**Artificial Intelligence and Machine Learning in Financial Services Market Developments and Financial Stability Implications (Reading Article 2)**

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**READING NOTES**

For the first Reading Assignment, I select **reading article 2[[1]](#footnote-1)** from the reading list to read. After completing the reading, I **summarize** this article and record **reading notes** as required by the assignment.

***SUMMARY.***

This article focuses centrally on the **market developments and financial stability implica-tions** of widely and rapidly adopted Artificial Intelligence (AI) and Machine Learning (ML) applications in the financial services industry.Recent increases in computing power coupled with increases in the availability and quantity of data have resulted in a resurgence of interest in potential applications of AI and ML. **Driven by a variety of supply and demand factors** that have contributed to the growing use of FinTech have also spurred the adoption of AI and ML in financial services. Some of the current and potential use cases in the financial system **can be summarized into four main sets**: (1) customer-focused uses; (2) operation-focused uses; (3) trading and portfolio management in financial markets; (4) uses of AI and ML in regulatory compliance and supervision. They generally offer significant advantages in terms of processing efficiency but are still limited by shortcomings such as lack of interpretability and discrimination due to data bias. The implications of AI and ML applications on financial stability at the macro and micro levels **have a number of potential benefits and risks**. On the one hand, the use of AI and ML in financial services may bring key benefits for financial stability in the form of efficiencies in the provision of financial services and regulatory and systemic risk surveillance. On the other hand, the lack of interpretability of the AI and ML methods has the potential to contribute to macro-level risk if not appropriately supervised by micro-prudential supervisors. Besides, network effects and scalability of new technologies may in the future give rise to third-party dependencies, which could in turn lead to the emergence of new systemically important players. Also, the applications could result in new and unexpected forms of interconnectedness between financial markets and institutions while bringing some important issues around appropriate risk management and oversight. As the underlying AI and ML technologies develop further, there is substantial promise for more financial products under the proper management of specific risks. It is important to **continue monitoring these innovations** and to update the assessment in the future. (349 words)

In order to understand the article summary more clearly, I have drawn a framework figure of the article as shown in **Figure 1**.



**Figure 1.** Framework of Article 2.

***NOTE.***

I was exposed to building a financial application using AI and ML as an undergraduate, so I choose this article to read for this assignment. Overall, this article collects and organizes a large number of use cases of AI and ML in finance and summarizes their possible implications for financial stability. Through this reading, I got the following three main points: (1) A framed understanding of the use cases of AI and ML in finance. Understand the logic of using the relevant applications in various application scenarios as well as the benefits and shortcomings they brought; (2) Gain a more comprehensive understanding of the core drivers for the development of relevant applications in finance; (3) Understand the impact that relevant applications may have on financial stability. All in all, this article provides a comprehensive analysis of the use of AI and ML in financial services and is a useful tool for understanding the framework of AI and ML applications for financial services.

**QUIZ QUESTIONS AND ANSWERS**

***Q1.*** *What are the applications of AI and ML in the financial service industry?*

***Answer:***

AI and ML are being rapidly adopted for a range of applications in the financial services industry. Some of the current and potential applications of AI and ML can be divided into 4 classes:

1. *Customer-focused (or ‘front-office’) uses.* Financial institutions and vendors are using AI and ML methods to assess credit quality (credit scoring), to price and market insurance contracts, and to automate client interaction (client facing chatbots).
2. *Operations-focused (or ‘back-office’) uses.* Institutions are optimizing scarce capital with AI and ML techniques, as well as back-testing models and analyzing the market impact of trading large positions.
3. *Trading and portfolio management in financial markets.* Hedge funds, broker-dealers, and other firms are using AI and machine learning to find signals for higher (and uncorrelated) returns and optimize trading execution.
4. *Uses of AI and machine learning by financial institutions for regulatory compliance or by public authorities for supervision.* Both public and private sector institutions may use AI and ML technologies for regulatory compliance, surveillance, data quality assessment, and fraud detection.

