

The Construction and Improvement of Financial Supervisory System in the Perspective of a Strong Financial Country--Applied research on innovation regulation based on deep learning

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Abstract

In recent years, China has placed the development of the financial industry in the overall national development plan from a national strategic perspective, aiming to promote the comprehensive upgrading of the financial industry through a series of policies, regulations, institutional reforms and innovations, and to realize the transformation from a large financial country to a strong financial country. Financial supervision refers to a series of activities in which the government and its authorized institutions supervise, manage and regulate financial institutions and financial markets in accordance with laws and regulations. At present, China's financial regulatory agencies still exist between the regulatory space on the gap between the coordination between the agencies still need to be further improved, a variety of negative influences emerge, seriously affecting the independence of the financial regulatory agencies. This project aims to study the shortcomings and weaknesses of the current financial regulators through a large amount of data and information, put forward feasible policy recommendations to improve, reduce market violations, reduce the occurrence of illegal business activities, reduce the systematic risk, and ultimately realize the construction and improvement of the financial regulatory system.

Keywords

Financial Strength, Financial Regulatory System, Innovative Regulation.

1. Introduction

In the context of a strong financial country, the construction and improvement of a modernized financial regulatory system has become a core issue in the development of the financial sector. The construction of a strong financial country not only implies the expansion of the financial market scale and the enhancement of the strength of financial institutions, but also requires that the financial regulatory system have a high degree of effectiveness, foresight and adaptability, so as to safeguard financial stability, prevent systemic risks and promote the efficient allocation of financial resources.

At present, the global financial market environment has become increasingly complex, with numerous financial innovations, and the traditional model of financial regulation is facing many challenges. From the increasing diversification of financial products to the growing complexity of transaction structures, from the cross-regional and cross-industry integration of financial services to the rapid development of financial technology, various new situations continue to emerge, making it difficult for traditional regulatory means based on rules and experience to comprehensively and timely capture and respond to potential risks. In this context, it is imperative to introduce advanced technological means to innovate and upgrade the financial regulatory system.

Deep learning, as a cutting-edge technology in the field of artificial intelligence, provides new ideas and methods for financial regulatory innovation with its powerful data mining, pattern

recognition and prediction capabilities. Through in-depth analysis of massive financial data, deep learning models can accurately identify abnormal trading behavior, predict the evolution of financial risk trends, help regulators formulate preventive measures in advance, and improve the timeliness and accuracy of supervision. At the same time, deep learning also shows great potential for application in the review of compliance of complex financial businesses and optimization of regulatory resources. In-depth research on innovation supervision based on deep learning not only helps to promote the modernization and transformation of the financial regulatory system, but also is a key path to achieve the goal of a strong financial country and ensure the sound operation of the financial market, which is of great theoretical and practical significance to the long-term development of China's financial sector.

2. Literature review

On June 6, the State Administration of Financial Supervision and Administration issued the Guiding Opinions, and the Central Financial Work Conference clearly pointed out that "we should do a good job in the five major articles of science and technology finance, green finance, inclusive finance, pension finance, and digital finance." That is, to strengthen and improve the modern financial regulatory efforts to create a healthy financial environment. This study is generated based on three aspects. First, the effectiveness of financial regulation. Huang Xiangzhong et al. (2023) examined the impact of local financial regulatory reform on regional financial risk through double-difference type, and conducted heterogeneity analysis, impact mechanism analysis and robust test. The following conclusions are drawn from the study: local financial regulatory reform does reduce regional financial risk: the impact of local financial regulatory reform on regional financial risk shows obvious regional heterogeneity. Qiu Xinguo et al. (2021) empirically investigated the impact of local financial regulation on regional financial development by using provincial dynamic panel data from 2009-2017 and system generalized method of moments estimation (system GMM), and the results show that local financial regulation has a significant impact on the level of regional financial development. The second is the efficiency of financial regulation. In the existing literature, the DEA method is often used to analyze the efficiency of financial regulation. Huang Xiangzhong et al. (2022) combine the three-stage DEA model with the Malmquist index method to construct an evaluation system to measure the efficiency of local financial regulation, and analyze the efficiency of financial regulation in each place from two perspectives: static and dynamic. The results of the study show that: after removing the influence of regional environmental variables, the real constraint on the improvement of local financial supervision efficiency is the lower scale efficiency, and there is management inefficiency or regulatory efficiency has not been effectively improved in local financial supervision in some provinces of China. Third, financial supervision methods. Cao Yanli et al. (2021) constructed an Internet financial supervision system based on machine learning algorithms and improved neural network algorithms, conducted factor analysis and discretization and Logistic regression model assessment, started from relevant factors, combined with the results of the credit risk assessment, obtained the relevant influencing factors through the regional study and carried out empirical analysis. The results show that the model it constructs has a certain degree of reliability. Therefore, it can be constructed through machine learning algorithms and artificial intelligence to build a financial regulatory system that is more intelligent and effective.

