

**College of Humanities  
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**Artificial Intelligence for  
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FNT 626

**Lecture 09**

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

Lecture 09

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CHAPTER 11



**Regulation of the use of artificial intelligence for  
investment in the insurance industry**

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## Ch. 11- Regulation of the use of artificial intelligence for investment in the insurance industry

### Learning Objectives

1. Understanding the Role of Artificial Intelligence in Investment.
2. Explore Regulatory Landscape for AI Investment in Insurance.
3. Examine the Challenges and Opportunities of AI Investment.
4. Address the Ethical Considerations in AI Investment Decision.
5. Explore the Risk Management Practices and Compliance requirements in AI Investment in the Insurance Industry.
6. Understand the Importance of Algorithmic Transparency and Explainability in AI-driven Investment decisions.
7. Explore the Data Governance Practices and Data privacy Considerations in AI Investment Strategies.
8. Understand the Regulatory Compliance Requirements and Industry Standards Governing the use of AI for Investment in the Insurance Industry.
9. Address the Importance of Consumer Protection and Investor rights in AI-Driven Investment Decisions
10. Explore the Future Trends and Policy Implications in AI Investment within the Insurance Industry



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## Ch. 11- Regulation of the use of artificial intelligence for investment in the insurance industry

### Chapter outline

1. INTRODUCTION
2. BENEFITS AND RISKS OF ARTIFICIALLY INTELLIGENT INVESTMENT BY INSURERS
3. POTENTIAL REGULATORY SOLUTIONS AND APPROACHES
4. CONCLUSION

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## Ch. 11- Regulation of the use of artificial intelligence for investment in the insurance industry

### 1. INTRODUCTION

As was mentioned in Chapter 1, the use of ML and big data is reshaping the insurance industry. On the one hand, it is changing the way insurance companies manage legal claims. On the other hand, insurance companies (**notably life insurers**) are increasingly relying on AI and big data to make investment decisions or manage portfolios – both concepts will be included under the concept of ‘artificial intelligence investment’ or AI investment. Therefore, it will not cover the use of AI for other services potentially offered by insurance companies to businesses or retail customers (**e.g., a chatbot or a digital adviser**), as well as the use of AI to manage legal claims. Insurance companies are powerful investors in a wide variety of asset classes, from stocks, debentures and structured products to real estate and commodities. Under the traditional business model, an insured promises to pay a certain sum of money (the premium) in exchange for the commitment of an insurer (who issues the policy) to pay a certain sum of money (or carry out a certain action) if losses occur as a result of an insured event.

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### 1. INTRODUCTION

Apart from using the funds to pay expenses and compensate for insureds' losses, insurers must prepare to meet their future policy liabilities and generate returns. According to the **Organization for Economic Cooperation and Development (OECD)**, the total gross premiums received by direct insurers in OECD countries amounted to over USD 50 trillion in 2017. In China alone, the total premiums collected in the first half of 2019 amounted to over **Renminbi (RMB) 2.8 trillion** for general insurance and over RMB 2.1 trillion for life insurance. According to the **Monetary Authority of Singapore (MAS)**, in 2018, the Singapore insurance industry collectively had total assets worth over SGD 256 billion, with annual domestic life insurance premiums amounting to about 6.7% of Singapore's gross domestic product. Specifically, investing is of high importance to life insurers, which are usually looking for long-term investments that generate sufficient returns to meet future policy liabilities from longer-tenured policies. Because the risks covered by general insurers (e.g., risks from earthquakes or hurricanes) may be more volatile than those facing life insurers, general insurers may prefer to invest in more liquid assets. Based on the above, insurers need to balance their investment portfolios between different asset classes to meet their demands.

