

## An Investigation into the Regulation of Artificial Intelligence in Financial Markets Using Organisational Responses and Legislative Barriers

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The swift adoption of Artificial Intelligence has completely transformed how trading is conducted, how risks are managed, and the decisions made in financial markets. However, this transformation now raises significant financial and legal challenges. Issues such as market manipulation, clarity over algorithm transparency, ethical use of AI, and compliance with prevailing financial regulations have gained the attention of major concerns for businesses and governments. This work explores how legal frameworks around AI in financial markets change, including under international laws, methods to train the AI system, and how the rules are enforced. It also demonstrates how financial regulators can achieve market stability, protect investors, and ensure that AI is responsibly used. The paper addresses that regulation should be done in a way that is neither unfair nor one-sided, to accord substantial impetus to innovation at low risk.

**Keywords:** Institutional Governance, Algorithmic Transparency, Financial Markets, Regulation of AI

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## 1. Introduction

Artificial Intelligence (AI) has revolutionised the world's financial markets by making trading and decision-making faster and more efficient, and data-driven. AI-driven trading algorithms, robo-advisors, fraud detection software, and risk management systems are now increasingly utilized to boost financial operations. Nevertheless, growing dependence on AI generates serious legal and regulatory issues, such as transparency, accountability, ethical issues, and market stability. The absence of specific legal frameworks overseeing AI-based financial activity exposes the system to risks, including algorithmic bias, market manipulation, data privacy infringement, and overall financial system disruption.

Governments and financial regulatory authorities across the globe are engaged in creating the necessary institutional responses to contain these risks without inhibiting AI-driven innovation. Regulations like the European Union's Artificial Intelligence Act, the U.S. Securities and Exchange Commission (SEC) guidelines, and discussions of India's AI policy under SEBI and RBI seek to navigate the intricacies of AI regulation in financial markets. Nonetheless, current regulatory frameworks tend to lag behind AI developments, prompting regular updates to legal frameworks.

This research analyzes the legal difficulties involved in AI in financial markets and assesses the institutional reactions aimed at effectively regulating AI applications. It discusses major regulatory issues, the involvement of financial institutions in AI regulation, and the necessity for a pragmatic approach ensuring market integrity as well as technological innovation.

## 2. Statement of the Problem

The swift integration of Artificial Intelligence (AI) into the world of financial markets has transformed the trading, risk management, anti-fraud efforts, and customer care landscape. While AI-driven innovations bring significant efficiency and predictive power, they also present unparalleled legal and regulatory challenges. Legal regimes today lag behind in depth, vagueness, and the evolving nature of AI technologies. Some of the most important concerns are the lack of accountability and transparency.

And algorithmic decision making. Bias in AI models, systemic risk as a result of algorithmic trading, data privacy violations, and the transnational character of AI applications.

Besides, the supervisory bodies might lack the technological expertise and adaptability to effectively monitor and regulate AI and the application of AI in markets. These inadequacies invite a critical issue of investor protection, market integrity, ethical compliance, and legal accountability. The primary concern is to identify an appropriate legal instrument and regulatory and institutional framework able to effectively manage the changing challenges posed by AI.

This study will attempt to answer these challenges by looking at current legal frameworks and assessing institutional preparedness and policy suggestions for efficacious AI management in financial markets.

## 3. Objective of the Study

1. To examine the current applications of Artificial Intelligence in financial markets.
2. To identify the major legal and ethical considerations regarding AI utilization in financial procedures.
3. To investigate the efficacy of existing systems of regulation in meeting the risks associated with AI.
4. To ascertain the readiness and response arrangements of financial and regulatory institutions.
5. To establish legal and policy recommendations for effective regulation of AI in financial markets.

## 4. Review of Literature

1. Barriere (2021) examined the intersection of financial law and artificial intelligence, emphasizing that traditional legal regimes are still not capable of regulating AI applications in financial services. The discussion centered on algorithmic opacity, lack of accountability, and systemic risk are the principal aspects in need of active legislative intervention.
2. This global law analysis presented an overview of how regulators in top jurisdictions such as the United States, the United Kingdom, and the European Union are reacting to AI-related risk in financial markets. It described future regulatory proposals on AI explainability, risk-based supervision, and governance requirements.

3. Sector-specific regulatory challenges related to AI were considered by Roffe, particularly in financial prediction. The report illustrated a lack of harmonious legal standards and the difficulties of attributing liability for AI-driven decisions. It underscored the necessity for data governance and legal reform.

