

# ***Financial Innovation Development Models and Risk Governance Mechanisms in the Context of the Digital Economy***

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**Keywords:** Digital economy; Financial innovation; Risk characteristics; Transmission mechanism; Risk management

**Abstract:** The digital economy is profoundly reshaping the operational logic and service form of the financial industry. This article focuses on financial innovation under the background of digital economy and discusses its development model and risk management mechanism. The research first clarifies the mechanism of digital economy driving financial innovation, and analyzes the operation logic of three main development models: technology-driven, scene fusion and platform ecology. On this basis, it reveals the characteristics of concealment, instantaneity and relevance of financial innovation risk, and depicts the network path of cross-layer transmission of risk from technology layer to business layer and market layer. In view of the above-mentioned risk characteristics, a risk management framework of overall development and safety is constructed, and some countermeasures are put forward, such as implementing penetrating supervision to eliminate regulatory arbitrage, deepening the application of regulatory technology to improve monitoring efficiency, and improving the financial consumer protection mechanism to alleviate information asymmetry.

## **1. Introduction**

In recent years, digital technology has accelerated its penetration into all walks of life. In this process, the operation logic and service form of the financial industry have changed significantly [1]. The circulation of data elements and the wide application of digital technology have broken the time and space restrictions of traditional financial services. This reduces the degree of information asymmetry and provides new technical support for the expansion of financial business [2]. Financial institutions rely on cloud computing, big data, artificial intelligence and other technical means to continuously optimize resource allocation efficiency [3]. This technology-driven change reshapes the supply mode of financial products and changes the operating mechanism of financial markets. Driven by the digital economy, financial innovation presents a multi-dimensional development trend. Technology-driven enables financial services to more accurately match the financing and wealth management needs of long-tail customers. Scenarios fusion promotes financial services to be embedded in all kinds of real economy transactions [4]. The rise of platform-based operation mode integrates various resources and builds a more complex financial ecosystem. The cooperation and

competition among financial institutions, technology enterprises and various market players are becoming more and more frequent, and the cross-integration of financial formats has become the norm [5]. This evolution requires a re-examination of the internal logic of financial innovation and its impact on the macro-economy.

The deepening of financial innovation is also accompanied by the complexity of risk forms. Although the application of digital technology improves the efficiency of business processing, it also introduces new technical risks. Data security problems, algorithm model defects and network system fragility may all have an impact on financial stability [6]. The cross-border integration of financial services makes the risk transmission path more complicated. Local risks in traditional financial markets may spread rapidly through digital networks, causing cross-market and cross-domain systemic risks [7]. The fuzziness of business boundaries increases the difficulty of risk identification and measurement. Traditional supervision methods often face the dilemma of lagging information and insufficient tools when facing new businesses. Based on the above background, this article focuses on financial innovation under the background of digital economy and discusses its development model and risk management mechanism.

## 2. Main Development Modes of Financial Innovation

### (1) Technology-driven service model

This model takes the underlying technological innovation as the core, and optimizes the processing flow of financial business by introducing big data, artificial intelligence and cloud computing. In the field of credit, financial institutions use machine learning algorithms to build intelligent risk control models to realize automatic evaluation and dynamic monitoring of borrowers' credit status [8]. In the field of wealth management, intelligent investment system provides personalized asset allocation scheme based on user risk preference and market data. This model transforms data processing ability into financial service ability, which improves the marginal efficiency of business operation, which enables financial institutions to cover a wider customer base at a lower cost.

### (2) Scenario-integrated business model

The scene-integrated business model emphasizes the extension of financial services to the specific transaction links between the real economy and residents' lives. Financial institutions seamlessly embed payment, financing and other products into high-frequency scenes such as e-commerce transactions, logistics and transportation [9]. In supply chain finance, core enterprises and financial institutions are connected through data interfaces, and services run through procurement, production and sales. In the field of consumer finance, payment tools are deeply bound with consumption scenarios, shortening the capital flow link. This model realizes the accurate matching between financial needs and physical transactions through scene acquisition and data precipitation, and enhances the convenience of financial services.

### (3) Platform-based ecological operation mode

The platform-based ecological operation mode relies on the digital platform to integrate various resources and build a market ecology with multilateral participation [10]. The platform operator provides the underlying technical infrastructure and rule framework, connecting the fund suppliers, asset demanders and third-party service providers. In this mode, data elements flow within the platform, breaking the information barrier between traditional institutions. By gathering massive transaction data, the platform forms network effect and economies of scale, and reduces the search cost and transaction friction of all parties. Through business collaboration and complementary capabilities, the subjects in the ecology jointly provide comprehensive solutions to promote the transformation of financial services from single product supply to diversified ecological

co-construction.

### 3. Risk Characteristics and Transmission Mechanism of Financial Innovation

#### (1) The typical characteristics of financial innovation risk

The financial innovation risk under the digital economy environment is different from the credit risk and operational risk faced by traditional financial business in form. In terms of concealment, the black box attribute of the algorithm model makes it difficult for external regulators to penetrate business logic and identify the real risk exposure of the underlying assets. Taking the joint loan business as an example, the risk sharing ratio between the funder and the customer acquisition platform is often nested in multi-layer cooperation agreements. A single institution can only observe its own part, while the overall leverage level and concentration risk are scattered among multiple legal subjects, forming a blind spot of regulatory vision. In terms of exposure speed, the high-frequency trading and real-time clearing mechanism of digital network reduces the time window from germination to diffusion of risks. The tight liquidity of a node can trigger a chain reaction within a few minutes, leaving the market players with very limited buffer time. In terms of relevance, data sharing, system docking and business nesting between financial institutions and technology platforms make it difficult to locate the source of risk quickly. Local technical failures may spread synchronously to multiple affiliated institutions along the business interface.