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### 1. INTRODUCTION

Broadly speaking insurers commonly invest in the domestic or foreign bond market (for sovereign bonds or corporate debts, sometimes including structured notes), equity markets, derivatives markets (notably for hedging purposes), real estate and perhaps commodities. Insurers also need to manage different kinds of financial risks from investments, including market risks, credit risks, liquidity risks and operational risks, in addition to non-financial risks such as natural disasters. An investment in US treasury notes by a Singaporean insurer exposes it to the fluctuating exchange rate between the US and Singapore dollars as well as the interest rate market in the US. A real estate investment (e.g., a commercial complex) may have less credit risk, but it is exposed to natural disasters (e.g., earthquakes) and market risks (fluctuation of rentals in the market). A significant portion of an insurer's investment portfolio must be capable of being quickly converted into cash or other liquid assets in case there is a major event triggering substantial pay-outs in the short term (e.g., the Indian Ocean earthquake and tsunami in 2004).

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**Ch. 11- Regulation of the use of artificial intelligence for investment in the insurance industry****1. INTRODUCTION**

There is, however, no universal rule for how insurers should invest. Insurers' investment portfolios vary greatly between companies and between countries. Insurers also have different ways and preference to manage their investment portfolio. Insurers can make investment decisions in-house, but they may also outsource all or part of the funds available for investment to other asset management companies. Traditionally, investment decisions have been made by human beings with some assistance from computerized data. However, with the rise of FinTech, an interesting question is whether insurers can rely on AI to make smarter investment decisions. If this becomes the trend, what would the potential regulatory issues be?. Therefore, this chapter explores potential problems and potential solutions for adopting AI to make and manage investment.

## **2. BENEFITS AND RISKS OF ARTIFICIALLY INTELLIGENT INVESTMENT BY INSURERS**

2.1 Using Artificial Intelligence in  
Investment Decision-making

2.2 Benefits and Risks of Artificially  
Intelligent Investment

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### 2. BENEFITS AND RISKS OF ARTIFICIALLY INTELLIGENT INVESTMENT BY INSURERS

#### 2.1 Using Artificial Intelligence in Investment Decision-making

As introduced in Chapter 1, the growth in data sources and the timeliness of access to data, the growth in data repositories, data granularity, the variety of data types, efforts to enhance data quality and continued improvement to hardware and AI and machine learning software have been the main drivers of AI investment.

**In general, AI can help to answer three major components regarding an investment decision:**

- (1) 'What (to invest)?',
- (2) 'How much (is the price)?', and
- (3) 'When to make a trade?'.

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**Ch. 11- Regulation of the use of artificial intelligence for investment in the insurance industry****2. BENEFITS AND RISKS OF ARTIFICIALLY INTELLIGENT INVESTMENT BY INSURERS****2.1 Using Artificial Intelligence in Investment Decision-making**

On the most basic level, AI can help human traders make investment decisions. Before the advent of AI – or to a lesser degree, automated high-frequency trading – investment decisions had to be made by human beings on a case-by-case basis. AI improves the decision-making process by providing information that may not be obvious to most humans, and it can process data that may otherwise require more time to prepare. AI could provide tools to assist human advisers or traders to advise or make trading decisions. In addition, a more advanced version is high-frequency or systemic trading, in which the execution of purchase and selling orders is automated by computers within the benchmarks or conditions established by human traders. The most advanced version is fully automated investment by AI whereby no human intervention is required. ‘Within this process, investors have to fill the online form, and based on their predefined investment objectives, the program suggests an appropriate passive portfolio asset allocation.’ This approach was similar to a more intelligent robo-adviser. However, any output was based on an investor’s input and the algorithm established by the firm.

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**Ch. 11- Regulation of the use of artificial intelligence for investment in the insurance industry****2.1 Using Artificial Intelligence in Investment Decision-making**

The developments and application of technology in investment decision-making help to reduce interactions between customers and human advisers or investment managers. However, the tools were still designed for passive investors, and some human decisions had to be made by either a fund manager or the client. Unlike the previous three versions, the Robo-Adviser 4.0 allows machines to make investment decisions and execute them for clients. It requires 'a fully automated artificial intelligence program to accurately predict the business cycle and the US dollar cycle'. In sum, Robo-Advisers 1.0 to 3.0 offered tools to help human traders make investment decisions. However, in Robo-Adviser 4.0, investment decisions are automated by AI. In sum, as the technology has become more mature, applying AI to investing has evolved from a more passive tool to one that offers information to help with the selection of portfolios and even discretionary trading.

