

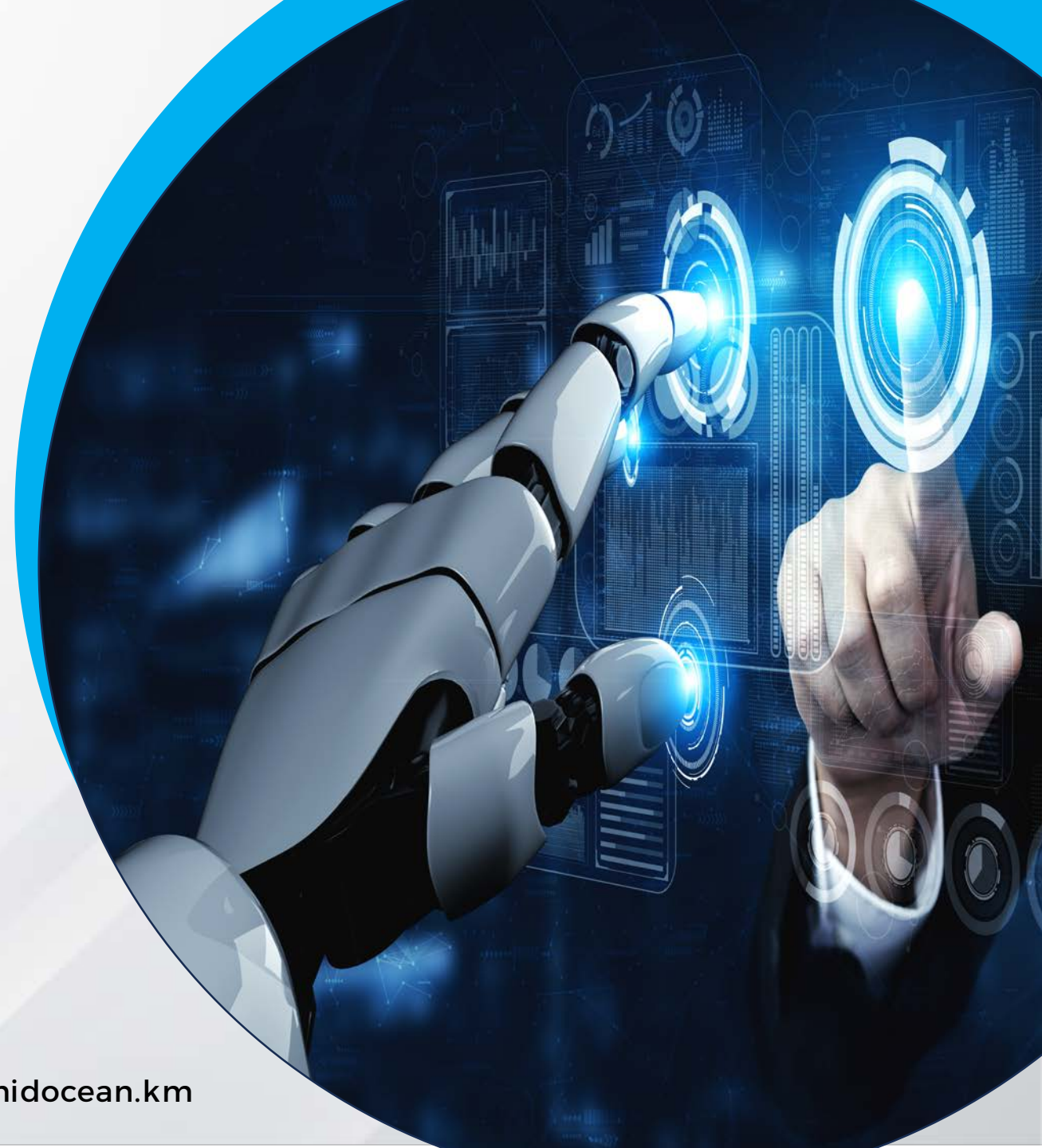


**College of Humanities
Master of Financial
Technology-
Fin Tech**

**Artificial Intelligence for
Financial Technology**
FNT 626

Lecture 06

**Prepared By:
Dr. Abeir Moussa**



Artificial Intelligence for Financial Technology
FNT 626- AI for Fin Tech

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CHAPTER 8



**The promises and perils of
robo-advisors**
Challenges and regulatory responses

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- **Learning Objectives**

1. Understanding Robo-Advisors in Financial Services
2. Explore the promises and benefits of robo-advisers
3. Examine the potential perils and challenges associated with robo-advisers
4. Understand the regulatory landscape governing robo-advisers
5. Address the ethical considerations in the use of robo-advisers
6. Explore the data privacy and security concerns associated with robo-advisory platforms
7. Understand the significance of algorithmic transparency and explainability in robo-advisory services
8. Explore the risk management practices and compliance requirements specific to robo-advisory platforms
9. Address the importance of consumer education and empowerment in utilizing robo-advisory services
10. Explore the future trends and regulatory innovations in the robo-advisory space

