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Good or Bad Robots? Responsible Robo-Advising

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Abstract

FinTech has changed the way financial services are produced and delivered.[1] As the Digital Finance Strategy for the EU put it: the future of finance is digital. Digital finance has also helped people and businesses tackle the unprecedented challenges caused by the COVID-19 pandemic. We increasingly rely on digital and remote technologies. The role of regulation is to make sure that these technologies are used in a responsible way.[2] Robo-advising is one of the innovations relating to FinTech. This article addresses central challenges and risks in robo-advising, and the regulatory means to tackle them. When these challenges are resolved, robo-advising can provide customers with an easy-to-use, cost-effective and flexible service.

Keywords

FinTech, Investment advising, Robo-advising, MiFID II, Responsibility, Algorithm, Information security, Cybersecurity, Financial literacy, Legal Design

1. Robots as Investment Advisors

1.1. FinTech and Robo-Advising

Financial technology, or shortly FinTech, is leading to an increased automation and reorganisation of business models in the financial sector. New services and products relating to, for instance, blockchain technology, online banking and robo-advising have emerged. The drivers of this development include technological progress, changing consumer behaviour highlighting electronic service channels, changing ecosystems of financial industry leading to resizing internal operations, and changing regulation which has lowered the entry thresholds for new types of actors.[3]

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[1] European Commission, *FinTech Action Plan: For a More Competitive and Innovative European Financial Sector* COM(2018) 109 final 2 (2018).

[2] European Commission, *Digital Finance Strategy for the EU* COM(2020) 591 final 1, 4, 17 (2020).

[3] Thomas Puschmann, *Fintech* 59 Business & Information Systems Engineering 69, (2017), 69-70, 74. Puschmann defines FinTech as incremental or disruptive innovations in the financial sector induced

From the regulatory perspective, FinTech has brought both opportunities and challenges. Compliance and reporting can be facilitated, streamlined and automated, and supervision improved. On the other hand, FinTech raises challenges such as cyber-security risks, and worries relating to data, consumer and investor protection as well as market integrity.[4]

Robo-advising is defined by the European Securities and Markets Authority (ESMA) as a provision of investment advice through an automated or semi-automated system used as a client-facing tool.[5] The European supervisory authorities (ESAs) consider robo-advising as an automated tool that asks prospective investors questions concerning their specific circumstances, and based on the answers, algorithms are used to recommend suitable financial instruments for investors. The term *robo*-advising highlights the central feature of the service: lack of human contact. Some robo-advisors are entirely automated while others can enable some human interaction.[6]

There are certain undisputable advantages in robo-advising. Automatisation reduces the costs of services and thus makes services available to a wider range of customers. It also offers more service provider options to choose as online services can be provided across borders. The 24/7 availability enables flexibility and online services are usually fast to use: it can only take a few moments to fill in an initial questionnaire after which an advice is obtained. Although the lack of human-to-human interaction can be viewed as a detriment, it can also bring some benefits. If the underlying algorithms are well-developed, they can serve more consistent advices and accurate predictions. Robo-advisors do not suffer from cognitive biases, human errors, poor judgment or prejudices. Equal advice can be served for all customers with similar characteristics. The automatic documentation of the advising process can also be viewed as one of the advantages.[7]

With automated tools, huge market data masses can be analysed and utilised. Accordingly, robo-advising enables efficient and on-time rebalancing of investments. In investment advising, the suitable investment mix is defined for each client. However, different types of asset classes perform differently over time and the portfolio can drift from the original allocations. Human advisors cannot continuously monitor

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by IT developments resulting in new intra- or inter-organisational business models, products and services, organisations, processes and systems.

[4] European Commission, *supra* n. 2, at 2.

[5] ESMA, *Guidelines on Certain Aspects of the MiFID II Suitability Requirements,* ESMA35-43-1163 4 (2018).

[6] ESAs, *Joint Committee Discussion Paper on Automation in Financial Advice* JC 2015 080 6-7, 12 (2015). The ESAs consist of the European Banking Authority (EBA), the European Securities and Markets Authority (ESMA) and the European Insurance and Occupational Pensions Authority (EIOPA). See also BaFin (*Die Bundesanstalt für Finanzdienstleistungsaufsicht), Robo-Advice, and Auto-Trading – Platforms for Automated Investment Advice and Automatic Trading*, <https://www.bafin.de/EN/Aufsicht/FinTech/Anlageberatung/anlageberatung_node_en.html>. The Germany's supervisory authority, BaFin, has defined robo-advising rather similarly.

[7] ESAs, *Ibid.*, 16-20.

the client's portfolio but this can be automatically done by robo-advisors. Investment allocations can then reflect better the client goals.[8]

The potential risks of robo-advising relate, for instance, to deficiencies in information and weaker opportunities to fill information gaps. This can lead to unsuitable investment decisions. The same result can be caused by the fact that customers are not always aware how their answers to the questionnaires affect on the advices. It is also important to note that despite of the automation, there is still people involved in making robo-advisors work. People design, program and implement them.[9] Errors in the algorithms and biases in the tool can lead to unsuitable advices. Although the tool appears to be free of charge, there can be different types of motivations impacting on the products that are recommended. In the online environment these risks might be emphasised as customers have less opportunities to ask clarifying questions concerning the conditions under which advices are given.[10]

In robo-advising, different parts of the advice process can be performed by different automated tools – one tool can collect information from customers while another tool proposes recommendations based on the collected data. Consumers may have difficulties to understand who is responsible for given advices which can make complaint making more difficult. The robo-advising programs can rely on different mathematical or market assumptions which can limit the output of the tool. Customers may not be aware of these limitations or they may not understand their meaning. Algorithms can also be manipulated by hackers. In addition, customers can make unsuitable investment decisions because the tool enables moving too quickly through the process.[11]

In the US, the U.S. Securities and Exchange Commission (SEC) and the Financial Industry Regulatory Authority (FINRA) have issued an Investor Alert on automated investment tools. In the alert, investors are given tips for using these types of tools. Firstly, it is important to understand the terms and conditions of a tool. Investors should also consider the tool's limitations, such as its key assumptions and how the information given to the tool directly determines the output of the tool. The output may not be right for a specific investor's needs and goals if the tool does not assess all of the investor's circumstances. Human judgment and oversight as well as more personalised service are missed. It is also important to understand how personal information is collected and used.[12]

From the financial market perspective, widespread automated tools can lead to the herding risk as many customers receive similar advices. This can increase market volatility. Widespread use of automated tools can also lead to decreased access of

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[8] Megan Ji, *Are Robots Good Fiduciaries? Regulating Robo-Advisors Under the Investment Advisers Act of 1940* 117 Columbia Law Review 1543, (2017), 1558-1559.

[9] Tom Baker & Benedict Dellaert, *Regulating Robo Advice Across the Financial Services Industry* 103 Iowa Law Review 713 (2018), 715.

[10] ESAs, *supra* n. 6, at 21-23.

[11] *Ibid.*, 24-26.

[12] SEC (U.S. Securities and Exchange Commission) & FINRA (Financial Industry Regulatory Authority), *Investor Alert: Automated Investment Tools* (2015).

human investment advising. From the robo-advising firm perspective, errors in auto-mated tools can lead to litigation and reputational risks.[13]

Overall, the risks of robo-advising relate mostly to the information given to the investors, and the understandability of that information and the advising process. The underlying technology and its implementation can also cause potential risks to the customers, robo-advising firms and market in general. Recognising these risks and reacting to them increases trust towards service providers, and can generate significant growth in robo-advising market.

