisers the "affirmative duty of 'utmost good faith, and full and fair disclosure of all material facts,' as well as an affirmative obligation to 'employ reasonable care to avoid misleading'" their clients and prospective clients." [6].

tolerance to risk, understanding the purpose of the investment, and measuring its ability to suffer losses [7][2] . Having all this data [8,9], the advisor will have to provide suitable investment options to the client and will have to provide specific documents explaining every important aspect, e.g., nature and risk of the investment in an understandable way! Mandatory prospectuses and other material may not be enough and human interaction between advisor and client is crucial to assist the client to decide the appropriate investment. Perhaps the primary reason that individual investors hire investment professionals is to gain access to professionally personalized investment advice.

Hypothesis I: What if human involvement in the provision of investment advice was to be replaced by software?

Regulatory Definition of Robo-Advisors

Robo-advisory and automated asset management emerged in the US [10] in the late 2000s. "Robo-advisors" have emerged in the investment advisory marketplace as a purported low-cost, low-hassle alternative to traditional investment advisers and broker-dealers, employing asset-allocation models and algorithms to invest client portfolios, typically in exchange-traded funds [11]. According to the OECD [12], "Robo-advisors can allow their retail clients to open various types of accounts on their platforms. The standard type of account is a simple brokerage account that allows the client to invest in the securities market".

At this point, it would be useful to examine the term robo-advisor. The term 'Robo-Advisor' broadly refers to any automated service that ranks or matches consumers to, financial products on a personalized basis [13-15]. The Financial Industry Regulatory Authority (FINRA) describes, [16][3] robo-advisors as "digital investment advice tools," which include automated investment analysis and recommendation services sold to traditional financial advisors. Although there is no general definition, robo-advisors are intermediaries between investors and the markets.

Software Definition of Robo-Advisors

The robo-advisor software, the technology behind the automation of advice, is an algorithm. Two are the key inputs:

- Personal information input by the client (online and in a questionnaire format).
- The logic of the algorithm, which 'decides' which products or services should then be recommended to the consumer. According to European Supervisory Authorities (ESAs'), [17]: "Automated financial advice tools are often presented in the form of a decision tree, where the consumer responds to a sequence of scripted questions which will generate recommendations based on the consumer's specific responses". Automated advice tools are therefore consumer-facing tools, as opposed to advisor-facing tools e.g., IT tools that are used by a human advisor to aid in the advice process.

Robo-advisors offer different levels of human interaction to their clients [15,18,19]. The 'classical' robo-advisor, often operated by a start-up and potentially backed by venture capital firms, interacts with clients online only without contact between clients and investment personnel. Furthermore, many robo-advisory services are hybrid (or 'semi-automated') models with some kind of human interaction.

A typical robo-advisor platform consists of three phases [20,21]:

- The initial investor screening
- Investment strategy implementation
- Monitoring and rebalancing the strategy

There are two types of robo-advisors [22]. In the first type, the robo-advisor is not only advising but also managing the financial instruments on behalf of the client- in a very similar way a fund's manager does, e.g., portfolio management. The second type of robo-advisor is providing advice, following the client's preferences and goals and then the client decides [23,24]. In this type, the robo-advisor would also monitor the portfolio and provide updates, and work, in a very similar way to a human advisor.

Financial and Investment Definition of Robo-Advisors

The next thing to examine is how robo-advisors' work. Robo-advisors start by defining the investment strategy of each individual based on his/her investment goals and risk profile [17]. Robo-advisors ask potential clients about the purpose of the investment and the time horizon- the screening and advice process for this form of robo-advisory takes place in the form of a decision tree where clients answer a sequence of scripted questions (risk metrics) [25]. These questions are complemented by objective and subjective questions that evaluate a client's willingness and ability to tolerate risk [26,27]. Objective risk

[2]According to article 24 of MiFID II for E.U [8] For the US, see, [9] (providing that the SEC, for example, has stated that "advisers owe their clients a duty to provide only suitable investment advice. This duty generally requires an adviser to make a reasonable inquiry into the client's financial situation, investment experience and investment objectives, and to make a reasonable determination that the advice is suitable in light of the client's situation, experience and objectives.") The Division expects investment advisers to provide advice under standards at least as high as these.