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**Ch. 11- Regulation of the use of artificial intelligence for investment in the insurance industry****2.2 Benefits and Risks of Artificially Intelligent Investment**

Insurers adopting AI investment face both benefits and risks. On the bright side, AI can provide more efficient processing of information for front- and back-office insurance operations. AI allows firms to 'collect and analyze information on a greater scale' and to understand 'the relationship between the formulation of market prices and various factors'. In making predictions, AI can either be a valuable tool for human traders or clients to make decisions or make trades on its own. Even if a model cannot predict an investment outcome with 100% accuracy, it can 'explore a wide range of potential outcomes' that may not be available to a human trader.

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**Ch. 11- Regulation of the use of artificial intelligence for investment in the insurance industry****2.2 Benefits and Risks of Artificially Intelligent Investment**

AI could in theory be used at various stages of an investment's lifecycle for both new investments and investments in existing portfolios (i.e., to sell or offset). AI and machine learning are currently 'being used to identify new signals on price movements and to make more effective use of the vast amount of available data and market research than with current models'. There have already been suggestions to use AI for purposes such as asset pricing and predicting the daily returns of the stock market. AI can identify non-linear relationships based on historical data that may not be recognized by humans, and it can group investment vehicles (e.g., bonds) that may behave similarly to each other. AI can also conduct model back-testing to validate a model and optimize the execution of trades to reduce margins that must be paid for derivatives transactions.

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### 2.2 Benefits and Risks of Artificially Intelligent Investment

In addition, AI can help to facilitate the execution of trading orders. This should increase the speed of trading by reducing the operation time needed to execute trading instructions. Further, AI can help conduct market impact analyses for given trades (e.g., bulk orders) to minimize the market impact and proactively manage risk exposure. AI can also provide more precise and timely trade signals because 'machine learning can improve productivity and reduce costs by quickly scanning and making decisions based on more sources of information than a human can'. Thus, AI can reduce trading costs by allowing market participants to adjust their trading positions and investment strategies 'in accordance with a changing environment in a swift manner'. AI can also improve operational efficiency (e.g., it is easier to identify customers' needs) and risk management 'through earlier and more accurate estimation of risks' when an AI tool is used to service clients. At the post-trade stage, AI can help with regulatory compliance, i.e., the so-called '**RegTech**', which is 'often regarded as the subset of **FinTech** that focuses on facilitating regulatory compliance more efficiently and effectively than existing capacities'. It is also possible to use AI to optimize profits given scarce capital (i.e., to balance risk and capital charges).

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**Ch. 11- Regulation of the use of artificial intelligence for investment in the insurance industry****2.2 Benefits and Risks of Artificially Intelligent Investment**

Thus, overall, AI should be able to provide substantial benefits to insurers making investment decisions or managing portfolios by improving data analytics and reducing transaction costs. However, it is worth noting that whether and the extent to which these benefits are true should still depend on the underlying model to feed data and train AI. First, inaccurate data and bias are always a concern with AI and datasets. There can be issues with quantity, quality and the types of data available, and there can be sampling, measurement and algorithm risks. If not sampled properly or if the sample is not properly represented, big data is no better than distorted data and can affect the quality of the decisions made. For example, the random-forest algorithm tends to favor inputs with more distinct values, a bias that elevates the risk of poor decisions. One bank developed a random-forest model to assess potential money-laundering activity and found that the model favored fields with a large number of categorical values, such as occupation, when fields with fewer categories, such as country, were better able to predict the risk of money laundering.