1.2.   *Purpose of the Paper*

The regulatory challenges of robo-advising do not relate to the *lack* of regulation – which can often be the case among new technological innovations. Due to the technology neutrality principle of the EU law, the Markets in Financial Instruments Directive II (MiFID II)[14] can be applied to the traditional investment advising as well as robo-advising. However, there are certain specific features in robo-advising that must be taken into account when the regulation is *applied*. In this paper, these features are linked to the responsibility in robo-advising. Because the regulation has been written from the traditional investment advice perspective, it might be necessary to go beyond the explicit wording in order to apply regulation in a responsible way that can strengthen investor protection and build trust in the industry.

Responsibility has been more and more highlighted in investing as well as business in general. Responsibility in investing can relate to the choice of investment objects but it can also be considered from the service perspective. This paper aims at addressing the central responsibility challenges in robo-advising and the regulatory means to tackle them. These challenges relate to the possibility of interest conflicts, algorithm failure, understandability of investor information, and information security and cybersecurity. Failures with these challenges can raise risks of inappropriate actions and threaten investor protection.

The responsibility challenges examined in this paper reflect the different parts of the robo-advising environment, which is divided here to technological and service environments. Algorithms and cybersecurity relate to the technological environment of robo-advising, while interest conflicts and investor information relate to the service environment and the relationship between customers and service providers. In regulating FinTech innovations both environments must be taken into account. Technological environment brings new advantages as well as challenges compared to traditional finance. In addition to the cybersecurity and other technological risks, the role of information is different in online settings. The European Banking Authority (EBA) has been worried about the lack of transparency and adequate information in a digital environment. Customers can have difficulties in identifying applicable terms

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[13] ESAs, *supra* n. 6, at 27-28.
[14] Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU.

and conditions, and understanding the financial products and services provided and the risks they entail. Problems can also relate to identifying the 'true contractual partners' because of the lack of face-to-face contact. Pricing models can be unclear, as well. In the automated environment there may not be opportunities to fill in information gaps or seek clarification.[15]

Although this paper concentrates on the *challenges* of robo-advising, it should be noted that robo-advising brings also many advantages, as was discussed earlier. So, this paper is not intended to criticise the service per se. Quite a contrary: when the responsibility challenges are considered and reacted, robo-advising can serve customers with an easy-to-use, cost-effective and flexible service.

The responsibility challenges discussed in this article relate to the duties of investment advisors regulated in the MiFID II. These main duties are information gathering duty, suitability assessment and disclosure duty. The first one relates to the Know your customer principle. Although the same regulatory framework is applied to the human and robot advisors, there are some specific features that must be taken into account when carrying out these duties in robo-advising. They are discussed in the next chapter.

The financial market regulation is a highly harmonised area of the EU law. The MiFID II, among others, serves as a Union-wide regime for investment services. For this reason, this article examines robo-advising mainly from the EU regulation perspective. However, many issues are common universally.

2.   Robo-Advising and the MiFID II

2.1.   *MiFID II Requirements in Robo-Advising*

The regulation of FinTech innovations has not developed uniformly. There may or may not be regulation covering the phenomena. If there is regulation, it can be national regulation of the Member States, or new innovations may be covered by the EU regulation. The regulation can be specifically tailored to the service in question or the new innovations can be fitted to the regulatory framework of more traditional financial market regulation. The regulation of crowdfunding is one example of tailored FinTech regulation. The new EU regulation 2020/1503[16] on crowdfunding has been applied from November 2021. Before the EU regulation, the regulatory framework of crowdfunding was very scattered as different Member States had enacted their own legislative actions, while others did not have any regulation at all. The regulatory regime of robo-advising is different. The MiFID II is applied to the robo-advising as

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[15] EBA (European Banking Authority), *Discussion Paper on the EBA's Approach to Financial Technology (FinTech)* EBA/DP/2017/02 49-50 (2017).

[16] Regulation (EU) 2020/1503 of the European Parliament and of the Council of 7 October 2020 on European crowdfunding service providers for business, and amending Regulation (EU) 2017/1129 and Directive (EU) 2019/1937.

well as traditional investment services.[17] This approach is based on the technology neutrality principle of the EU law.[18]

One goal of the MiFID II directive has been to build trust towards market after the financial crisis and to strengthen the investor protection.[19] Despite of the technology neutrality, there are some special challenges in robo-advising, especially from the investor protection perspective. Robo-advising brings significant changes to the communication between customers and service providers. It changes also the format of information and contracts. The lack of human contact can be problematic if the investor does not understand online disclosures or the questions asked in the suitability assessment.[20]

The MiFID II tries to tackle interest conflicts with stricter rules. One way to prevent interest conflicts is to regulate remuneration policy. Investment firms should not remunerate or assess their staff in a way that conflicts with the duty to act in the best interests of their clients. The possibility of investment firms to accept and retain fees, commissions or other benefits from third parties is restricted. The MIFID II strengthens investor protection also via stricter disclosure duties. In addition, attention has been paid to the documentation of the investment advising process. Retail clients should be provided a written statement on suitability of given advices.

Investor protection problems can also result from the complex investment products that are offered to the retail clients. These products can be aggressively marketed and investors do not often understand how these products work.[21] The MiFID II strives to mitigate these risks with new product governance requirements. The needs of an identified target market must be taken into account when the investment products are manufactured and distributed. Identifying target market is important both in traditional investment advising and robo-advising. However, it should be noted that decision-making on the target market must take place *before* the actual advising process. The business policies and distribution strategies are typically defined by the management. Hence, target market identification is not meant to substitute the suitability assessment which is done later, during the advice process. The assessment of

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[17] See e.g., Commission delegated regulation (EU) 2017/565 of 25 April 2016 supplementing Directive 2014/65/EU of the European Parliament and of the Council as regards organisational requirements and operating conditions for investment firms and defined terms for the purposes of that Directive, Recital (86). It is stated that investment firms are responsible for undertaking suitability assessments also when the investment advice is provided in whole or in part through an automated or semi-automated system.

[18] See e.g., European Commission, *supra* n. 2, at 10. However, technology neutrality is not unproblematic in robo-advising. For instance, Ringe and Ruof notify that many EU rules are still written from the perspective of human interaction. This can be an obstacle in the digitalisation of financial services. Wolf-Georg Ringe & Christopher Ruof, *A Regulatory Sandbox for Robo Advice,* 27 (ILE Working Paper Series No. 14 University of Hamburg, 2018).

[19] MiFID II, Recitals (70), (86).

[20] Marika Salo & Helena Haapio, *Robo-advisors and Investors: Enhancing Human-Robot Interaction Through Information Design,* Jusletter IT 3 (23 February 2017), <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2937821>.