[3]See FINRA (2016) listing, [16] many good governance practices for FINRA members to employ in relation to digital investment advisors, all or most of which could also form the basis for external evaluation.

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metrics can include a client's income and years of retirement. Subjective questions ask, for example, how the client would react to a market decline and how comfortable he/she is with fluctuations in the market. Following the clients' assessment, depending on the type of advisor the robo-advisor is recommending possible transactions or is picking and executing the preferred transaction [28].

A very interesting issue to be examined is how financial ideas shape algorithms to make recommendations on how to allocate funds on different assets, in other words, which theory is used to recommend an investment to clients? The dominant theory in the world of the provision of financial services is the modern portfolio theory, stated by, [29] basic portfolio theory "the investor does (or should) consider expected return a desirable thing and variance of return an undesirable thing". Markowitz's idea is based on the hypothesis that investors can design an optimal portfolio to maximize returns by taking on a quantifiable amount of risk. Essentially, investors can reduce risk through diversification using a quantitative method. Modern portfolio theory (MPT), [30-33] which is the updated and most dominant theory in capital markets today- strongly declares that it is not enough to see the expected risk and return of one particular stock (or not putting all of your eggs in one basket).

By investing in more than one stock, an investor can reap the benefits of diversification - chief among them, a reduction in the riskiness of the portfolio. MPT was a sufficient starting point for asset allocation models but only laid the theoretical foundation. The two most important developments in Modern Finance that built on MPT included the Capital Asset Pricing Model (CAPM) [34] and the Efficient Market Hypothesis [34,35][4] which is often commingled with the Fama French Factor Models. Modern portfolio theory states that the risk for individual stock returns has two components:

- **Systematic Risk:** These are market risks that cannot be diversified away, e.g., interest rates, recessions, and wars.
- **Unsystematic Risk:** Also known as "specific risk," this risk is specific to individual stocks, such as a change in management or a decline in operations.

This kind of risk can be diversified away as you increase the number of stocks in your portfolio. It represents the component of a stock's return that is not correlated with general market moves. For a well-diversified portfolio, the risk - or average deviation from the mean-of each stock contributes little to portfolio risk. Instead, it is the difference between individual stocks' levels of risk that determines overall portfolio risk. As a result, investors benefit from holding diversified portfolios instead of individual stocks, [36-38].

Now and after the presentation of MPT, we are ready to answer the question. In most cases, robo-advisors algorithms are based on MPT, [39]. Portfolio optimization is adjusted by taking into account investment goals and the desired risk level, e.g., for a given level of risk, asset allocation will be different if the goal is to generate income for expenses or save for the long term. If desired by the clients robo-advisors will construct portfolios with higher risk by increasing the ratio of equity to bonds and, within each type of instrument, investing in riskier assets. It was mentioned above that one type of robo-advisors is also managing [40] the client's account, maintaining future profits by detecting risks and automatically rebalancing investments or automatically selling assets if the client is in need of money. It is worth mentioning that, in practice, robo-advisors seem to follow a conservative approach, offering funds that have wide coverage, long operating history, market liquidity, and good performance over time. This type of robo-advisors is ideal for investors who are prepared to adopt the passive investing strategy recommended by disinterested finance researchers [41].

Hypothesis II: What are the Benefits of Using a Robo-Advisor Rather than a Traditional Intermediary?

Advantages of Robo-Advisors

For starters there are several advantages, [42] in terms of management, e.g., robo-advisors are easily accessible to everyone owning a smartphone and mobile broadband internet. Also, pricing, [18] is more attractive since robo-advisors offer fixed costs. Being nothing more than FinTech, an algorithm, robo-

advisor is overcoming human behavioral bias and offering logical and rational advice, leading to increased objectivity, consistency, and transparency. Finally, robo-advisors can yield additional savings to clients in the form of "tax harvesting", [43]. This is the practice of selling assets that experience a loss and using the proceeds to buy an asset with similar risk (keeping the same risk profile of the portfolio). Recording a loss decreases capital gains, reducing taxable income [44,45].