Compared to traditional machine learning techniques, deep learning can extract features directly from raw data. Martin et al [2018] used Recurrent Neural Network (RNN), Convolutional Neural Network (CNN), Combination of RNN and CNN to recognize the traffic of IoT, and concluded that the combination of RNN and CNN works best. Zou et al [2018] presented a novel network combining convolutional network and recurrent network, which achieved

good results in website fingerprinting. Mengwang Li et al. (2024) proposed a robust website fingerprinting method based on graph neural networks, using deep learning algorithms and more representative algorithms LSTM, FS-Net and optimized algorithms for network fluctuations ProGraph as a comparison method to conclude that the robust website fingerprinting method based on graph neural networks is better, and effectively improves the accuracy rate.

3. Problems in China's current financial regulatory system

In the process of building a strong financial country, China's financial regulatory system has gone through many rounds of reform and improvement, and has achieved certain results, but in the complex and changing financial market environment, it still reveals a lot of problems, which restricts the enhancement of the effectiveness of financial regulation and the healthy development of the financial market.

3.1. Regulatory models lag behind the pace of financial innovation

With the rapid development of financial technology, innovative financial products and services are springing up. However, China's current financial regulatory model is mostly constructed on the basis of traditional financial business, oriented by rules and experience, and is slow to react in the face of innovative financial activities. For example, in the field of digital currency supported by blockchain technology, virtual currency trading platforms once grew wildly in China. The traditional regulatory model is difficult to quickly define the nature of their business, and there is an obvious lag in the formulation of regulatory rules. This has led to the participation of a large number of investors blindly following the trend, and the market is full of chaos, not only the accumulation of financial risks, but also a serious impact on the financial order. Another example is the smart investment advice business, which provides investment advice to clients with the help of algorithms and big data. However, as the regulatory model fails to keep up with the pace of innovation, and there is a lack of clear specifications on the compliance review of algorithms, data privacy protection, and the definition of responsibility, some smart investment platforms are misleading investors and other irregularities exist in the course of their operations.

3.2. Deficiencies in regulatory coordination mechanisms

3.2.1. Poor sharing of information between sectors

China's financial supervision involves a number of departments, including the "one line, two chambers", and each department has accumulated a large amount of data in the process of financial supervision. However, due to the lack of a unified data-sharing platform and an effective information communication mechanism, interdepartmental data are independent of each other, forming information islands. This problem of information barriers is particularly prominent in the supervision of cross-industry financial products. For example, for a comprehensive financial product that combines the functions of bank finance and insurance protection, the banking regulator masters the data of its fund-raising process, and the insurance regulator understands its insurance terms and claims-related information. However, since the information of both parties cannot be shared in a timely manner, it is difficult to comprehensively assess and supervise the risk of the product as a whole, which is prone to regulatory loopholes and gives lawbreakers an opportunity to take advantage of it.

3.2.2. Blurred division of regulatory responsibilities between central and local authorities

In the financial regulatory system, there are cross-cutting and gap areas between central and local regulatory responsibilities. Some local financial organizations, such as microfinance companies and financial guarantee companies, have strong regional characteristics in their

business activities. However, in the process of supervision, the division of supervisory authority and responsibility between the central and local authorities is not clear enough. In some regions, the central supervisory authorities are "beyond their reach", while the local supervisory authorities are not in a position to supervise due to the limitations of professional capacity and resource allocation. This has led some local financial organizations to conduct their business in violation of the law, such as some microfinance companies operating beyond their scope and charging exorbitant interest rates in violation of the law, seriously disrupting the local financial order, and making it difficult to identify and dispose of responsibilities in the event of a risk.