[21] ESMA, *Risks of Investing in Complex Products,* Investor warning, 1 (2014).

suitability will safeguard the suitability of a product to a *particular* client. ESMA has noted in its guidelines for product governance that services for the mass market may require automation of processes, which is usually based on formulas or algorithms that process quantitative criteria for clients and products. This can mean different types of scoring systems utilising product features, such as volatility, and rating of issuers. Quantitative data should be balanced with qualitative criteria.[22]

In addition to the strengthened disclosure duties, the MiFID II considers also the quality of information. The information given to the clients must be provided in a comprehensible form so that clients are reasonably able to understand the nature and risks of the given service and offered investment products. The staff providing investment advice must also have appropriate knowledge and competence on the products offered. According to the ESMA, if automated tools are used, investment firms should ensure that their staff has an appropriate understanding of the technology and algorithms that are used in digital advising, and that they can understand the automated advices that are generated by the algorithms.[23]

The applicability of the MiFID II has faced some critique, as well. For instance, *Maume* states that robo-advising is so significantly different from traditional investment advising that different approaches to regulation are needed. The traditional framework for human advisors rests on the fact that advisors communicate with clients. The regulation can be inefficient or even ineffective if applied to robo-advising.[24] *Ringe* and *Ruof* propose regulatory sandbox approach as a solution. It would offer a controlled space in which innovative products, services and business models can be tested under the supervision of competent regulatory authority. Relaxed regulatory requirements would allow easy experimentation and growth opportunities for robo-advisors.[25] The regulatory sandbox approach is mentioned also in the FinTech Action plan of the EU. It was stated that in the public consultation, industry respondents supported this approach while national supervisory authorities had mixed views.[26] However, the EU has recently noted the role of regulatory sandboxes as tools for more

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[22] ESMA, *Guidelines on MiFID II Product Governance Requirements,* ESMA35-43-620 5, 9-10 (2018).

[23] ESMA, *supra* n. 6, at 27-28.

[24] Philipp Maume, *Regulating Robo-Advisory* 55 Texas International Law Journal 49 (2019), <https://ssrn.com/abstract=3167137> or <http://dx.doi.org/10.2139/ssrn.31671375>. Maume notes that the service provided by the robo-advisors differ from traditional advice, as robo-advisors do not provide long-term saving plans, or educate clients. Robo-advisors do not either build up personal relationships or apply subjective elements, such as intuition or experience, in the advising process. See also Pablo Sanz Bayón & Luis Garvía Vega, *Automated Investment Advice: Legal Challenges and Regulatory Questions* 37 Banking & Financial Services Policy Report 1 (2018), 7. The authors call lawmakers for new laws on robotics, that could solve the legal conflicts in implementing and interpreting the MiFID II.

[25] Wolf-Georg Ringe & Christopher Ruof, *Keeping up with Innovation: Designing a European Sandbox for Fintech* (ECMI Commentary no 58 European Capital Markets Institute 3, 2019).

[26] European Commission, *supra* n. 1, at 9.

innovation-friendly, future-proof and resilient regulation which can help to emerge stronger from the COVID-19 crisis.[27]

Similarly, in the US, for instance *Strzelczyk* has criticised the Advisers Act[28] for being unequipped to protect investors in robo-advising.[29] Overall, the regulatory challenges relate more to the application of current legal framework than the wording of law.[30] Robo-advising differs from traditional investment advice especially in its reliance on algorithms and online service, as well as limited – if any – human contact.[31] Therefore, it is necessary to consider how robo-advisors can fulfil their Know Your Customer, suitability assessment and disclosure duties. Another problem can emerge from the fact that there are different types of robo-advisors utilising various levels of AI and other technology.[32]

2.2.   *Know Your Customer and Suitability Assessment in Robo-Advising*

According to the MiFID II (Article 4), investment advice means provision of personal recommendations to a client on transactions relating to financial instruments. The Article 25 regulates the assessment of suitability and information gathering duties. When giving investment advice, investment firms shall obtain the necessary information on the client's knowledge and experience relating to the specific product or service, client's financial situation including his ability to bear losses, and investment objectives including risk tolerance. Advices must be suitable for the client based on this information, and special attention should be paid on the client's risk tolerance and ability to bear losses. The duty to obtain client information is also known as the Know Your Customer duty. In practice, this duty is usually fulfilled with standardised questionnaires.

In robo-advising, suitability assessment duty can be fulfilled with obtaining information, and matching the profile of customers with financial products that are categorised as being suitable for that specific investor profile. The advisory process can be programmed in terms of sequencing and matching. When the advice is limited to a narrow range of investment products, it is relatively easy to label products into a few categories, and then customers can be sorted into these categories with quite simple

[27] Council of the European Union, *Council Conclusions on Regulatory Sandboxes and Experimentation Clauses as Tools for an Innovation-Friendly, Future-Proof and Resilient Regulatory Framework that Masters Disruptive Challenges in the Digital Age*, 13026/20 2-3 (2020). Regulatory sandboxes are increasingly used in the finance sector, especially relating to new, emerging technologies.

[28] Investment Advisers Act of 1940 (Advisers Act).

[29] Bret E. Strzelczyk, *Rise of the Machines: The Legal Implications for Investor Protection with the Rise of Robo-Advisors* 16 DePaul Business & Commercial Law Journal 54 (2017), 63.

[30] Ringe & Ruof, *supra* n. 18, at 29.

[31] SEC, *IM Guidance Update* (No. 2017-02 2, 2017).

[32] See Sanz Bayón & Vega, *supra* n. 24, at 3-4. The authors have presented different types of classifications for robo-advisors. See also Maume, *supra* n. 24, at 18-19.

questionnaires.[33] In the US, the FINRA has noted that typically there are from five to eight investor profiles. It is important to carefully consider the characteristics of investors that make a certain portfolio suitable for a given investor profile.[34]

The ESMA has made guidelines on certain aspects of the MiFID II suitability requirements. Some of these guidelines are highlighted in robo-advising context. In robo-advising, it is especially important to give 'a very clear explanation' on whether there is human involvement or not, and inform how the answers provided by the customer impact on the suitability assessment. The sources of information that are utilised in generating the advice must be explained. Customers must also be informed on how and when the customer information will be updated.[35]

According to the ESMA, in designing the questionnaires collecting customer information for suitability assessment, attention should be paid on clarity, exhaustiveness and comprehensibility. Misleading, confusing, imprecise and excessively technical language should be avoided. The layout, including font and line spacing, is important, too. In robo-advising utilising online questionnaires it is especially important to consider the design of the questionnaires. They must be clear and provide additional clarifications or examples when needed. This can be executed by using design features such as tool-tips and pop-ups. The robo-advising customers must also be informed whether it is possible to get any human remote interaction when filling in the questionnaire. There should be procedures with which inconsistent client responses could be notified.[36]

Robo-advisors have been criticised for being overly simplistic. If the questionnaires obtaining client information are too inaccurate, the resulting advice can be more of a one-size-fits-for-all type, than a truly personal recommendation.[37] The other problem is that customers tend to overestimate their knowledge and experience. The risk of overestimation may be emphasised in robo-advising where there is very limited or no human interaction.[38]

2.3. Disclosure Duty in Robo-Advising

The MiFID II (Article 24) regulates the disclosure duty of investment advisors. All information provided to the clients must be fair, clear and not misleading. In addition to the information relating to the products that are recommended, information must be provided on, for instance, the independency of the advice, whether the advice is

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[33] Iris H-Y Chiu, *Transforming the Financial Advice Market – The Roles of Robo-Advice, Financial Regulation and Public Governance in the United Kingdom* 35 Banking & Finance Law Review 9 (2019), 25-26.