Limitations and Challenges of Robo-Advisors

What are the new obstacles that the use of robo-advisors creates? Some authors are very cautious, [46] about the dominion of robo-advisors in the market. For starters being relatively new,

[4]The Efficient Capital Markets Hypothesis (ECMH), stated in its basic form by Eugene Fama [33]. According to ECMH, human behaviour to the change of market prices, following the pull and demand principle, is affected by two factors, first human preferences - which are stable and unchangeable through time- and second by access to information and the ability to process them [34].

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their business models have not been tested in the long term and are under financial stress. Furthermore, robo-advisors seem to have the same informational gap as marketplace lenders [47]. Risk assessment, based on online decision trees where the future client makes input and possibly excludes other information, e.g., client's investments so far might (such as pension funds and real estate), not provide a complete overview of a client's overall financial condition. If robo-advisors act on partial information, they might not provide optimal recommendations.

Another crucial challenge is how the existing regulatory framework about the provision of financial advice is capable to involve robo-advisors services within its scope, e.g., the duty of care standards since many platforms have tried to avoid regulatory requirements by including a disclaimer that the recommendation, they provide is a general recommendation and should not be interpreted as personalized. This is maybe the most intriguing challenge for the regulator. Clients' disengagement is another risk. Since the whole process is automated, clients may not devote time to understanding how the process is delivered. The very benefit of robo-advising is also dangerous, particularly in cases where mass market consumers with certain details, e.g., low financial knowledge and low income, are targeted.

Lastly, possible disengagement from monitoring their investments is a fearful possibility. A final concern is a potential for robo-advisors to lead to pro-cyclicality in the market and affect the stability of the financial system. This could be a concern where the algorithms used by robo-advisors recommend very similar investment strategies leading to herd behavior, and where the robo-advice market achieves a significant volume to move markets with its trading activity.

Hypothesis III: How Current Regulation Defines and Protects Robo-Advisors?

Having examined the robo-advisor functions and pros and cons at this point it would be useful to display how regulatory agencies have interacted with aspects of robo-advising. There are different approaches to how the authorities understand Robo-Advisors. Some of the regulator's opinions will be displayed. Commentators, [48], and regulators, [49] have questioned whether and to what extent Robo-advisors can be investment advisors and fiduciaries. The ESAs, [50] expressed "that any output generated by an automated tool that could be reasonably perceived by the consumer as financial advice should be considered within the scope of this exercise, depending on the precise characteristics of the tool and subject to meeting the other relevant criteria (i.e. the automated tool is used directly by the consumer, without (or with very limited) human intervention; and an algorithm uses personal information provided by the consumer to produce an output).

The level of specificity of the advice provided will depend on the information collected by the automated tool. For instance, some risk profiling tools capture information to categorize consumers, for example by risk profile and investment horizon. In these instances, the advice provided may be the same as every other consumer who is in the same category of investor (i.e., with similar risk profile and investment horizon). The level of specificity of the advice will also depend on the universe of products/services considered by the tool: if the algorithm only considers a limited range of products/services when providing the final advice, the output of the tool will, therefore, be limited.". The ESA even set examples of advice tools meeting the previously mentioned criteria, but these examples are not to be considered as numerus clauses. Yet still, ESA's concerned about how successfully robots can manage the pedagogic role of an investment advisor: asking the relevant questions and answering questions, and, finally: giving information in an understandable manner.

In the US, The Securities and Exchange Commission's (SEC) Office of Investor Education and Advocacy (OIEA) and the Financial Industry Regulatory Authority (FINRA) have even issued an alert to investors concerning automated investment tools. SEC is more cautious than ESA about the matching of the provision of investment services from Robo-Advisors to those provided by traditional advisors. For example, during the stage of estimating the clients' assets, the SEC is highlighting, [25,51-54]: "For example, robo-advisers typically do not conduct due diligence on assets held outside of a client's account or inquire about this information from clients. Rather, the robo-advisers will require the client to agree that he or she is responsible for any assets outside the account. Robo-advisers attempt to disclaim this due diligence duty by stating that they do not provide financial planning or wealth management services.

However, assets held outside of a client's account directly impact the client's total financial picture and, accordingly, the investment". Money managers, investment consultants, and financial planners are regulated in the United States as "investment advisers" under the federal Investment Advisers Act of 1940 ("Advisers Act" or "Act") or similar state statutes. Section 202(a)(11), [55] of the Act defines an investment adviser as any person or firm that: "For compensation is engaged in the business of providing advice to others or issuing reports or analyses regarding securities". A person/firm must satisfy all three elements to fall within the definition of "investment adviser [56]. Every person/firm that falls within the definition of "investment adviser" (but is not eligible for one of the exclusions) must register under the Advisers Act.