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Chapter outline

1. INTRODUCTION
2. CONCEPT AND EVOLUTION OF ROBO-ADVISERS
3. THE REGULATORY FRAMEWORK OF ROBO-ADVISORS: AN INTERNATIONAL OVERVIEW
4. PROMISES OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING FOR FINANCIAL ADVICE
5. THE PERILS OF USING ROBO-ADVISORS AND THE SOLUTIONS
6. LEGAL DUTIES AND LIABILITY OF ROBO-ADVISORS
7. CONCLUSION

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Artificial intelligence (AI) is changing the operation and business model of many market intermediaries and asset managers. For example, many firms are using AI and machine learning (ML) to support their advisory and support services, risk management, client identification and monitoring, selection of trading algorithms and portfolio management. Namely, since robo-advice reduces the interaction of humans, it can become less expensive, helping certain investors to gain access to advisory, investment and wealth management services that they could not afford otherwise. Despite these potential advantages of the automation of financial advice, the use of robo-advisers may also create or exacerbate certain risks. For this reason, regulators around the world are exploring the promises and perils of robo-advisers, and whether the existing regulatory frameworks for financial advisers can effectively address the risks and challenges potentially generated by the rise of robo-advisers.

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The term 'robo-advice' is generally employed for the provision of financial services that use algorithms to automatically perform many investment tasks done by a human financial adviser. First, an algorithm is fed with information from the client interested in getting financial and investment advice. This information typically includes details about the client's income, financial education, investment experience, and attitude to risk, among other aspects. Second, relying on the information collected from the future investor, the algorithm builds an investment portfolio theoretically suitable for the client. Finally, although this aspect depends on the particular features of the robo-adviser, some forms of robo-advice also provide continuous monitoring and assessment of the client's investment strategy. For example, while some commentators include the use of internal tools that financial firms use as a basis for the financial advice ultimately provided to their clients, most authors and regulators define 'robo-advice' as the provision of investment advice using client-facing technology tools.

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2. CONCEPT AND EVOLUTION OF ROBO-ADVISERS

Following the concept and scope of robo-advice used by other scholars, this chapter will limit the term 'robo-advice' to include the provision of financial services mainly focused on recommending investment products. While financial firms have always used different technologies and analytical tools to provide financial advice, robo-advice was first offered to public investors after 2010. Namely, as of 2018, there was USD 2 billion of Assets Under Management (AUM) related to robo-advisers in Singapore; USD 90 million in Hong Kong; USD 81 billion in China; USD 3 billion in Japan; and USD 1 billion in Australia. In the Western world, as of 2018, there was more than USD 400 billion worth of AUM related to robo-advisers in the US, and approximately EUR 14 billion worth of AUM related to robo-advisers in Europe, with the largest market being the UK (when still part of the EU) with AUM of EUR 5.5 billion. Further, within large markets for robo-advisers like the US, the value of AUM related to robo-advisers is projected to reach approximately USD 1.5 trillion by 2023.

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3. THE REGULATORY FRAMEWORK OF ROBO-ADVISERS: AN INTERNATIONAL OVERVIEW

In most countries and regions around the world, robo-advisers are subject to the same regulatory framework existing for traditional financial advisers. Therefore, entities providing financial advice are also subject to the licensing regime existing for financial advisers. For example, in Singapore, the Monetary Authority of Singapore (MAS) enacted a Guide on Principles to Promote Fairness, Ethics, Accountability and Transparency in the Use of Artificial Intelligence in the Financial Sector. This document provides financial firms using AI, such as those providing robo-advice, with a set of foundational principles on the responsible use of AI and data analytics, especially in terms of fairness, ethics, accountability and transparency. This document focuses on five primary aspects: (i) the governance and supervision of algorithms; (ii) technology risk management; (iii) anti-money laundering and countering financing of terrorism (AML-CFT); (iv) disclosure of pertinent information; and (v) suitability of advice.