[34] FINRA (Financial Industry Regulatory Authority), *Report on Digital Investment Advice* 6 (2016). It must also be noted that the construction of portfolios can bring risks on conflicts of interest.

[35] ESMA, *supra* n. 6, at 6-7.

[36] *Ibid.,* 8-10.

[37] Melanie L. Fein, *Robo-advisors: A Closer Look,* 4 (2015), <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2658701>.

[38] ESMA, *supra* n. 6, at 15.

based on a broad or more restricted range of investment products, and whether there is periodic assessment of the suitability.

In order to provide comprehensible information, it is crucial to consider the characteristics of customers, such as their investment experience and knowledge. In addition, the MiFID II classifies clients into three categories: retail clients, professional clients and counterparties. The classification impacts on the strength of the investor protection, such as implementing disclosure duties. Despite of this classification, in the financial market regulation, there is a presumption that the receiver of the information is a so-called 'reasonable investor'. This 'standard' investor is generally understood as a perfectly rational investor who aims at maximising returns in the marketplace. Reasonable investor could read and understand all the material data affecting on the decision-making.[39] In the Market Abuse regulation (EU) 596/2014,[40] reasonable investor standard is used to assess what type of information is material, and hence, utilised by a reasonable investor. However, financial literacy studies discussed later in this paper have proved that the behaviour of investors deviates from this hypothetical rational decision-maker.[41]

Inspite of the deviation from perfect rationality, carrying out disclosure duties per se is not a problem in the online environment. Typically, at least standardised documents are delivered and they can be provided easily in robo-advising, as well. However, the *quantity* of the information should not be at the core. Instead, it is crucial to consider, whether the clients read and understand the information.

Problems can emerge from the fact that documents concerning investment products tend to be long. They can remain unread especially in the online environment. Customers usually click 'I agree' without even taking a glance on the terms and conditions. *Lannerö* names this as the 'biggest lie on the internet'. The accessibility of online documents is still seen as an important goal universally. There are several means to achieve it. These can include using standardised symbols, phrases, layouts, machine readable codes, and plain language. Automation could also be utilised in analysing the documents.[42] The ESAs also notify that the risk that customers do not understand the key information is bigger in the online environment where it is assumed that consumers read and digest the information. Important information might be dismissed as 'legal small print'.[43]

There are also significant differences in the information needs of investors in robo-advising as opposed to traditional investment advising. In the latter, investors can concentrate on the product-specific information. In robo-advising, instead, they

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[39] Tom C. W. Lin, *Reasonable Investor(s)* 95 Boston University Law Review 461 (2015), 467.

[40] Regulation (EU) No 596/2014 of the European Parliament and of the Council of 16 April 2014 on market abuse (market abuse regulation) and repealing Directive 2003/6/EC of the European Parliament and of the Council and Commission Directives 2003/124/EC, 2003/125/EC and 2004/72/EC.

[41] See Ch. 3.3 *infra*.

[42] Pär Lannerö, *Fighting the Biggest Lie on the Internet,* CommonTerms Beta Proposal, 3, 16 (2013), <http://commonterms.org/commonterms_beta_proposal.pdf>.

[43] ESAs, *supra* n. 6, at 21-22.

should familiarise themselves also with the functioning of the robo-advisor. Robo-advising demands some technological knowledge from customers.[44]

2.4. Responsibility Challenges of Robo-Advising

The central duties of investment-advising can be fulfilled in robo-advising but specific features of the automated service must be taken into account. *Ji* states that the critique relating to the regulatory acceptability of robo-advisors have concentrated on three specific issues. First one of them is the limitations of using questionnaires in gathering client information. As a consequence, robo-advisors may fail to take into account factors such as investor's experience and financial goals. Secondly, robo-advisors lack human perception. They might miss some issues of client situation that could have arisen in conversation. Lastly, the ability of robo-advisors to address market failures have been questioned. Critiques argue that clients will need human advisors to talk with in financial downturns in order not to make detrimental panicked decisions.[45]

In the next chapter, the responsibility challenges in robo-advising are examined. The possible solutions on these issues will also be considered. The central duties of investment advising discussed in this chapter resonate significantly behind the responsibility challenges.

3. Responsibility in Robo-Advising

3.1. Possibility of Interest Conflicts

According to the MiFID II (Article 24), when providing investment services, the investment firms must act honestly, fairly and professionally in accordance with the best interests of its clients. The article forms an essential standard for the responsibility in investment advising. However, conflicts of interests are not seldom in investment advising. While the interest rate levels have been very low for a long time, the fees from selling investment products have been an important source of earnings for investment firms. This can lead to the over-selling of the products even in the situations where investors do not benefit of them.

Unbiased advices are seen as one advantage of robo-advising. However, this view takes into account only employee-client conflicts of interest, not firm-client ones. The latter conflicts can impact on how robo-advisor algorithms are programmed. So, the algorithms themselves can be biased. It is also common that a robo-advisor

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[44] FINRA, *supra* n. 34, at 13.

[45] Ji, *supra* n. 8, at 1565-1571. Inspite of some shortages, Ji states that well-designed robo-advisors can meet the fiduciary duty of care. The clients seeking robo-advice know that the recommendations they receive are based on the information they give in the questionnaires, and human judgment is not usually utilised.

recommends only affiliated products and services. The biased algorithms can be especially harmful for clients as they impact on all clients. The interest conflicts in robo-advising can thus have a larger and more certain impact on the client benefit.[46]

In the MiFID II, the risk of firm-client interest conflicts have been notified. The possibility of interest conflicts is made apparent, for instance, by regulating the independency of investment advice. If the investment advice is given on an independent basis, a sufficient range of investment products from different product providers should be considered in making recommendations. Restricting the remuneration and ability to take fees from third parties is also an important means to tackle the conflict situations.

However, even regulating the independency of investment advising does not guarantee the lack of interest conflicts. *Chiu* notes that surveying the whole market and providing an objective recommendation is not applicable to all advisors. In addition to the expensiveness of the independent advice, advisors can be 'restricted' in nature, such as banks that sell their own products. Hence, totally conflict-free advice cannot usually be achieved.[47]

The transparency of interest conflicts is especially important in robo-advising. Although the remuneration policies concerning individual investment advisors may not be a problem due to the lack of human contact, the possible firm-client interest conflicts behind the algorithms can be difficult to detect for clients. The MiFID II Article 23 requires investment firms to take all appropriate steps to identify, and prevent or manage conflicts of interest concerning any investment and ancillary services. If these risks cannot be prevented, they must be clearly disclosed to clients. The possible interest conflicts behind the algorithms should be revealed. In addition, the range of products utilised in robo-advising should be clearly defined. Robo-advisors are typically 'restricted' advisors with limited range of products.[48] Usually they rely on mutual funds and exchange traded funds (ETFs). These funds can be either actively or passively managed which affects on, among other things, the fee structure of the products.[49] Customers should be able to take this into account when comparing different robo-advisors.

3.2. *Managing Algorithms*

Robo-advisors typically utilise algorithms. The advice given is reliant on information input from the consumer and the logic of the algorithm. The algorithm 'decides' which

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[46] *Ibid.,* 1572-1573, 1576, 1578.