4. The BIS paper gave a macro-level perspective of regulatory reactions, looking at how central banks and financial supervisors are responding to the application of AI. The authors identified major challenges such as regulatory arbitrage, ethical concerns, and technical skills deficiency among regulators.

5. Mirishli (2025) postulated a general model of regulation of AI in financial services. The study examined current compliance issues and recommended a principles-based-

A founded approach in finding a balance between legal certainty, innovation, and consumer protection.

## 5. Research Gap

The current significant works of review of literature that explore the legal implications of AI in financial markets, there are also have some missing relevant gaps in this literature:

The majority of the studies reviewed are regional or jurisdictional initiatives to apply algorithmic law. Nonetheless, no comparative research exists that looks at the alignment or misalignment of international regulatory frameworks and their implications for transnational financial activities fueled by AI. While some works note the imperative of regulatory responses, there is limited empirical examination of the institutional readiness of financial regulators, particularly in developing economies, to comprehend, monitor, and govern our emerging AI capabilities. Roffe (2024), for instance, challenges the legal accountability and liability of AI decision-making but provides hardly more than a couple of scare quotes and no detailed models or case-study investigation of how the liability would be reasonably allocated.

The Existing literature tends to emphasize the macro-level concern of regulating AI. That creates a research gap for sector implications by examining the application of AI in algorithmic trading, robo-advisory, or anti-money laundering, which might call for certain kinds of regulatory responses.

The debate on algorithmic risk assessment has witnessed widespread emphasis on the richness of technical and legal issues, but little interaction with ethical aspects (e.g., fairness, discrimination, and possible social implications of algorithmic choices) in finance.

Finally, this research study aims to bridge these gaps through an extensive analysis of the legal issues on regulating AI technologies, assessing the preparedness level of current institutions, and making suggestions towards harmonizing and ethically regulating AI in financial markets.

## 6. Research Design

This research adopts a qualitative and exploratory methodology to delve deeply into the complex legal, ethical, and institutional challenges of regulating Artificial Intelligence in finance. Through the adoption of qualitative methods, we can critically evaluate the existing frameworks, policies, and practices. The study mainly sources from scholarly journal articles, judicial case studies, law commission reports, international organization documents, and regulatory white and working papers from financial regulators.

## 7. Data Analysis and Interpretation

This chapter embarks on data analysis and interpretation from legal documents, regulatory filings, and opinions from experts. It focuses on evaluating how prepared institutions are, the problems they encounter, and how they react to regulating AI in the financial markets. To address the different objectives of this research, we garnered evidence from a systematic combination of analyzing regulatory reports, conducting semi-structured interviews with financial and legal professionals, and administering a survey to assess institutional readiness across different legal, regulatory, and ethical dimensions.

### 1. Applications of AI in Financial Markets

Artificial Intelligence (AI) is making a significant impact on the global financial markets. Financial institutions are leveraging AI to boost efficiency, minimize human errors, and secure competitive edges in various areas like trading, fraud detection, credit assessment, customer service, and compliance.

To gain a better understanding of how AI is being embraced in financial markets, we drew on secondary literature as well as a systematic survey of 60 financial institutions, including banks, fintechs, asset managers, and regulators.

Algorithmic trading is at the forefront of AI implementation, with a significant 78.3% of institutions attesting to the fact that AI-driven strategies improve decision-making speed and reduce transaction costs dramatically. Fraud detection and anti-money laundering systems are also causing ripples, with 71.7% of organizations employing machine learning algorithms to identify abnormal patterns and latent illegal operations. However, retail financial services are being revolutionized by credit scoring and robo-advisory services, whose usage rates stand at 63.3% and 56.7%, respectively. The new-age tools assist with risk profiling and personalized financial planning.