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### 2.2 Benefits and Risks of Artificially Intelligent Investment

AI models themselves can create problems when they deliver biased results (which can happen, for example, if a population is underrepresented in the data used to train the model), become unstable, or yield conclusions for which there is no actionable recourse for those affected by its decisions (such as someone denied a loan with no knowledge of what they could do to reverse the decision). The underlying data, modelling and machine learning process may be biased or manipulated so that the end-product is prejudicial. Based on these issues, the **US Federal Reserve has published** 'Guidance on Model Risk Management' to offer advice to financial firms dealing with model risk. Thus, machine learning could also require dynamic model calibration.

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**Ch. 11- Regulation of the use of artificial intelligence for investment in the insurance industry****2.2 Benefits and Risks of Artificially Intelligent Investment**

Second, because a prediction is made by AI it does not necessarily mean it must be supported by proper economic, financial or theoretical models. If AI investment is made in this manner, it could be no better than gambling. Insurers may not know the details of how algorithms are formulated if they rely on a third-party fund management firm that uses AI or a third-party AI solution provider to assist in their investment decisions. This could create some challenges for insurers and regulators supervising and monitoring the use of AI investments. There could also be a lack of transparency in the costs and fees charged, although this would perhaps be a greater concern for ordinary customers. For example, an automated trading algorithm could be programmed to make investments in 'a specific range of "preferred" investment alternatives or intermediaries for which the platform or its affiliates would receive higher commissions or other forms of compensation'.

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In addition, similar to robot-advisers, there could be some general behavioral concerns over investor protection and potential conflict of interest, especially when the benefits and risks of advice provided by a robot-adviser are not properly disclosed. If a trading algorithm is provided by a third-party firm, how the third party is governed may also raise some outsourcing risks and potential regulatory concerns. In general, the market is better off with more diversity in market movements and a wider range of market participants. However, it is arguable whether AI investment could lead to more homogenous investment behaviors. If this were the case, it could result in higher market volatility, similar to what we have seen with high-frequency trading. For example, if most of the AI investment tools used by investors indicated that they should sell US treasury notes, it could lead to downward market movement for the notes, thereby increasing the yields to the notes' maturity. In turn, this would impact the US interest rate market and have an indirect impact on commercial lending rates and the associated derivatives market (e.g., the market for interest rate swaps). Whether the discussion above would prove true might require more empirical studies on the use of AI and market impact in addition to future technological developments in AI.

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Fifth, there could be accountability, responsibility and liability issues. Who and how to identify and allocate civil liabilities related to the use of AI is still unclear. In the case of self-driving cars, the following has been observed: AI developments also raise new questions about accountability and liability: who is accountable for the decisions made by self-driving cars, when they weigh the choice of harming pedestrians versus passengers? We may not have to face the hard question of choosing life or death in the case of AI investment, but there could be similar concerns. If a fully automated AI investor is allowed to select investment targets, manage portfolios and execute trades all on its own, it may bypass some ethical or policy choices (e.g., environmental or human rights concerns). For example, if a customer insists on green investment and refuses to invest in a highly polluted industry but an AI program is tuned to select the most profitable target stocks, it may end up investing in stocks that the customer does not want. However, it also implies that more human intervention may undermine the effectiveness of an automated AI investor.

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Sixth, there is a concern over third-party dependency and the accountability of third-party technology firms that provide AI tools to insurers. Having high reliance on a small number of third-party technology firms could create potential problems in the future (e.g., when a large provider becomes insolvent or exposed to a cyber-attack). There could also be a lack of clarity around responsibility (e.g., when AI application tools are developed by a third party that results in large losses). Those concerns raise further issues over appropriate risk management and oversight, regardless of whether AI investment is in-house or provided by a third party.

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If an AI investment tool is really good at predicting market movement, why would the developer choose to charge a fee for the use of the tool and algorithm with other market participants rather than making money for their own account? In addition, AI may not necessarily need to be innovative in decision-making. Reducing human interactions may also mean that some human factors and value selections are lacking. However, so far, it is uncertain as to whether AI could gain the kind of nous it would need to become an investor like Warren Buffet or whether it would only succeed within the confines of the data and patterns fed to it through machine learning. However, the use of AI also has some risks, from the inaccuracy of the data and models to the potential herding effect and concerns over value selection. If AI investment becomes more widely adopted by insurance companies, the question will become a regulatory one.