(It is worth noting that the examples selected in this article (2017) for presenting the fourth class applications were all taken from the academic community. Because there was no applications being applied by regulatory or supervisory bodies. However, in recent years, with the rapid development of natural language processing (NLP), such applications have become a reality. For example, some firms use FinBERT or FinGPT to analyze regulatory texts.)

*Q2. What is driving the rapid adoption of AI and ML in the financial service industry?*

***Answer:***

A variety of factors that have contributed to the growing use of FinTech generally have also spurred the adoption of AI and machine learning in financial services.

* *On the supply side,* there are 2 main factors. (1) *The improved technology*: The availability of computing power owing to faster processor speeds, lower hardware costs, and better access to computing power via cloud services. Similarly, there is cheaper storage, parsing, and analysis of data through the availability of targeted databases, software, and algorithms. There has also been a rapid growth of datasets for learning and prediction owing to increased digitization and the adoption of web-based services. (2) *The financial sector factors*: A variety of technological developments in the financial sector have contributed to the creation of infrastructure and datasets.
* *On the demand side,* there are 3 main factors. (1) *Greater profitability:* Financial institutions have incentives to use AI and ML for business needs and search for opportunities for cost reduction, risk management gains, and productivity improvements. (2) *Arms races:* market participants increasingly find it necessary to keep up with their competitors’ adoption of AI and ML. (3) *Regulation Compliance:* New regulations have increased the need for efficient regulatory compliance, which has pushed banks to automate and adopt new analytical tools that can include use of AI and ML.

***Q3.*** *What are the financial stability implications of AI and ML applications ?*

***Answer:***

There are a number of potential benefits and risks for financial stability. In summary, **the five main points** are as follows:

1. *More effective.* The more efficient processing of information, for example in credit decisions, financial markets, insurance contracts, and customer interaction, may contribute to a more efficient financial system. The RegTech and SupTech applications of AI and machine learning can help improve regulatory compliance and increase supervisory effectiveness.
2. *Bring new players.* Network effects and scalability of new technologies may in the future give rise to third-party dependencies. This could in turn lead to the emergence of new systemically important players that could fall outside the regulatory perimeter.
3. *New forms of interconnectedness.* Applications of AI and machine learning could result in new and unexpected forms of interconnectedness between financial markets and institutions, for instance, based on the use by various institutions of previously unrelated data sources.
4. *Poses risk.* The lack of interpretability or “auditability” of AI and machine learning methods could become a macro-level risk. Similarly, the widespread use of opaque models may result in unintended consequences.
5. *More regulatory requirements.* As with any new product or service, there are important issues around appropriate risk management and oversight. It will be important to assess the uses of AI and machine learning in view of their risks, including adherence to relevant protocols on data privacy, conduct risks, and cybersecurity. Adequate testing and ‘training’ of tools with unbiased data and feedback mechanisms is important to ensure applications do what they are intended to do.

*Q4. What are the main difficulties of adopting AI and ML applications in financial service industry ?*

***Answer:***

During the adoption of AI and ML applications in financial service industry, there are **two main kinds of difficulties**:

1. *The bias in the data leads to discriminatory models being trained.* Even if AI and ML models are based on large datasets and numerous variables, algorithms can entail biases that can lead to non-desirable discrimination and even reinforce human prejudices.
2. *The potential macro-level risk contributed by the lack of interpretability of AI and ML model.* Many of the models that result from the use of AI or ML techniques are difficult or impossible to interpret. The lack of interpretability will make models even more difficult to determine potential effects beyond the firms’ balance sheet, for example during a systemic shock.

***Q5.*** *What should be done in the future development of AI and ML application in financial service industry ?*

***Answer:***

Advances in AI and ML technology are unquestionable, so ***making strong use of new AI and ML techniques and keeping innovating*** is really important for the application in financial service.

At the same time, the uses of AI and ML ***should continue to be monitored***. Assessing AI and ML applications for risks, including adherence to any relevant protocols regarding data privacy, conduct risks, and cybersecurity, is important at this stage. It is important that progress in AI and machine learning applications is accompanied with further progress in the interpretation of algorithms’ outputs and decisions.

1. https://www.fsb.org/wp-content/uploads/P011117.pdf [↑](#footnote-ref-1)