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3. THE REGULATORY FRAMEWORK OF ROBO-ADVISERS: AN INTERNATIONAL OVERVIEW

In Hong Kong, the Guidelines on Online Distribution and Advisory Platforms issued under section 399 of the Securities and Futures Ordinance (SFO) applies to all licensed or registered persons (platform operators) when conducting regulated activities in providing online advisory services concerning investment products via online platforms. The guidelines focuses on six primary issues affecting platform operators: (i) proper design of the platform in compliance with existing laws and regulations; (ii) adequate disclosure and information to clients; (iii) risk management; (iv) governance, capabilities and resources of platform operators; (v) review and monitoring; and (vi) record-keeping.

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3. THE REGULATORY FRAMEWORK OF ROBO-ADVISERS: AN INTERNATIONAL OVERVIEW

In the UK, the Streamlined Advice and Related Consolidated Guidance requires firms providing financial advice to consider the target market for the product offering, the needs of clients the service is directed to, as well as the risk tolerance of a client. Moreover, it prohibits firms from offering products through their streamlined advice (including robo-advisory) services if the needs and objectives of the target market for the offered products are inconsistent with the clients receiving streamlined advice. It also requires financial firms providing, among other advice, robo-advice (i) to act honestly, fairly and professionally in accordance with the best interests of the client, have due regard to the interests of its customers and to treat them fairly; (ii) to have due regard to the information needs of clients, and to communicate information in a clear, fair and non-misleading way; and (iii) to provide comprehensible information in good time about its services so that the client is reasonably able to understand the nature and risks of the service and of the specific type of designated investment that is being offered and, consequently, to take investment decisions on an informed basis.

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In the European Union, robo-advisers are covered under the **Markets in Financial Instruments Directive (MiFID)**, supplemented by the Guidelines on certain aspects of the MiFID II suitability requirements issued by the **European Securities Market Authority (ESMA)**. The European capital market regulator focuses most of its efforts on the suitability assessment to be performed by firms providing robo-advice. In addition to these European guidelines, national regulators in the European Union play an essential role when it comes to the enforcement of European rules.

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3. THE REGULATORY FRAMEWORK OF ROBO-ADVISERS: AN INTERNATIONAL OVERVIEW

For instance, in **Germany**, even though the automated distribution of financial instruments and similar digital services (i.e., robo-advice) are treated as investment advice and require authorization under German law, the focus is on determining whether the service offered by a robo-adviser counts as providing investment advice. The German regulator- **Federal Financial Supervisory Authority (BaFin)** determines whether a robo-adviser fulfils the legal criteria for investment advice, based on the actual range of functions it offers, and a robo-adviser cannot disclaim that the service offered does not constitute investment advice. This is assessed in three steps, from exploration, to recommendation, and then content.

In the **Netherlands**, the Financial Supervision Act does not distinguish between automated and physical service provision (and the same duty of care is applicable). Interestingly, though, robo-advice and semi-automated portfolio management have different guidelines applicable to them. The primary focus of both regimes is the duty of care owed to the customer.

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In Australia, there is a licensing regime applicable to providers of financial product advice, that is, a recommendation and/or statement of opinion of what is intended to, or can reasonably be regarded as being intended to, influence a client in deciding on, or having an interest in, a particular financial product or class of financial product. Therefore, robo-advisers are subject to the licensing regime existing for other financial advisers. Additionally, they are subject to the Guidelines on Providing Digital Financial Product Advice to Retail Clients issued by the **Australian Securities and Investment Commission (ASIC)**.

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In the US, robo-advisers are also subject to the regulatory framework, including a licensing regime, as well as substantive and fiduciary obligations, existing for investment advisers. Additionally, several guidelines have been issued clarifying the treatment, approach and risks of robo-advisers, with particular emphasis on: (i) the substance and presentation of disclosures to clients about the robo-adviser and its investment advisory services; (ii) the obligation to obtain information from clients to support the robo-adviser in its duty to provide suitable advice; and (iii) the adoption and implementation of effective compliance programs reasonably designed to address concerns relevant to providing automated advice.

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In Mainland China, the approach to robo-advice has been slightly different. Namely, until the mid-2010s, China **adopted a 'light touch' approach** to the FinTech industry, including robo-advisers. Therefore, robo-advisers focused on innovation at the expense of risk management. Nowadays, China requires the filing of key parameters of robo-advisory models with financial regulators and it is placing increasing scrutiny on risk and return disclosure. Robo-advisers must also (i) maintain a robust framework to effectively manage and supervise their algorithms; and/or (ii) provide customers with sufficient information (e.g., scope and limitations of robo-advisory services) to make informed investment decisions.