[47] Chiu, *supra* n. 33, at 18-19, 26. According to Chiu, personalised independent advice is likely to be a luxury or premium market good. There is an inverse relationship between access and personalisation. Easier access usually means mass-marketisation and lower cost barriers as well as lower personalisation. One problem is also that in order to give independent robo-advice, the design of the robo-advisor must be more sophisticated as it must sort large number of different providers and products into categories. Accordingly, there is an increased risk of misunderstandings and wrong categorisations.

[48] *Ibid.,* 24.

[49] Fein, *supra* n. 37, at 3.

products and services are suitable for the customer based on the given information. There can be huge differences on how broad product or service selection is considered by the algorithm. If this selection is very narrow, the resulting advice can be limited.[50] There can also be significant differences in investment styles utilised by different robo-advisors which affects on the recommended asset allocation. It is important to know how a robo-advisor handles volatility and how often the account is rebalanced and what types of changes trigger the rebalancing.[51]

Errors or biases in algorithms can cause systemic risks and harm consumers. The European Parliament emphasises that the same consumer protection requirements should be applied to the robo-advising as to traditional advising.[52] According to the ESMA, the algorithms should be regularly monitored and tested in order to ensure the consistency of the suitability assessment and advices that are based on it. The nature and characteristics of the products offered should be taken into account when algorithms are defined. The purpose, scope and design of the algorithms, as well as test strategy, should be systematically documented. Algorithms should also be reviewed and updated to ensure that they reflect current situation. Policies and procedures should be in place to detect possible errors in algorithms.[53] Although cost-efficiency is typically connected to the robo-advising, continuous testing, maintenance and marketing of the tool incurs costs that can be significant.[54]

Baker and *Dellaert* have listed rather similarly the information that regulators could require concerning the algorithms. The models as well as the data used by them should be explained. Attention must be also paid to the data quality. Robo-advisors should be demanded to test the accuracy and completeness of the data and they should develop strategies with which to deal with missing or incorrect data. Robo-advice providers should also describe what types of outcomes the algorithms are seeking, and evidence that algorithms perform in the way they are designed, and how this is ensured.[55] From the staff involved, robo-advising requires different types of expertise than traditional investment advice. It is important to have an appropriate understanding of the technology and algorithms, as well as rationale, risks and rules behind the algorithms.[56]

The SEC has listed information on algorithms that should be disclosed to customers in robo-advising. This information includes a description of the algorithmic functions used. Algorithms can, for instance, generate recommendations and rebalance

[50] ESAs, *supra* n. 6, at 12-13.

[51] SEC (U.S. Securities and Exchange Commission), *Investor Bulletin: Robo-Advisers* (2017).

[52] European Parliament, *Report on FinTech: The Influence of Technology on the Future of the Financial Sector,* 12 (2016/2243(INI), 2017).

[53] ESMA, *supra* n. 6, at 23. In the US, the FINRA has stated rather similarly that firms should effectively govern and supervise the algorithms used in digital-advice tools. They should also understand the methodological approaches behind the algorithms, and the biases or preferences related to them. See FINRA, *supra* n. 34, at 3-4.

[54] ESAs, *Report on Automation in Financial Advice,* 8 (2016).

[55] Baker & Dellaert, *supra* n. 9, at 735-736, 739. The authors notify that gathering information is just a start. Good judgment and domain-specific expertise are needed, as well.

[56] ESMA, *supra* n. 6, at 27-28.

investments. Assumptions, limitations and risks of the algorithms should be described. The algorithm may not take into account all market changes or can consider them differently than the customer expected. Information on possible third parties and interest conflicts are also essential. Other necessary information includes fees and costs, the degree of human involvement and how the robo-advisor uses information gathered from customers.[57]

It is important to notice that technology do not only entail risks to investment advising. Partly it can even make investment advising more secure for customers. Investor alerts in response to news or market changes can be given without any delay. With algorithms, different types of investment strategies, such as tax-loss harvesting, can also be efficiently implemented. In addition, robo-advisors can be very transparent – personal interest conflicts between the customer and the advisor are eliminated. However, there can still appear interest conflicts between customers and investment companies.[58] The MiFID II tries to tackle the latter ones, as was discussed earlier.

In addition to eliminating interest conflicts between advisors and customers, robo-advising can significantly reduce the effects of different types of biases. *Foerster* et al. found that traditional investment advisors do relatively little to tailor their recommendations according to client characteristics. The advices are then more of a one-size-fits-for-all type. According to the study, the preferences and beliefs of an advisor affected on the advices.[59] Thus, the advices can be prone to different types of cognitive limitations. However, robo-advising is not totally immune to these types of limitations either. It can be exposed to biases, conflicts and other limitations by the humans and institutions that develop it. But if appropriately developed, robo-advising process is otherwise less prone to these types of deficiencies.[60] It is important to note that robo-advising can be more consistent and accurate than human advising only if the underlying logic of algorithms and quality of the information utilised are appropriate.[61]

Antretter et al. studied whether an algorithm outperforms average angel investors. In their study, investing algorithm was built and compared to the decisions of 255 angel investors. The task was to select investment opportunities among 623 choices. The algorithm won average investors easily. Novice investors had limited experience, and cognitive biases affected on their decision-making. However, experienced investors who could control their own cognitive biases outperformed the algorithm. The experience alone was not enough – experienced investors who showed high levels of cognitive biases did not beat the algorithm. The results also showed that algorithms

[57] SEC 2017, *supra* n. 31, at 4.

[58] Francesco D'Acunto, Nagpurnanand Prabhala & Alberto G. Rossi, *The Promises and Pitfalls of Robo-Advising* 32 The Review of Financial Studies 1983 (2019), 1989, n 5.

[59] Stephen Foerster, Juhani T. Linnainmaa, Brian T. Melzer & Alessandro Previtero, *Retail Financial Advice: Does One Size Fit All?* 72 The Journal of Finance 1441 (2017), 1480. It must be noted that the data used in the study was from Canada.

[60] D'Acunto et al., *supra* n. 58, at 1987.

[61] ESAs, *supra* n. 54, at 9.

can have systemic inequalities. The algorithms themselves are not irrational or biased but they depend on the training data given to them. This data can be biased.[62]

D´Acunto et al. found that robo-advising helped investors to overcome cognitive biases. In addition, they found that investors with undiversified portfolios benefited from robo-advising the most.[63] So, there are studies indicating that robo-advising can help to overcome human limitations in investment decision-making. However, the efficiency and understandability of information may be another problem. The next chapter addresses this issue and proposes means to tackle the problem.

3.3.   *Understandability of Information*

Investor protection regulation in financial markets relays heavily on information and disclosures. However, it can be said that the regulation focus is shifting from the quantity of information to the quality of information. In robo-advising, it is especially important *how* the investor information is given to investors. If the advising is totally automated, investors may not be able to ask questions or clarifications. This can lead to misunderstandings and unsuitable investment decisions. Legal Design is an approach that strives for making legal documents more user-friendly. The approach is based on Proactive Law. According to the Proactive Law, legal documents are not primarily meant to be resolving disputes but to serve the actual users of the documents.[64] This perspective is consistent with the MiFID II. According to the Article 24, information should be provided in a comprehensible form in such a manner that clients are reasonably able to understand the nature and risks of the offered products, and to make investment decisions on an informed basis.