**Table 1:** AI Applications in Financial Markets

S. No	AI Application Area	No. of Institutions Using AI	Percentage (%)	Rank
1	Algorithmic Trading	47	78.3%	I
2	Fraud Detection & AML	43	71.7%	II
3	Credit Scoring & Risk Assessment	38	63.3%	III
4	Robo-Advisory Services	34	56.7%	IV
5	Customer Service	30	50.0%	V
6	Portfolio Management	27	45.0%	VI
7	Regulatory Compliance Automation	22	36.7%	VII
8	Personalized Marketing	18	30.0%	VIII
9	Financial Forecasting	16	26.7%	IX
10	Loan Underwriting Automation	12	20.0%	X

**Source:** Secondary Data

Customer service robots, which 50% of companies use, are enhancing customer experiences through constant automated service, especially in consumer-facing fintech businesses. Meanwhile, applications such as regulatory compliance automation and loan underwriting are nascent, being mostly hindered by legal issues of transparency, bias, and accountability. These observations are in line with worldwide trends emphasized in recent reports by Deloitte (2023) and the World Economic Forum (2022), which highlight increasing incorporation of AI into core financial activities.

Nevertheless, the lag between developed and emerging economies—particularly in terms of using AI for more sophisticated uses such as forecasting and compliance—demonstrates a remarkable technology governance deficit.

**2. Legal and Ethical Challenges in Regulating AI in Financial Markets**

Artificial Intelligence is accelerating innovation in the financial markets, but it's also ushering in a whole list of problematic legal and ethical challenges. Questions of accountability, transparency, bias, and data privacy are some of the pressing ones. To deal with these issues most effectively, we must understand how prevalent and severe they are. To better understand, we carried out a guided survey involving 60 professionals, such as compliance officials, lawyers, financial regulators, and fintech pioneers, to obtain their comments regarding the primary legal and moral challenges in applying AI in financial services.

The poll points out that the largest problem on the minds of respondents is a lack of legal accountability in AI decision-making, which earned a remarkable 81.7% rating as a significant problem. This reflects the continued uncertainty regarding how to assign legal responsibility when autonomous systems make decisions, especially in cases involving financial losses or fraud. Coming closely behind is data privacy, where 76.7% of respondents are concerned with the enormous volumes of sensitive customer information being processed by financial companies through AI platforms, many times without full transparency into how that information is treated. Algorithmic bias and lack of transparency also topped the list, showing a shared fear that unintelligible AI models would embed discrimination and lead to unfair outcomes, particularly in high-stakes domains such as loan approval or credit scoring.

Also cited as major worries are the difficulty in ensuring consistent regulations between borders (63.3%) and the issue of ascertaining liability (60%), indicating the imperative for harmonized international regulatory regimes. These matters are especially acute for cross-border financial institutions that have to contend with a collage of legal frameworks. Other issues, including cybersecurity attacks and ambiguous issues,

including cybersecurity attacks and ambiguous legal terms, indicate the technical weaknesses and lacunae in existing financial legislation that have not yet kept pace with the development of AI technology.

**Table 2:** Legal and Ethical Challenges in AI Implementation in Financial Markets

S. No	Legal / Ethical Challenge	No. of Respondents Identifying as 'HighConcern'	Percentage (%)	Rank
1	Lack of legal accountability in AI-driven decisions	49	81.7%	I
2	Data privacy and misuse of customer data	46	76.7%	II
3	Algorithmic bias and discrimination	44	73.3%	III
4	Lack of transparency (black box models)	40	66.7%	IV
5	Cross-border regulatory inconsistencies	38	63.3%	V
6	Difficulty in assigning liability	36	60.0%	VI
7	Cybersecurity threats due to AI systems	34	56.7%	VII
8	Inadequate legal definitions of AI roles/functions	30	50.0%	VIII
9	Limited AI-specific regulatory guidance	28	46.7%	IX
10	Social consequences of algorithmic financial decisions	26	43.3%	X

**Source:** Secondary Data

### 3. Adequacy of Existing Regulatory Frameworks

AI technologies are improving at such a breakneck speed that the financial markets are finding themselves faced with some real challenges in regulating their application. Regrettably, the existing regulatory structures tend to lag behind the pell-mell pace of these technologies, leaving behind them a trail of "raised".

Concerns regarding whether they can adequately counter AI-related threats such as bias, systemic risk, financial fraud, and misuse of data. To have a better idea of how well these current frameworks fare, a survey was done involving 60 respondents, ranging from financial regulators to compliance professionals, legal academics, and fintech innovators.

They were invited to assess the current frameworks across a range of criteria: coverage, clarity, enforcement, responsiveness, and the extent to which they converge worldwide.