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Additionally, financial firms providing robo-advice must comply with the Guiding Opinions on Regulating the Asset Management Business of Financial Institutions published in 2018. The Guiding Opinions require financial institutions to: (i) make filings of their AI technology with the relevant financial regulators; and (ii) make sufficient disclosure to customers regarding the potential risks of automated investment technology.

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In greater detail, a financial institution: (i) shall use AI technology for asset management business in strict conformity with the Guiding Opinions concerning the suitability of investors, investment scope, information disclosure, and risk isolation; (ii) shall file the main parameters of its AI model and the main logic of asset allocation with the financial regulatory authority, open separate intelligent management accounts for investors, give full alerts of the inherent defects and usage risks of AI algorithms, clarify transaction process, strengthen trace management, and strictly monitor the trading positions, risk limits, transaction types, and price permissions, of intelligent management accounts; (iii) shall, as legally required, be liable for any damage caused to investors by its violation of any law or regulation or improper management;

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(iv) shall develop AI algorithms or programmatic transactions corresponding to different product investment strategies, prevent homogenization of the algorithms from increasing the pro-cyclicality of investment, and develop response plans for the market fluctuation risks that may arise; (v) shall, where the homogenization of algorithms, errors in program design, insufficiently deep use of data, and other defects in AI algorithm models or system malfunctions causes the herd effect and affects the stable operation of the financial market, take manual intervention measures in a timely manner and forcibly adjust or terminate AI business; and (vi) shall not use the AI business to exaggerate the promotion of asset management products or mislead investors.

4. PROMISES OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING FOR FINANCIAL ADVICE

4.1 Operational Efficiencies and Democratization of Access to Wealth Management Services

4.2 Reduction of Human Biases and Perverse Incentives



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4. PROMISES OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING FOR FINANCIAL ADVICE

4.1 Operational Efficiencies and Democratization of Access to Wealth Management Services

Robo-advisers can take a wide variety of forms A simple example is where clients use a platform to enter a questionnaire relating to their investment amount, and answer questions on their risk tolerance, objectives and time horizon; the algorithm-based model then generates the recommended (and personalized) portfolio based on the answers and information provided. Once the initial allocation advice is made, robo-advisers can also provide management services, including monitoring the portfolio and engaging in rebalancing where there are deviations from the stated risk profile.

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In fact, when robo-advisers were first introduced after the 2008 global financial crisis, they were used as automated measures for rebalancing asset allocation and portfolio management. As robo-advisers are fully automated and use algorithm-based tools to advise clients with limited or no human intervention or interaction, the key benefit of robo-advisers that has been touted is the reduction of operational costs, the speed at which such advice can be given and the availability of such advice around the clock. There are also variants of robo-advisory firms, such as where they provide hybrid services, where there is a human relationship that exists on top of an automated process, normally for more complex financial management where human oversight is more appropriate.

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The reduction of operational costs is particularly relevant in emerging economies because it can promote financial inclusion. In advanced economies, reducing the operational costs associated with financial advice can also be important because governments may expect their citizens to take increasing responsibilities for their own financial well-being and to plan adequately for their retirement and other financial needs. Prior to the global financial crisis of 2008, the view in advanced economies (including the UK and the US) was that financial literacy and a robust disclosure framework incentivizes issuers to disclose the risks of investments or financial goods. Investors were left to make that decision themselves so long as appropriate disclosure was given. The global financial crisis, however, demonstrated the deficiencies in the (then) existing regulatory design framework in many of these economies. In particular, systemic problems revealed by the mis-selling of structured products showed that providers of financial services provide less than optimal outcomes for both retail investors when there are minimal curbs on the free market of such services. Robo-advisory services, which provide affordable independent advice, have the potential to have a greater reach to the retail investors.

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A second benefit is the reduction of the financial adviser's otherwise perverse incentives or bias to recommend certain kinds of products. There are at least two primary types of biases. The first relates to the institutional or structural bias created by the fee arrangements; the 2008 crisis shows that the fees that could potentially be generated for the benefit of the financial adviser or their affiliates drive the outcome of the advice and the problem is compounded by the relative lack of sophistication by most retail investors. If well designed and properly programmed, the robo-adviser can remove the potential for such human adviser's own bias in making recommendations which are harder to detect by regulatory surveillance, such as their own risk-taking and home bias, rather than based exclusively on the client's own risk tolerance.