The Commission Delegated Regulation (EU) 2017/565[65] includes some specifications on how investor information of the MiFID II should be designed. According to the Article 44, the font size used to describe relevant risks must be at least of equal size than the predominant font used throughout the information provided. Attention must also be paid on the layout of the information. The information should be presented in a way that it is likely to be understood by the average member of the target group. Important information and warnings should not be disguised. The information must also be relevant to the means of communication used. In robo-advising, this would mean considering the specific features of online settings.

In the US, the SEC guides robo-advisors to offer information in a manner that clients are likely to read and understand. The SEC has notified that dense disclosures that are not in plain English are unlikely to be read and understood. Robo-advisors use wide variety of practices in providing information. The SEC states that the

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[62] Torben Antretter, Ivo Blohm, Charlotta Siren, Dietmar Grichnik, Malin Malmström & Joakim Wincent, *Do Algorithms Make Better – and Fairer – Investments Than Angel Investors*? (Harvard Business Review, 2 November 2020).

[63] D'Acunto et al., *supra* n. 58, at 2017-2018.

[64] Helena Haapio, *Next Generation Contracts: A Paradigm Shift,* 37-43 (Helsinki; Lexpert Ltd, 2013). Helena Haapio has been developing the Proactive Law and Legal Design approaches.

[65] Commission Delegated Regulation (EU) 2017/565, *supra* n. 17.
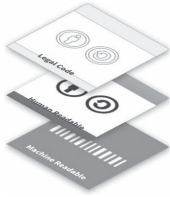
Figure 1. The Layered Structure of the Creative Commons License.
Sources: Creative Commons, *About The Licences,* <https://creativecommons.org/licenses/>.

disclosures in robo-advising should be designed to be effective. This can include design features, such as pop-up boxes and interactive text.[66]

The understandability and user-friendliness of information in robo-advising can be strengthened with Legal design. For instance, simplification and visualisation can be effective tools in designing the investor information. Important information can also be highlighted with icons that can represent the main features of the investment products.[67] The aim of the visualisation is not just to replace text but to complete and explain it. The most effective design depends on the clients' characteristics, as well as information needs and goals of the target group.[68]

In online settings, understandability of information can be improved by means that are not available in traditional investment advising. Different views can be served depending on the characteristics of the customer. Information can be layered in the same way as in the *Creative Commons* -licenses. CC-licenses consist of three layers. The first layer is the legal code layer which contains traditional legal terms of the license. Since the actual users of the licenses are not typically lawyers, the next layer serves a human readable version of the license. The final layer is a machine readable version that is understood by software systems, search engines, and other kinds of technology.[69]

In robo-advising, investor information could be layered in a way that different views could be displayed for investors with different investment profiles. Unexperienced investors could benefit from a view where information is presented very clearly. Alternatively, investors could always be displayed first the simplified view which would offer a basic understanding of the information. Additional information could be served after that.

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[66] SEC, *supra* n. 31, at 3, 5-6. See also SEC (U.S. Securities and Exchange Commission), *A Plain English Handbook,* 7 (Washington, DC 20549 1998). According to the handbook, with plain English, investors are more likely to understand what they are buying and they can make informed decisions on whether to sell or hold their investments.

[67] On information design, see, e.g., Robert Waller, Jenny Waller, Helena Haapio, Gary Crag & Sandi Morrisseau, *Cooperation Through Clarity: Designing Simplified Contracts* 2 Journal of Strategic Contracting and Negotiation 48, (2016), 60-61.

[68] Helena Haapio & Stefania Passera, *Contracts as Interfaces: Exploring Visual Representation Patterns in Contract Design* in *Legal Informatics*, 3 (Cambridge; Cambridge University Press, 2016).

[69] Creative Commons, *About The Licenses*, <https://creativecommons.org/licenses/>.

In addition to layering of the information, robo-advisors could utilise, for instance, linking. Complex financial terms could have links where clients can find additional information. The artificial intelligence serves new communication possibilities, as well.[70] A chatbot is a program with which communication between customers and service providers can be automated. Chatbots are fed with natural-language data derived from past customer interaction. The intelligent system processes the data and learns to answer customers in text format. The development of natural-language processing and AI enables the effective use of chatbots in various sectors. In robo-advising, the chatbots could serve clients the specific meaningful information they ask for in order to make investment decisions.[71] The development of AI would also enable communicating by speech with robo-advisors – in the same way that we can communicate with digital assistants such as Apple's Siri and Amazon's Alexa. This would help especially those customers that are reluctant to read written disclosures.[72]

The ESMA has also stated in its MiFID II guidelines that firms should carefully consider the effective design of their disclosures. The disclosures should be directly available to customers, and they should not be hidden or incomprehensible. In robo-advising, this means that relevant information could be emphasised by using design features such as pop-up boxes. Interactive text or F.A.Q. section could provide additional information for customers seeking further information.[73] In the Fintech Action plan, it is stated that data-driven solutions could be used to ensure that information for retail investors is complete, comparable and easily accessible. New tools could provide user-friendly interfaces linking existing databases or digital tools.[74]

One important aspect that should be taken into account when designing effective disclosure, is the financial literacy. According to the new Capital Markets Action plan of the EU, financial literacy is 'an essential skill for making good decisions about personal finances'.[75] The European Parliament has emphasised that financial literacy and digital literacy are crucial in order to make efficient use of FinTech.[76] The EBA has stated that the level of financial literacy and consumer awareness is very low.[77] In the US, the SEC advices investors to consider their own level of financial literacy before using robo-advisors. Low financial literacy levels limit investors' ability to

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[70] The EU has emphasised the importance of human-centric approach to AI. According to it, AI is not an end in itself, but a tool that can serve people end enhance well-being. In order to achieve this goal, trustworthiness of AI must be ensured. See European Commission, *Building Trust in Human-Centric Artificial Intelligence,* COM(2019) 168 final 1-2 (2019).

[71] Mikko Riikkinen, Hannu Saarijärvi, Peter Sarlin & Ilkka Lähteenmäki, *Using Artificial Intelligence to Create Value in Insurance* 36 International Journal of Bank Marketing 1146 (2018), 1146-1149. The authors studied the use of chatbots in the insurance sector.

[72] Salo & Haapio, *supra* n. 20, at 7.

[73] ESMA, *supra* n. 6, at 7.

[74] European Commission, *supra* n. 1, at 15.

[75] European Commission, *A Capital Markets Union for People and Businesses – New Action Plan* COM(2020) 590 final 10 (2020). According to the new CMU Action plan, the Commission will assess the development of a European financial competence framework.

[76] European Parliament, *supra* n. 52, at 15.