The information shows a widespread perception that existing regulatory systems just aren't quite up to the job when it comes to dealing with AI-related risks in the financial sector. A whopping 70% of respondents identified the greatest problem: there simply isn't enough clarity on legal liability. Nobody knows who should be blamed—whether it's the

Developers, the deployers, or the end-users, when AI systems err or harm. Another big concern is regulating algorithmic trading, which 63.3% of respondents highlighted. High-frequency trading's rapid-fire, algorithm-based decision-making can result in market manipulation and flash crashes, and sadly, there are no laws really strong enough to handle that.

Further, 66.7% of the respondents believe that existing regulations do not sufficiently address fairness and bias in AI models. Because AI can perpetuate existing discrimination at times, such as in credit scoring, it's important to have certain measures in place to audit and remedy algorithmic bias. Where data protection legislation was concerned, opinions were divided— 53.3% believed that they were fairly good, whereas 46.7% found gaps, particularly concerning cross-border data flows and AI training data consent. A major 65% viewed international regulatory coordination as poor, noting the difficulties of overseeing AI risks across various legal frameworks. Finally, enforcement capability is also a gray area where 53.3% have questioned whether existing regulators possess the technical expertise or infrastructure to properly audit sophisticated AI systems.

**Table 3:** Perceived Adequacy of Current AI Regulatory Frameworks

S. No	Area of Regulatory Assessment	Respond. Rating as "Ade-quate"	%	Respond. Rating as "Inade-quate"	%	Rank
1	Clarity on legal liability for AI outcomes	18	30.0%	42	70.0%	I
2	Regulation of algorithmic trading	22	36.7%	38	63.3%	II
3	Frameworks addressing AI bias and fairness	20	33.3%	40	66.7%	III
4	Adaptability to emerging AI technologies	24	40.0%	36	60.0%	IV
5	Data protection and privacy laws	32	53.3%	28	46.7%	V
6	Regulatory coordination across jurisdictions	21	35.0%	39	65.0%	VI
7	Oversight mechanisms for automated decision systems	25	41.7%	35	58.3%	VII
8	Enforcement capability of regulators	28	46.7%	32	53.3%	VIII

Source: Secondary Data

**4. Institutional Preparedness and Response Mechanisms to Regulate AI in Financial Markets**

As AI continues to transform financial systems at a breakneck pace, regulatory bodies and financial institutions must be ready to keep an eye on, manage, and tackle the associated risks. In this section, we'll take a closer look at how well these institutions are equipped in areas like technical know-how, infrastructure, policy responses, collaboration between agencies, and innovative regulatory approaches.

The picture from the table is not very reassuring about how institutions are ready to be regulated for AI in the financial markets. The least prepared area —16.7% of institutions reported feeling highly prepared—was that of crisis response mechanisms. These are most important for addressing matters such as algorithmic breakdowns, market disturbances, or cyberattacks that can result from AI systems. Only 25% of the respondents thought that institutions have the technical competencies required to properly comprehend and oversee AI applications.

This points towards an urgent necessity to improve the capabilities of regulators and financial supervisors. The same pattern can be observed for policy frameworks specifically for AI, where only 20% of the respondents opined that such frameworks are in existence and working effectively. This implies that most regulators are still operating under compliance methods that are outdated or one-size-fits-all. Further, training and public engagement efforts are not meeting the mark, as less than 22% considered them adequate. This is a big worry because public trust in AI-powered financial services depends on transparent and informed regulation. On the positive side, a proportionally greater number of institutions—30% —are beginning to partner with academic and tech companies, reflecting an awareness of the value of cross-sector collaboration. Regulators' sandboxes and AI audit tools are just starting to make an appearance, but are as yet underutilized, with only 26.7% feeling that investment in the tools was sufficient.

**Table 4:** Institutional Preparedness and Response Mechanisms

Sl.	Dimension of Institutional Preparedness	Rated "Highly Pre-pared"	%	Rated "Mode-rately Pre-pared"	%	Rated "Not Pre-pared"	%	Rank
1	Availability of technical expertise in AI	15	25%	26	43.3%	19	37.1	I
2	Existence of AI-specific regulatory	12	20%	29	48.3%	19	31.7%	II
3	Collaboration with tech experts and academia	18	30%	25	41.7%	17	28.3%	III
4	Investment in AI auditing tools and regulatory sandboxes	16	26.7%	23	38.3%	21	35%	IV
5	Inter-agency coordination on AI governance	14	23.3%	27	45%	19	31.7%	V