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A related benefit is that the use of the robo-advisory services (if followed) reduces the bias among the individual investors/clients, leading them to make decisions that produce better outcomes. Decisions on rebalancing of portfolios are often complex, and robo-advisory services allow for the ease in which recommendations are given; prior research shows that using these services (and following the advice) reduces behavioral biases such as disposition effect (selling winners and holding losers), trend chasing (purchasing stocks after positive returns), and the rank effect (trading the best and worst stocks in the portfolio), which benefits under-diversified investors.

5. THE PERILS OF USING ROBO-ADVISERS AND THE SOLUTIONS

5.1 The Risks Posed by Robo-advisers

5.1.1 Disclosures of the benefits and risks of advice provided by robo-advisers and investor protection generally

5.1.2 Reliability of the client information collected via questionnaires and suitability of the financial products recommended to clients

5.1.3 Integrity of the algorithm – bias, conflicts of interests, ethics and, the black box

5.1.4 Extraordinary market events and ongoing relationship between the adviser and clients

5.2 Governance of Robo-advisory Firms



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Challenges and regulatory responses****5. THE PERILS OF USING ROBO-ADVISERS AND THE SOLUTIONS****5.1 The Risks Posed by Robo-advisers**

This section addresses the primary risks posed by robo-advisers, especially in terms of lack of disclosure, unsuitability or unreliable financial advice, integrity of the algorithms used by robo-advisers, and those associated with extraordinary market events and ongoing relationship between the adviser and clients.

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5.1.1 Disclosures of the benefits and risks of advice provided by robo-advisers and investor protection generally

How financial advisers disclose the benefits and risks of advice and the substance of such disclosure raise difficult issues, and the problem is compounded when it comes to financial consumers. Further, due to the relative novelty of robo-advisers and often the opacity in the decision-making, investors face information costs in assessing the risks and benefits of the use of such services. **For example, Australia** has recently extended the requirement of plain advice to digital financial advice (such as robo-advisers) to retail investors. **The US** Securities and Exchange Commission (SEC) requires robo-advisers to disclose the information to clients on its business model, the scope of the advisory services and disclosures should be made clearly.

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In Hong Kong, the Securities and Futures Commission (Hong Kong's securities regulator) requires disclosures on the limitations of the robo-advisory services and requires the client to be given sufficient information to determine whether to use the robo-adviser's services (though not the technical details of the algorithm). In Mainland China, the People's Bank of China issued Guiding Opinions on Regulating Asset Managers Business of Financial Institutions, requiring financial institutions to disclose, among other aspects, inherent limitations of their AI algorithms.

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5.1.1 Disclosures of the benefits and risks of advice provided by robo-advisers and investor protection generally

In the UK, the Financial Conduct Authority (FCA) has found that service and fee-related disclosures of robo-advisers covered in the FCA report were unclear or compared in a misleading manner. The first two enforcement proceedings by the SEC against robo-advisers for making misleading disclosures took place in late 2018. However, regulating the substance of the disclosures and how disclosures are given will not be a panacea for all individual investors. This assumes that each class of retail consumers is largely homogenous within the class and that investors within each class have the same objectives in investing. Certain investors may not necessarily understand the complexity of robo-professional financial advice due to the lack of high-quality independent providers. Even though robo-advisers claim to provide individualized advice, it is necessarily based on a set of investment algorithms and, even within that class, investors may have individual requirements that are not picked up by the questionnaires.

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When information is collected from clients via questionnaires, regulatory requirements provide that robo-advisory firms will need to have mechanisms to detect inconsistent information and reasonable assumptions provided via questionnaires. However, the larger question is whether the existing regulatory duties that are placed on financial advisers, designed with human beings in mind, need modification when we are dealing with robo-advisers. In the US, courts have interpreted the Investment Advisers Act 1940 to impose fiduciary duties on financial advisers, and the question is how such fiduciary duties will work in the context of robo-advisers.

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5.1.2 Reliability of the client information collected via questionnaires and suitability of the financial products recommended to clients

In Australia, it has been argued that the imposition of the 'best interests duty' by Part 7.7A of the Corporations Act on financial advisers in respect of advice, which **Australian Securities and Investment Commission (ASIC)** has held to apply equally to robo-advisers, has made it too costly for the model to work. However, such comments must be viewed in the context of the fact that, more generally, the 'best duties' framework for advisers has been regarded as more of a safe harbor; adhering to a list of specified actions would allow the adviser to claim the safe harbor.