[77] EBA, *supra* n. 15, at 51.

ask questions about investing and then online disclosures may be the only source of information.[78]

Ji states that robo-advisor clients are on average less sophisticated, and they can have more difficulties to understand the investor information. This relates to the fact that robo-advising services have lower costs, and as a result they can be typically marketed to younger and less sophisticated investors.[79] The Vanguard Digital Advisor survey (2020) indicated that millennials – people born 1981 to 1996 – are twice as likely to consider using a robo-advisor as young boomers, born 1956 to 1964. The COVID-19 pandemic has even increased the interest of millennials to receive professional investment advices.[80] However, *D'Acunto* et al. did not found any substantial demographic differences between robo-advisor users and non-users. The users even appeared to be less prone to behavioural biases and have higher trading activity and higher amounts of assets under management. Under-diversified investors that adopted robo-advising increased their portfolio diversification. However, investors who were highly diversified before did not change their diversification.[81]

The OECD has studied the financial literacy levels in twenty-six countries in Asia, Europe and Latin America, and found that financial literacy is low in sampled economies. However, the differences between the economies are large. There are also differences between certain groups of people. For instance, young people (aged 18-29) as well as seniors (aged 60 and above) have lower financial literacy. There are also gender differences in financial literacy, as men perform better than women. People who use digital devices and services also scored higher in financial literacy.[82] The COVID-19 crisis has emphasised the importance of financial literacy. It is even more important than ever that people can handle their personal economy and avoid stepping into digital pitfalls.[83] According to the CMU Action plan of the EU, retail investors should be shielded from the complexities of the financial system. Sophisticated investors, instead, should not be overloaded with information as they may not need the same information as inexperienced investors.[84] Overall, differences in investor groups should be taken into account when designing information disclosures in robo-advising.

Finally, information design should not only be left for making disclosures more comprehensible. The whole design of the robo-advisors should be considered from that perspective. The context of decision-making – that can be called choice

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[78] SEC 2017, *supra* n. 51.

[79] Ji, *supra* n. 8, at 1578. See also Strzelczyk, *supra* n. 29, at 82. Robo-advising has altered the demographics of investing as it can be accessed online and through mobile devices.

[80] Vanguard Group, Inc., *Generational Views on Financial Advice, Investing and Retirement,* A Vanguard Digital Advisor Survey, 1, 9-10 (2020).

[81] D'Acunto et al., *supra* n. 58, at 1997, 2017-2018.

[82] OECD, *OECD/INFE 2020 International Survey of Adult Financial Literacy,* 7-9 (2020), <https://www.oecd.org/financial/education/launchoftheoecdinfeglobalfinancialliteracysurveyreport.htm>.

[83] EBF (European Banking Federation), *Financial Literacy Playbook for Europe,* 7, 15 (2020). European countries vary wildly with their financial literacy landscape. Some countries are beginning to implement a national strategy while some have had it for a long time.

[84] European Commission, *supra* n. 75, at 11. The CMU Action plan also notes the critical role of financial advisors, and highlights the importance of the qualifications of advisors.

architecture[85] – can heavily affect on the decision-making. For instance, the order in which options are presented and the framing of options can make major difference. If investment options are presented in overly complex way, investors may make unsuitable decisions. Comparably, a format that enables easy comparison of different products, and provides assistance in decision-making can significantly benefit customers.[86] Hence, the choice architecture should be taken into account when assessing the appropriateness of the robo-advisor program.

3.4.   Information Security and Cybersecurity

Big Data – the collection, processing and use of high volumes of data – is increasingly used in banking and securities sectors to generate ideas and solutions, or predict future events or behaviours. The collection of data is partly mandatory, such as for making suitability assessment in investment advising. The use of Big Data can significantly change the ways that financial services are provided. For consumers, it can bring better tailored products and services, and for financial firms more efficient processes and better risk management. Robo-advisors can manage complex and dynamic data that would be very costly and difficult to handle in traditional investment advising.[87] However, Big Data also raises questions on the processing of data, limitations and errors of the analytic tools, and privacy concerns. In addition to the risks for consumers, this can mean legal and reputational risks for finance institutions.[88]

New generations accept to share their data and forego privacy in order to get more personalised services. In the banking sector, customers trust that their data is used in a confidential way.[89] However, as customers are more accustomed to share personal data in online services, the risks of phishing and other scams increase.[90] Because the collection and analysation of data is central in the FinTech sector, the European Parliament has stressed that the data and consumer protection regulation is applied to new types of actors, as well. Consumers should also be more informed on the value of their personal data.[91]

The General Data Protection Regulation (GDPR) (EU) 2016/679[92] has increased the opportunities to control own data. The data subjects have, for instance, right to

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[85] Richard H. Thaler, Cass R. Sunstein & John P. Balz, *Choice Architecture,* 2, 12 (2010), <https://ssrn.com/abstract=1583509> or <http://dx.doi.org/10.2139/ssrn.1583509>.

[86] Baker & Dellaert, *supra* n. 9, at 739-740.

[87] Sanz Bayón & Vega, *supra* n. 24, at 5. The authors state that robo-advisors can also allow financial firms to know their customers and financial products in a more exhaustive way.

[88] ESAs, *Joint Committee Discussion Paper on the Use of Big Data by Financial Institutions*, 11 (JC/2016/86 5-6, 2016).

[89] EBF (European Banking Federation), *EBF Discussion Paper: The Digital Transformation of Banks and the Digital Single Market,* 5 (EBF_015782, 2015).

[90] ESAs, *supra* n. 6, at 25.

[91] European Parliament, *supra* n. 52, at 11-12.

[92] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

be forgotten (Article 17), and they must be given information on the existence of automated decision-making and its logic and consequences (Article 13). However, it should be noted that robo-advising does not actually mean decision-making but giving personal recommendations that guide investor decision-making. The Center for Data Innovation has criticised the GDPR for having a negative impact on the development and use of AI in Europe. For instance, the right to be forgotten can complicate machine learning that learn from the data it processes. The erasure of meaningful data can make it less accurate and limit its benefits.[93] The complexity of the GDPR also makes it difficult to follow.[94]

The ESAs note that while consumers can benefit from more tailored services, there can be unlimited or unclear information and comprehension on what extent the service is tailored and whether there is a personal recommendation or not. Consumers may also be unaware on how their personal data is used, as the awareness of the use of Big Data and consumer data protection rights appears to be low.[95] In order to comply with the regulation and to preserve consumers' trust, the processing of the data should be transparent and clearly communicated.[96] Clear communication is especially important in robo-advising, where personal data and algorithms are combined.[97]

As financial sector is increasingly dependent on digital technology, the threat of cyberattacks has also grown significantly. Cyber risks can deteriorate the investor confidence which is essential for the functioning of financial markets.[98] The ESMA has stated that if investment services are provided through online tools, special attention should be paid to the risks of malicious cyber activity. The firms should have procedures to mitigate such risks. This can also be seen as part of the MiFID II obligations according to which investment firms must take reasonable steps to ensure continuity and regularity in the performance of investment services and activities (Article 16).[99]

The European Parliament has stated that cybersecurity should be 'number one priority' in the Commission's FinTech Action plan, and the ESAs and the European Central Bank (ECB) should have it as a key element of their regulatory and supervisory

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[93] See also Amber Ausley, *The Prospective Impact of the Global Data Protection Regulation in Entrepreneurship: A Roboadvisor Case Study* 15 I/S: A Journal of Law and Policy for the Information Society 85 (2019), 101. A consumer can ask the robo-advisor to destroy data that is not absolutely necessary to the functioning of the robo-advisor. This can lead to impaired ability to provide best possible recommendations as robo-advisors have less information about the consumer.