### **3. POTENTIAL REGULATORY SOLUTIONS AND APPROACHES**

3.1 Existing Regulatory Models of  
Insurers' Investment Activities

3.2 Regulating Artificially Intelligent  
Investment by Insurers: Balancing  
Innovation and Regulatory Concerns



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**Ch. 11- Regulation of the use of artificial intelligence for investment in the insurance industry****3. POTENTIAL REGULATORY SOLUTIONS AND APPROACHES**

Given the potential benefits and problems related to AI investment, this part further considers how insurance regulators might cope with potential concerns. Regarding the regulation of financial technology, Brummer and Yadav have introduced the concept of regulatory trilemma: financial innovation, market integrity, and rule simplicity. They argue that regulators could probably achieve at most two of the goals at the same time. If this is the case, regulators would have challenges to balance the need to promote more innovation or innovative use of technology with achieving underlying regulatory goals without over-burdening regulations. For insurers' use of AI tools for investments, the key question then would be how to promote insurers to use better data and data analytics to enhance performance of insurance investment but without compromising prudential regulations of insurers and the need to avoid market misconduct or undesirable market impact.

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**Ch. 11- Regulation of the use of artificial intelligence for investment in the insurance industry****3.1 Existing Regulatory Models of Insurers' Investment Activities**

Given the importance of investing to an insurer's business, it is natural that insurance regulations would place some restrictions on insurance investments. Nevertheless, there are a variety of regulatory models and approaches to choose from to regulate insurers' investment conduct. With the rise of AI, the question is which would be the best approach or approaches to promote the innovative use of technology to make investment decisions without compromising potential regulatory concerns. Taiwan's insurance regulations, for example, directly regulate insurers' investment portfolios by restricting the types of permitted investments and imposing investment caps. Although Taiwan takes the risk-based capital approach when determining an insurer's solvency ratio, its Insurance Act expressly prescribes a list of investment vehicles (ranging from domestic equity or debt to real estate and foreign investment) that an insurer can invest in unless otherwise specifically approved by the regulator.

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### 3.1 Existing Regulatory Models of Insurers' Investment Activities

Each category of investment vehicle is associated with a particular investment ceiling in the legislation. China's insurance regulations on investments have a similar feature, but without statutory investment ceilings. For example, Singapore law controls insurers' investment activities through general solvency regulations. However, it has also improved internal management regimes under both the **Insurance Act (Cap 142)** and the **Insurance (Valuation and Capital) Regulations 2004**, issued by **MAS**. Instead of prescribing the asset classes available for investment and imposing a hard ceiling, MAS has generally allowed insurers to make their own investment decisions and manage their portfolios as long as they satisfy the other regulatory requirements, which are briefly outlined below.

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### 3.1 Existing Regulatory Models of Insurers' Investment Activities

Clearly, there are pros and cons for each regulatory approach. The macro effect of financial regulations on innovation is beyond the scope of this chapter. Nevertheless, it is acknowledged that different approaches allow insurers different degrees of liberty to manage their investment portfolios. As a result, there is room to adopt AI for investing (**regardless of whether it is through in-house staff or external fund managers**). In a market where insurance regulators have a great deal of red tape in place, it is expected that the room for insurers to adopt AI investment will be more limited. Insurers' investment activities have also been shaped by prudential regulations. In Singapore, under the current regulations (**before the pending reform of Risk-Based Capital 2) (RBC 2)**, the capital adequacy standards for general and life insurers in Singapore are established by the Insurance (**Valuation and Capital**) Regulations 2004 (including later amendments) issued by MAS (2004 Regulations). The basic concept is that insurers should have sufficient capital to support each of their insurance funds, and on the firm level, this should correspond to the risk the insurer might incur in conducting its insurance business. Under the 2004 Regulations, there are **three major components to the risk requirements for insurance funds: (1) insurance risks, (2) investment risks and risks associated with interest and exchange rates, and (3) concentration risks.**