The law governing SEC-registered advisers imposes five types of requirements on an adviser:

i. A fiduciary duty to clients

ii. Substantive prohibitions and requirements

iii. Contractual requirements

iv. Recordkeeping requirements

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v. Administrative oversight by the SEC, primarily by inspection

For the SEC robo-advisors are obliged, bound under law to share similar duties with traditional advisors. Yet it is the Commission's clear opinion that "fully automated robo-advisers usually: 1) do not meet with or conduct significant (or any) due diligence on a client, 2) provide investment advice that is minimally personalized, 3) may fail to meet the high standard of care that is imposed on the appropriateness of investment advisers' investment decision-making, and 4) specifically decline the obligation to act in a client's best interests". A point that concerns the regulators, [57] is that robo-advisors tend to disclaim various duties in customer agreements and elsewhere. These disclaimers are typically embedded in a lengthy electronic client agreement that must be "signed" by the client before services can be provided. Robo-advising software rests on the assumption that people read and digest the relevant information and that they do not usually need the possibility to ask questions about them. There is doubt that people do not always read information in an online setting, [58].

Results

This article provided information on Robo-Advisors as an upcoming investment method used by professionals who are hired to provide personalized investment bits of advice. Moreover, Robo-advisors are not mere tools, but they are complex computer systems that harness AI and implement distributed algorithms to provide personalized investment advice to their clients thus, enhancing human-computer interaction and assisting with new investment strategies and possible suggestions and examination of existing ones.

The technical novelty of this paper lies in explaining the emergence of robotic financial advisors as a low-cost and low-hassle alternative to traditional investment advisers. Throughout this paper, we have focused on reviewing the current state of robo-advising and discussing the interactions between regulatory agencies and the industry. Our main conclusion after studying the regulation scope of this tool is that robo-advisors can and should assist financial institutions. SEC is strongly questioning the ability of robo-advisors to keep up with their fiduciary obligations and their ability to conduct due diligence, while the robo-advisors' depersonalized structure may not allow the provision of adequate personalized advice and therefore appropriate decisions. SEC even expressed openly that there is a legislative gap existing that must be filled by the legislator and until then robo-advisors seeking state registration in the Commonwealth will be evaluated under the foregoing guidance on a case-by-case basis.

In the US robo-advising is more involved in investment than in the European Union. The EU is currently heading a Digital Single Market (DSM) [58], where online goods and services can be accessed seamlessly and fairly across borders. One of the objectives of the DSM is to simplify consumer rules for online purchases. ESA also recognizes the potential risks arising from the robo-advising trend and categorizes, [17] the risks to those (i) related to consumers (a) having limited access to information, and/or limited ability to process that information, (b) risks related to flaws in the functioning of the tool and (c) risks related to widespread use of automated financial advice tools and (ii) related to financial institutions arising (i) from the functioning of the tool and (ii) from the allocation of liability.

Yet ESA's opinion about robo-advising is that apart from the potential risks, there are also potential benefits for consumers and financial institutions. Consumers will pay less when they receive advice through automated tools, will have access to a wider range of advice, will obtain financial advice in a faster, easier, and non-time-consuming way, will receive more consistent advice, and will find it easier to keep a record of the advisory process. Institutions on their side will have access to a wider range of consumers if they provide advice through automated tools, will incur fewer costs to deliver financial advice, will deliver a consistent consumer experience, and will provide more easily auditable advice because automated tools are more easily interrogated. To summarize, the benefits are related to costs, accessibility, and quality of service in essence and procedure, for all sides! The pros outweigh the cons in using Robo-Advisors as asset allocation models or as an enhancement to current algorithms aiming at increasing the value of client portfolios by harnessing different levels of risks and rewards.

Author Contributions

Stavros Kourmpetis was responsible for conceptualization, investigation, methodology, validation, writing the original draft, and the optimization and writing of the original draft.

Alexandros Gazis was responsible for the investigation, methodology, resources, validation, writing the original draft, review, and review-editing resources.

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