3.3. Insufficient and unevenly distributed regulatory resources

3.3.1. Human resources professionalism needs to be improved

The work of financial supervision requires a high level of professionalism on the part of supervisors, who need to have knowledge of finance, law, information technology and other aspects. However, at present, in China's financial regulatory team, some personnel have a single knowledge structure, which makes it difficult to adapt to the increasingly complex financial regulatory work. Especially in the current rapid development of financial technology, there is a lack of sufficient professional talents for the supervision of the application of new technologies such as blockchain and artificial intelligence in the financial field. For example, when carrying out on-site inspections of fintech enterprises, it is difficult to identify potential risk points and impossible to effectively implement supervision because supervisors do not have an in-depth understanding of the core technological principles and business processes of the enterprises.

3.3.2. Relative lag in investment of technical resources

Compared with financial institutions that have invested heavily in financial technology research and development and application, financial regulators are lagging behind in the investment of technological resources. In terms of data collection, analysis and processing, there is a lack of advanced technical means. For example, in the face of massive financial transaction data, the data mining and analysis capabilities of the regulatory authorities are limited, making it difficult to quickly and accurately identify abnormal transaction behavior. At the same time, the construction of regulatory technology infrastructure, such as regulatory big data platforms and intelligent risk early warning systems, has been slow, failing to meet real-time and dynamic regulatory needs and leading to low regulatory effectiveness.

3.3.3. Regional imbalances in resource allocation

The degree of development of financial markets in different regions of China varies greatly, with developed regions in the east having active financial markets, numerous financial institutions and frequent financial innovation activities, while the financial markets in the central and western regions are relatively small in scale and lagging behind in development. However, in the allocation of financial regulatory resources, failed to fully take into account such regional differences. The eastern region has a heavy regulatory task, but there is a relative lack of regulatory resources, making it difficult to achieve comprehensive and in-depth regulation of various types of financial activities; in the central and western regions, there is a phenomenon of idle and wasteful regulatory resources, and regulatory resources are not effectively utilized, further exacerbating the imbalance in regional financial regulation.

China's current financial regulatory system has many problems in terms of regulatory model, coordination mechanism and regulatory resources, which seriously affect the effectiveness and authority of financial regulation. In order to realize the goal of a strong financial country and ensure the sound operation of the financial market, it is necessary to address these problems and accelerate the reform and improvement of the financial regulatory system.

4. Policy recommendations to reduce risks in the current financial regulatory system

4.1. Innovate the regulatory model to fit the development of financial innovation

4.1.1. Building an innovation-driven regulatory framework

Regulators should change their thinking from traditional rule-following mode to innovation-driven regulation. Set up a special financial innovation research group to deeply analyze the development trend of fintech and the characteristics of innovative products, prejudge potential risks in advance, and formulate forward-looking regulatory rules. For emerging areas such as digital currencies and blockchain financial applications, based on sufficient research, timely introduce regulatory rules to standardize business processes, clarify access thresholds, and strengthen risk prevention and control, so as to guide the development of innovative activities within the compliance track.

4.1.2. Introducing a "regulatory sandbox" system

Drawing on international experience, piloting a "regulatory sandbox" system in some regions where financial innovation is active. Fintech enterprises are allowed to conduct tests of innovative products or services under limited scope and conditions. Regulators will conduct real-time monitoring and evaluation of innovative projects in the sandbox, and flexibly adjust regulatory strategies based on test results. For innovations with controllable risks and market potential, they will be quickly released and promoted; for projects with greater risk potential, they will be terminated in a timely manner and lessons learned will be summarized to provide reference for subsequent supervision.

4.2. Optimize regulatory coordination mechanisms and strengthen sectoral linkages

4.2.1. Building a unified financial regulatory information platform

The State Council will take the lead in integrating the financial regulatory data resources of the "one line, two chambers" and other relevant departments to build a unified national financial regulatory information platform. Through standardized data interfaces, real-time sharing and exchange of data from various departments will be realized. Using big data, cloud computing and other technologies, the platform data are deeply mined and analyzed to provide comprehensive and accurate data support for cross-industry financial product supervision. For example, in the supervision of comprehensive financial products, various departments can rely on the platform to obtain complete product information and collaborate in risk assessment and regulatory decision-making.