[94] Center for Data Innovation, *The Impact of the EU's New Data Protection Regulation on AI,* 2-4 (2018). The right to data portability (Article 20) is seen as one of the few positive provisions of the GDPR. Data portability gives data subjects right to transmit their data from one service provider to another which is increasing competition. However, this incurs also costs when handling large data sets.

[95] ESAs, *supra* n. 88, at 23-24, 28.

[96] *Ibid.,* 16.

[97] European Parliament, *supra* n. 52, at 12. The quality of data is also significant, as errors or biases in algorithms or in the underlying data can cause systemic risks and harm consumers.

[98] European Commission, *supra* n. 1, at 15-16.

[99] ESMA, *supra* n. 6, at 29.

programmes.[100] The EU has recently renewed its Cybersecurity Strategy. Despite the fact that digital services and finance sector are frequent targets of cyberattacks, cyber readiness and awareness among businesses and individuals is low. Improving cybersecurity is essential for people to use and benefit from digital innovations, and safeguarding privacy and protection of personal data.[101] The Cybersecurity Act (EU) 2019/881,[102] which came into force in 2019, enables getting voluntary cybersecurity certification for ICT products, processes and services in the EU (Article 46). The certification can be one efficient tool in building trust to new types of digital innovations. In addition, the EBA has issued guidelines on the ICT and security risk management for financial institutions.[103]

4.   Conclusions

Robo-advising is one of the innovations relating to FinTech. With automation, investment advices can be served with lower costs. Typically, a robo-advisor is an online program that provides advices based on the algorithms, and customer information and other data utilised by the program. According to the technology neutrality principle, the same regulation is applied both to the traditional investment advising and robo-advising. However, the specific features of robo-advising must be taken into account when applying the regulation.

Figure 2 demonstrates the investment advising process and the responsibility challenges relating to different parts of the process. In this article, these challenges have been considered from the robo-advising perspective.

In robo-advising, specific attention must be paid to the questionnaires with which the Know Your Customer principle can be fulfilled. Sufficient information must be obtained on the characteristics of investors and their investment experience and knowledge, financial situation and investment objectives. The user-friendly design of the questions can significantly help investors to understand the questions and give appropriate information on their circumstances.

Information design must be taken into account also in fulfilling disclosure duties. Typically, investors do not read long documents. It is especially so in online environments. Specific tools can be used in order to enhance readability and understandability. These tools can include pop-ups, links and information layering. It is also important to note that the technology-dependent nature of robo-advising brings new information needs for investors in order to assess the quality of the investment advice.

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[100] European Parliament, *supra* n. 52, at 12.

[101] European Commission, *The EU's Cybersecurity Strategy for the Digital Decade,* 3-4 (JOIN(2020) 18 final, 2020).

[102] Regulation (EU) 2019/881 of the European Parliament and of the Council of 17 April 2019 on ENISA (the European Union Agency for Cybersecurity) and on information and communications technology cybersecurity certification and repealing Regulation (EU) No 526/2013 (Cybersecurity Act).

[103] EBA (European Banking Authority), *EBA Guidelines on ICT and Security Risk Management* (Final Report, EBA/GL/2019/04 13, 2019).

Know Your Customer	Suitability assessment	Disclosure duty
–understandable and clear questionnaires; –reacting to the information security challenges.	–suitability of advices, and programming algorithms; –taking into account the possible interest conflicts.	–user-friendly investor information in online settings.

Figure 2. Responsibility Challenges in Robo-Advising.

Investors should understand that the advice they receive depends on the algorithms and underlying assumptions.[104]

Because the resulting advice in robo-advising is highly dependent on the algorithms behind the advising program, special attention must be paid on the programming and governance of the algorithms. The functioning of the algorithms should be regularly tested and updated when needed. Assumptions behind the program and the data set utilised should be transparent. Robo-advising programs constantly collect data from investors. This data can be used to develop more personalised services. However, the nature of the robo-advising as an automated service is more likely to lead to simpler decision-making and mass-customisation of advices rather than to very personalised and complex advices. The development of AI can lead to the increase on personalisation of robo-advices in the future.[105] In addition to the technological constraints, data collecting relating to robo-advising and machine learning can generate problems on information security. The principles on the data usage should be informed clearly and understandably.

The lack of human contact does not eliminate interest conflict risks. These risks can even be multiplied in robo-advising as they can concern all customers. The MiFID II directive has addressed interest conflicts. Robo-advising companies must transparently inform customers on possible interest conflicts. Information must also be given on how broad range of products will be considered when giving advices. Based on these types of information, customers can estimate how independent and individual advising they receive.

Figure 3 summarises the checklist for responsible robo-advising. When the responsible procedures are implemented, robo-advising serves as a flexible and cost-effective alternative for traditional investment advising.

The central duties can be fulfilled in robo-advising as well as in traditional investment advising. However, there are specific challenges concerning them which have been considered in this article. Attention must be paid, for instance, on the design of the investor information. The design of the robo-advisors in general is an important issue, as well. Regulators face new challenges, as they should assess whether

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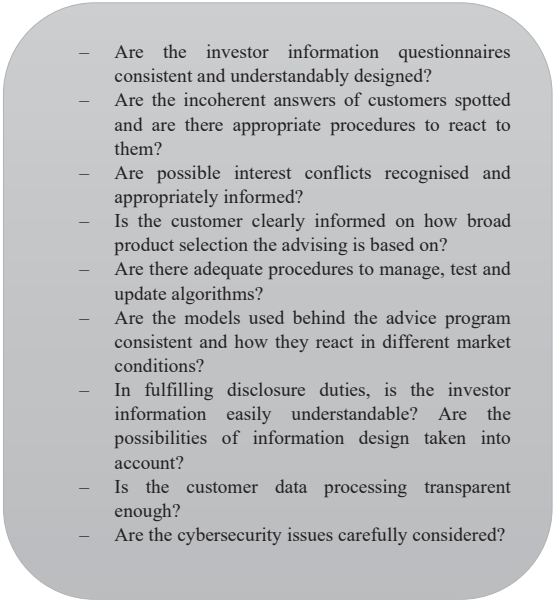[104] FINRA, *supra* n. 34, at 13.
[105] Chiu, *supra* n. 33, at 26, 28.

- Are the investor information questionnaires consistent and understandably designed?
- Are the incoherent answers of customers spotted and are there appropriate procedures to react to them?
- Are possible interest conflicts recognised and appropriately informed?
- Is the customer clearly informed on how broad product selection the advising is based on?
- Are there adequate procedures to manage, test and update algorithms?
- Are the models used behind the advice program consistent and how they react in different market conditions?
- In fulfilling disclosure duties, is the investor information easily understandable? Are the possibilities of information design taken into account?
- Is the customer data processing transparent enough?
- Are the cybersecurity issues carefully considered?

Figure 3. Checklist for Responsible Robo-Advising.

robo-advisors are designed well enough or not. In addition to legal knowledge, technological expertise is needed. And if this is challenging for regulators, it certainly is that also for customers. How could customers assess whether the robo-advisor is well developed and trustworthy?[106] The design aspect relates to the technological environment of robo-advising which is missing in traditional investment advising that can be more easily assessed with traditional legal tools. Uniform standards should be developed in order to assess the technological features, such as operation of algorithms, in order to enhance investor protection in robo-advising, and to build trust in the industry.

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[106] Baker & Dellaert, *supra* n. 9, at 718, 724.