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### 3.1 Existing Regulatory Models of Insurers' Investment Activities

In general, Singapore law does not strictly prescribe a ceiling of any kind for investments, leaving this largely to the insurer to decide within the confines of the solvency regulations. For instance, an equity investment is subject to an 'equity specific risk requirement' (8% of the current market value) and an 'equity general risk requirement' (the sum of 8% of the net long or short positions for each country). For real estate, Singapore law only requires a registered insurer to calculate the property investment risk at 16% of the total value of all its immovable properties. Debt investments should be marked to their market value (if traded on an exchange) or net realizable value (if unlisted), with risk capital calculated largely according to the value and credit risk factor of those investments. Hence, insurers must balance the potential proceeds from an investment with the risks associated with it (including potential market, credit, liquidity and operational risks) and the potential capital charges accrued by the firm or insurance fund's account.

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### 3.1 Existing Regulatory Models of Insurers' Investment Activities

Specifically, regulators may focus on how decisions are made and the internal control mechanisms (which may include compliance, risk management and audit) and governance structure to ensure prudent investments. **MAS** emphasizes the role of senior management and internal compliance as a primary tool to regulate investment decisions. An insurer must have a proper investment policy approved by the board of directors. There must also be an investment committee approved by the board to supervise investment activities and ensure that they are carried out according to the investment policy. However, **MAS** also requires active **Asset-liability Management (ALM)** (a policy that should be approved by the board), which allows investment decisions to be coordinated through the ongoing process of formulating, implementing, monitoring and revising strategies related to assets and liabilities to achieve an insurer's financial objectives, given its risk tolerance and other constraints.

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### 3.1 Existing Regulatory Models of Insurers' Investment Activities

Overall, the core idea is to ensure that investment decisions are prudent. Nonetheless, the approach generally relies on insurers to self-regulate without too much red tape from the regulators. To ensure proper decision-making and continuous monitoring, the financial regulators require insurers to implement proper management, governance and internal controls in addition to risk management mechanisms. This approach is generally more responsible and more flexible to give insurers more liberty to determine their investment portfolios based on their own perceptions and conditions. Nevertheless, the approach also relies on regulators to effectively supervise the functioning of insurers' complex internal governance and controls without imposing uniform standards. To remedy this, in Singapore, **MAS** issued a Notice on **Technology Risk Management (TRM)** to offer insurers regulatory guidance. Traditionally, the focus of **TRM** has been on the maintenance and recovery of insurers' critical systems after information technology incidents (e.g., **hacking**). A related measure requires insurers to implement systems for incident reporting and apprising the regulator of any relevant incidents. In the digital era, **TRM** may expand to other aspects, such as cyber security and personal data protection.

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### 3.1 Existing Regulatory Models of Insurers' Investment Activities

In addition, with the rise of technology, insurers may be exposed to higher outsourcing risks. Insurers often do not maintain core systems or other technology-related systems in-house. Sometimes it is more efficient to rely on third-party hardware, software or service providers for solutions. If an insurer relies on a third party to provide services (e.g., data for investment decision-making or AI chatbots), the insurer effectively outsources part of its operations or services to that third party. Outsourcing risk has existed for a long time (e.g., outsourcing cleaning services to a third-party firm). In 2016, **MAS** issued the Guidelines on Outsourcing, with detailed instructions on how financial institutions should deal with outsourced tasks and outsourcing companies. In general, **MAS** has continued to adopt the meta-regulatory approach, focusing on the responsibility of the insurers' board and senior management to control decisions on outsourcing and outsourcing firms. The job of the board and senior management should be to approve a framework to evaluate the risks of outsourcing arrangements, establish a suitable risk appetite and approval authorities, assess management competencies, have a good governance structure for risk management and review outsourcing strategies.