4.2.2. Clarify the boundaries of central and local regulatory responsibilities

Drawing up a detailed list of the division of responsibilities between central and local financial supervision, and clarifying the macro-supervisory responsibilities of central supervisory authorities for national financial markets and large financial institutions, as well as the specific supervisory responsibilities of local supervisory authorities for regional financial organizations and local financial risk prevention. A central and local financial supervision coordination meeting system will be established to communicate regularly on the progress of financial supervision and to coordinate the resolution of problems of overlapping responsibilities and blank areas. With regard to the supervision of local financial organizations, the central authorities will provide policy guidance and technical support, while the local authorities will be responsible for day-to-day supervision and risk management, thus forming a supervisory pattern in which the central and local authorities will work in coordination and perform their respective roles.

4.3. Optimize the allocation of regulatory resources and enhance regulatory capacity

4.3.1. Strengthening the regulatory workforce

Financial regulators should formulate a systematic talent training program and cooperate with universities and research institutions to carry out professional training courses in multiple fields, such as financial technology, financial law and risk management, so as to enhance the professionalism of supervisors. Establish a talent introduction mechanism to recruit high-end talents with fintech background and rich practical experience at home and abroad to enrich the supervisory team. At the same time, it has improved internal incentive mechanisms to encourage self-improvement of supervisory personnel, and provided incentives such as promotions and rewards to those who have outstanding performance in supervisory work and possess professional specialties.

4.3.2. Increase investment in regulatory technology

Establishing a special fund for regulatory science and technology to support technology research and development and infrastructure construction for financial regulators. Regulators are encouraged to cooperate with technology enterprises to introduce advanced data collection, analysis and processing technologies to build intelligent financial regulatory systems. For example, the use of big data analysis technology to monitor financial transaction data in real time, the use of artificial intelligence algorithms to identify abnormal transaction behaviors, and the establishment of risk early warning models to prejudge financial risks in advance, thus enhancing the timeliness and accuracy of supervision.

4.3.3. Balancing regional regulatory resource allocation

Depending on the size, activity and risk profile of the financial market in each region, regulatory resources will be rationally deployed. For the eastern region with developed financial markets and frequent innovative activities, it will appropriately increase the investment in regulatory staffing and technical equipment, and strengthen the supervision of key financial institutions and innovative businesses; for the central and western regions, it will guide the tilting of regulatory resources to emerging financial sectors and potential markets on the basis of guaranteeing the basic regulatory needs, and at the same time, strengthen the exchange of regulatory experience and cooperation among regions to enhance the level of regulation in the central and western regions, and promote the balanced development of financial regulation across the country. At the same time, it will strengthen inter-regional exchange of regulatory experience and cooperation to enhance the level of regulation in the central and western regions, and promote the balanced development of national financial regulation.

5. Conclusion

A series of problems in China's current financial regulatory system have had a significant negative impact on the stability and development of the financial market. The lagging regulatory model makes financial innovative products and services lack effective guidance and regulation in the development process, which easily triggers systemic financial risks, harms the interests of investors, and destroys the foundation of trust in the financial market. The lack of regulatory coordination mechanism leads to poor information communication between departments and unclear responsibilities between the central and local governments, which not only reduces the efficiency of regulation, but also creates the space for regulatory arbitrage, making it difficult to curb financial irregularities in a timely and effective manner. Insufficient and uneven distribution of regulatory resources has further weakened the comprehensiveness and accuracy of regulation, making it impossible to adequately respond to complex regulatory

needs in developed financial markets and difficult to promote the healthy cultivation and development of financial markets in less developed regions.

In the face of these problems, there is an urgent need for systematic reform and optimization of China's financial regulatory system. Through innovative regulatory models, we can keep up with the pace of financial innovation and provide clear compliance guidelines for emerging financial sectors; improve the regulatory coordination mechanism, break down barriers between departments and central and local governments, and form a regulatory synergy; and rationally allocate regulatory resources, improve the quality and technical level of the regulatory team, and ensure that the regulatory coverage is comprehensive and focused. Only in this way can we enhance the effectiveness of China's financial supervision, maintain the sound operation of the financial market, build a solid foundation for the construction of a strong financial country, and promote China's financial industry to realize sustainable and high-quality development in the global competition.

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