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5.1.3 Integrity of the algorithm – bias, conflicts of interests, ethics, and the black box

In theory, well-designed robo-advisers provide investment advice free from bias that human advisers are susceptible to. Where faced with similar scenarios, algorithms can provide predictable and consistent answers. However, algorithms are only as good as the architecture, and a poorly designed system can incorporate the same conflicts of interest that humans are subject to. If robo-advisers push for the recommendation of certain financial products where their firms or affiliates receive commissions or transaction fees, this poses high degrees of potential conflicts of interest. The more difficult question is that even if fraud is not intended, the design could inadvertently incorporate inherent biases, such as the assumptions that are used for certain answers to the questionnaires as to risk tolerance.

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In the International Organization of Securities Commissions (IOSCO) report, the risks are heightened when matters are at the stages of data cleaning, data transformation and anonymization of data. Where non-traditional ways of harnessing data are used, such as social media and big data, the models run the risk of discriminating against segments of the population. Thus, if the quality of the data that drives the algorithm is biased or has other shortcomings, such shortcomings will affect the quality of the advice or output. Nevertheless, disallowing the use of such data is counter-productive, as the use of such data can allow for individualized recommendations, and portfolios based on individual goals (as opposed to standardized goals).

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In the area of financial investment decisions, financial regulators will find that their oversight is more complex because the developers will often claim that the technologies are proprietary in nature and/or difficult to understand (such as where ML uses deep learning methods rather than a decision tree). ML algorithms, such as deep learning which models statistical patterns, will allow for the processing of large quantities of data which aim to provide better outcomes. Thus, the use of ML algorithms will develop and may change the recommendations over time even when the answers to the questionnaires remain the same.

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Robo-advisory algorithms rely on a set of economic conditions and market returns and the characteristics of the investors. If extraordinary events occur, algorithms developed by robo-advisers will have a range of differences in their responses, and these may not be transparent to the client up front until after the event is over. For instance, Betterment suspended trading after a 2% market drop after the UK's vote on Brexit on 24 June 2016, and this decision was criticized as being made without the input of its clients.

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Consistent with the IOSCO report, the regulatory framework in the EU and Singapore place on the board of directors of robo-advisory firms certain specific duties to monitor the controls and use of the algorithms as well as to test the algorithms regularly. This is consistent with the general duty of oversight generally imposed on corporate directors. Academic commentators have suggested further steps. One is that regulators develop a market to incentivize robo-advisers to compete directly based on the quality of the advice and services, in order to promote accountability and innovation. We caution against over-regulation, beyond that which is already in place for regulating financial advisers.

6. LEGAL DUTIES AND LIABILITY OF ROBO-ADVISERS

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What happens if the robo-adviser falls short of its standard of care (such as through failure to disclose conflicts or poorly designed algorithm), whether it is the 'best interests' duty such as that imposed under Australia's Corporations Act or fiduciary duties imposed under the Investment Advisers Act? The conventional theory is that the firm which is offering these services would have to bear contractual liabilities to the client or duties owed to the client as a result of assuming responsibilities for the advice. Namely, it has been argued that due to advances in ML which allow robo-advisers to make autonomous decisions that can lead to unintended consequences or be the subject of hacking, it is no longer just to hold the original designer of the algorithm accountable. We caution against going so far as to impose legal personhood on robo-advisers, as there is no compelling case for the creation of such a new category with its added complexities.

Conclusion

Robo-advisers are becoming increasingly popular in the financial services industry. This chapter has sought to provide a general overview of the concept, evolution, promises and perils of robo-advisers, as well as the regulatory responses adopted in various countries and regions around the world, including the US, the UK, the European Union, Australia, Hong Kong, Mainland China, and Singapore. However, most jurisdictions have enacted guidelines or principles addressing some of the particular risks and challenges of robo-advisers, and more generally the use of AI in the financial services industry. Still, it has been shown that, despite these challenges that need to be addressed, the rise of robo-advice is a positive development in the financial sector since it can reduce the costs of investment and wealth management services, democratizing access to capital markets.

Artificial Intelligence for Financial Technology

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The End of Lecture

Thank You

Dr. Abeir Moussa