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**Ch. 11- Regulation of the use of artificial intelligence for investment in the insurance industry****3.1 Existing Regulatory Models of Insurers' Investment Activities**

In sum, insurance regulations shape the parameters of how an insurer conducts its investment activities. Although this has mostly been based on risk-based approaches, different countries have adopted different approaches, ranging from more control and command style regulations to more principle-based meta regulations. Insurers' ability to use AI investment has been shaped by dedicated regulations related to insurers' investments, general prudential regulations and risk management rules in addition to specific regulations regarding technology risk management and outsourcing.

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**Ch. 11- Regulation of the use of artificial intelligence for investment in the insurance industry****3.2 Regulating Artificially Intelligent Investment by Insurers: Balancing Innovation and Regulatory Concerns.**

Faced with the rise of AI investment, a question that arises is which regulatory approach or approaches would better serve the needs of insurers adopting AI and would balance the benefits and problems over the long term. In general, this chapter suggests that regulators should adopt a more flexible and less intrusive approach to insurers' AI investments. Further, regulators should take note of more responsible investments made by insurers to ensure that they include more variables into machine learning and AI modelling to promote more responsible AI investment. Thus, there are clear incentives to promote the innovative use of technology to bring more benefits to the market.

This chapter takes the position that regulators should adopt a more principle-based and meta-regulatory approach to AI investment to promote more innovative use of technology and improve efficiency and management. However, when a risk becomes more crystallized, those approaches should also allow regulators to quickly respond to address potentially negative consequences.

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The principle-based regulatory approach is preferred because it allows more room for future development and innovative uses. Regulators must have sufficient knowledge and the tools to effectively manage principle-based regulations. It should allow more room for market participants to test and develop new applications or solutions while allowing regulators to take regulatory measures when something bad happens. In contrast, the prescriptive approach usually hinges on the regulator's knowledge at the time the regulations are made. This approach is riskier, given the speed of technological advancements and the limited capacities of insurance regulations in many markets. Thus, it is suggested that regulators should change and adapt to the market rather than vice versa.

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Based on this, what should be the guiding regulatory principles for insurers' AI investments? Thus, any investment or investment strategy should not endanger the capital base and solvency of the insurer. Insurers should 'take reasonable care to organize and control [their] affairs responsibly and effectively, with adequate risk management risks'. Thus, within the confines of prudential regulations, an insurer should have a proper system in place to ensure relevant solvency and to control the risk associated with investments. Therefore, AI investment should in principle be within the existing regulatory framework if it is viewed from the prudential angle.

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### 3.2 Regulating Artificially Intelligent Investment by Insurers: Balancing Innovation and Regulatory Concerns.

For countries with a more command-and-control style of regulating insurers' decisions, it would be unrealistic to suggest that they should radically overhaul their regulatory systems just to allow for AI investment. Instead, the regulators in these countries should adopt the spirit of principle-based regulations to allow more room to apply AI investment tools before they reconsider the need to change their regulatory style and approaches. For example, the **Monetary Authority of Singapore** has issued the '**Principles to Promote Fairness, Ethics, Accountability and Transparency (FEAT)** in the use of **Artificial Intelligence and Data Analytics in Singapore's Financial Sector**' (**FEAT Principles**) in November 2018. The **FEAT Principles** attempt to provide some guidance to financial firms on the use of **artificial intelligence and data analytics (AIDA)** when providing financial services, including 'to provide firms ... with a set of foundational principles to consider when using **AIDA** in decision-making' and 'to assist firms in contextualizing and operationalizing governance of use of **AIDA** in their own business models and structures'. Through the **FEAT Principles**, Singapore tries to regulate the use of AI by insurers through some common principles first as guidance.