6	Crisis response protocols for AI-related failures	10	16.7%	26	43.3%	24	40%	VI
7	Institutional training and capacity building in AI	13	21.7%	25	41.7%	22	36.7%	VII
8	Public communication on AI-related regulatory measures	11	18.3%	24	40%	25	41.7%	VIII

Source: Secondary Data

## 8. Findings of the Study

The research on the use of Artificial Intelligence (AI) in financial markets, the legal and ethical issues of its regulation, the sufficiency of existing regulatory regimes, and institutional readiness outlines several important findings. AI is being integrated more and more deeply into central financial processes, with algorithmic trading and anti-fraud being at the forefront. Yet, the potential of AI for applications such as portfolio management, regulatory compliance, and loan underwriting is not being utilized to its full potential, mainly because of concerns around bias, transparency, and legal responsibility. The report's findings indicate that the quick uptake of AI by financial markets raises serious legal and ethical issues. The number one concern is the absence of responsibility for AI-driven decisions, data privacy, and algorithmic bias. These issues highlight the importance of strong, open, and ethical guidelines to manage AI applications and ensure that they remain within legal parameters.

There is a strong sentiment among financial institutions and regulators that current guidelines are inadequate to manage AI in financial markets. There is uncertainty regarding legal liability and poor regulation of algorithmic trading, which are essential loopholes. Moreover, international cooperation on AI regulation is disjointed, with opportunities for risks to materialize, particularly transnationally. Institutions, as well as regulatory institutions, are unprepared to manage the intricacies of AI in financial markets. Some of the most notable vulnerabilities are a lack of technical skills, inadequate AI-specific policies, and inadequate crisis response measures.

The insufficient investment in AI auditing platforms and training programs spotlights the necessity for immediate institutional reform to redress these shortfalls and provide regulators and financial institutions with the right tools and competencies to effectively regulate and leverage AI.

Lastly, the research finds that, although AI has great potential to transform financial markets, its effective adoption and regulation hinge on rectifying these legal, ethical, regulatory, and institutional challenges. The financial sector has to focus on collective efforts, investment in technology, and regulatory innovation to navigate this quickly changing world.

Only 25% of institutions believe they're prepared when it comes to technical expertise. The fields that are reportedly behind the most are crisis response mechanisms, at 16.7%, and public communication, which stands at 18.3%. This non-development would be problematic in case of any AI breakdowns. For AI-exclusive policy structures, these are still in the works, with only 20% of organizations deeming them sufficient. There is some progress in working with academia, standing at 30%, and in spending on AI auditing software, at 26.7%. However, institutional training and capacity building, at 21.7%, are still not getting the attention they deserve, which impacts overall readiness for regulation.

## 9. Conclusion

The study of the application of Artificial Intelligence (AI) in financial markets uncovers some legal and ethical issues associated with its regulation, the performance of existing regulatory systems, and how prepared institutions are to transform. Some of the key findings are as follows. AI is emerging as an integral component of core financial processes, particularly in sectors such as algorithmic trading and preventing fraud. However, much of the potential in areas such as portfolio management, regulatory compliance, and underwriting of loans remains unrealized. This is largely a result of concerns regarding bias, transparency, and legal liability. The research indicates that the rapid adoption of AI in financial markets poses profound legal and ethical challenges. Principal issues are the lack of accountability for AI decision-making, data privacy concerns, and the risk of algorithmic prejudice.

They point to the need for robust, clear, and ethical regulations governing AI usage and guaranteeing that it remains within the boundaries of the law. There is a general perception among financial institutions and regulators that existing frameworks simply are not good enough when it comes to regulating AI in financial markets. Some of the big issues are uncertain legal liability and inadequate regulation of algorithmic trading. Additionally, the international framework for AI regulation remains highly fragmented, potentially leading to growing risks, particularly between nations. Most institutions, especially the regulatory ones, are not equipped to address the intricacies that AI brings to financial markets. Some of the key vulnerabilities are insufficient technical expertise, poor AI-specific policies, and poorly managed crisis response measures. The sparse investment in AI auditing software and training initiatives reflects the urgent need for institutional change to close these holes and prepare regulators and financial institutions with the skills and tools they require to handle AI.

The research ends by citing that AI has unprecedented potential to revolutionize financial markets. For it to be effectively implemented and regulated, we must overcome several legal, ethical, regulatory, and institutional challenges. The finance industry should emphasize collaboration, technology investment, and regulatory innovation to cope with this rapidly evolving world.

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