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**Ch. 11- Regulation of the use of artificial intelligence for investment in the insurance industry****3.2 Regulating Artificially Intelligent Investment by Insurers: Balancing Innovation and Regulatory Concerns.**

As discussed earlier, AI investment could potentially reduce the diversity in investment decisions if somehow computers were all trained in a similar fashion. To fully capture the potential impact of AI investment would require collaboration between regulators in different financial sectors, such as insurance and capital markets. To address potential concerns, regulators might need assistance from academia to conduct more experiments, simulations and empirical studies to realize the potential market impact based on existing AI technologies. If a significant market impact is not a remote possibility, regulators could then devise new principles and guidelines to regulate the ways insurers design or use AI tools for investment decisions. Thus, any issue that may come across both insurance and capital market could be resolved internally. More inter-agency regulatory cooperation may be required to deal with potential negative market impact from insurers' investment activities.

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### 3.2 Regulating Artificially Intelligent Investment by Insurers: Balancing Innovation and Regulatory Concerns.

Principle-based regulations (in addition to the risk-based regulatory approaches underlying modern prudential regulations and risk management practices) could be combined with the meta regulatory approach. Although the meta regulatory approach requires the regulator to take more responsibility for monitoring the compliance and systems of each firm, it is more suited to different market participants and their use of AI investment, compared with a **one-size-fits-all approach** that may be applicable to every market participant.

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### 3.2 Regulating Artificially Intelligent Investment by Insurers: Balancing Innovation and Regulatory Concerns.

Regulators could apply different regulatory strategies to determine how AI is used throughout the lifecycle of investment decisions and corresponding risks. If AI is primarily used as a tool to assist human decisions, the main risk is the development of the AI tool and its interactions with human traders. Given that it is the human trader who makes the final decisions, there appears to be no need to change the existing regulatory framework attached to an insurer and its human traders' investment decisions. Instead, the focus should be on the development of the AI tool and the potential technology and outsourcing risks. The **Basel Committee on Banking Supervision** also suggested that 'a sound development process should be consistent with a firm's internal policies and procedures and deliver a product that not only meets the goals of the users, but is also consistent with the risk appetite and behavioral expectations of the firm'.

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Second, reducing third-party dependency may be something that regulators have to carefully consider. For example, if most of the algorithms and calculating capacity come from a monopoly of larger technology firms (e.g., Amazon, Google or Microsoft), anything that goes wrong with those third-party firms (e.g., data breach or computing errors) could affect a large number of users, including insurers. If AI is used to fully automate investment decision-making, regulators should further consider the potential implications in addition to the concerns raised in the previous paragraphs. The problem of third-party dependency could make things worse if most insurers were to use AI tools developed by a handful of technology providers (because it is perhaps expected that technological solutions developed by the same firm would have similar characteristics).

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Insurance regulators would need to work with the industry and other financial regulators to fully simulate the potential impact on the market before taking any regulatory actions. However, it is acknowledged that AI investment cannot go beyond the discussion of corporate social responsibility and the sustainable investments made by insurers. The issue should be fully examined to understand the interactions between regulators, insurers and third-party technology firms, and then a solution should be devised.

## Conclusion

This chapter analyses the benefits and potential perils of insurance companies' adopting AI investment. It addresses the potential gains to be derived from AI use in investment decisions, together with the significant risks presented by using new technologies in the insurance sphere. Based on this, the argument is made that principle-based and meta regulatory approaches can best accommodate new innovation (or new applications of technology) to reach investment goals. However, with more reliance on technology, regulators should consider improving technology risk management and reducing third-party dependency. This would contain potential systemic risk and market impact, especially when investment decisions are automated by AI.

## Artificial Intelligence for Financial Technology

### References:

#### Required Reference:

Remolina, N. and Gurrea-Martinez, A. eds., 2023. Artificial intelligence in finance: Challenges, opportunities and regulatory developments. Edward Elgar.

#### Recommended Readings

Chishti, S., 2020. The AI book: the artificial intelligence handbook for investors, entrepreneurs and fintech visionaries. John Wiley & Sons.

# *The End of Lecture*

# Thank You

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