#### (2) Cross-market and cross-domain transmission paths of risks

Figure 1 shows the cross-layer transmission mechanism of financial innovation risk under the background of digital economy. At the technical level, the high concentration of data service providers constitutes a single point of vulnerability. Once the core data interface is interrupted or attacked by network, many financial institutions that rely on this interface will lose the input of risk control data at the same time, which will lead to the collective suspension of credit approval and transaction verification. At the business level, technical failures quickly turn into liquidity pressure, and the short-term blockage of payment and clearing channels can lead to the difficulty of capital turnover of merchants, resulting in the centralized release of short-term credit demand. At the market level, the liquidity tension at the business level spreads to a wider financial market through interbank lending, asset securitization and other channels. This multi-level and multi-channel conduction structure makes the final impact range of risk far beyond the initial failure point.

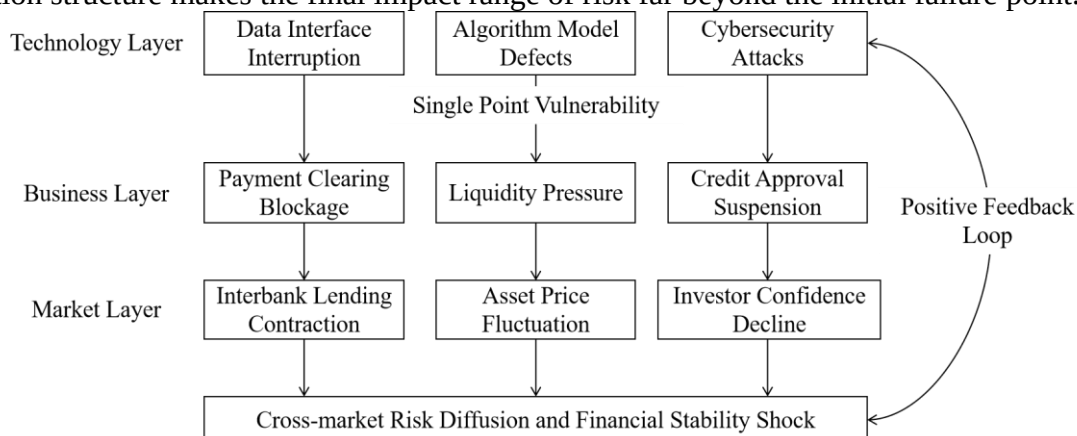


Figure 1 Cross-layer transmission mechanism of financial innovation risk

#### (3) The superposition effect of technical risk and financial risk

Technical risk and financial risk will form resonance amplification under certain conditions. Algorithm homogenization is a typical performance. Most institutions adopt similar data sources and model frameworks, which leads to a high degree of consistency in risk assessment behavior. In

the upward period, credit was relaxed collectively, while in the downward period, it was tightened synchronously, which aggravated the pro-cyclical fluctuation. Data quality problems can also trigger superposition effect. When the training data is systematically biased or maliciously polluted, the risk control model will collectively fail in the same time window, resulting in a large area of misjudgment. In addition, network security incidents and financial panic constitute a positive feedback loop. The failure of payment system fermented by social media may lead to centralized cash withdrawal, enlarge local technical problems into institutional liquidity crisis, and promote the qualitative change of technical risks to financial risks.

#### **4. Risk Management Mechanism of Financial Innovation**

##### **(1) The objectives and basic principles of risk management**

The risk management of financial innovation in the digital economy environment needs two core goals: overall development and security. Regulators should adhere to the basic principle of combining tolerance and prudence with bottom line thinking when formulating policies. The principle of inclusiveness and prudence requires the governing body to reserve reasonable trial and error space for financial technological innovation, so as to avoid over-regulation to inhibit market vitality. Bottom-line thinking requires defining the essential attributes of financial business and ensuring that all innovation activities are not divorced from the fundamental purpose of serving the real economy. The design of governance mechanism should follow the principle of unity of functional supervision and behavioral supervision. No matter what technical coat or business form financial institutions adopt, as long as they engage in the same financial business, they should apply unified regulatory standards and capital constraints. This principle-oriented governance idea can effectively eliminate the regulatory arbitrage space.

##### **(2) Penetrating supervision and collaborative governance framework**

Facing the characteristics of multi-layer nesting and cross-border integration in financial innovation business, regulators must establish a penetrating supervision system. Penetrating supervision requires the governance subject to accurately identify the true nature of the underlying assets and the credit status of the ultimate debtor through complex transaction structure and product packaging. In terms of collaborative governance, it is difficult for a single regulatory department to deal with cross-market risk contagion independently, and it is necessary to build a collaborative governance network with multi-agent participation, as shown in Figure 2. Regulators are responsible for formulating rules and enforcing laws, and industry self-regulatory organizations undertake standard-setting and dispute mediation. Platform enterprises implement first-line risk management and control responsibilities, and third-party service providers provide technical audit and compliance assessment. Through two-way information interaction, each subject forms a joint force of governance, which makes up for the blind spot of the traditional single supervision model to some extent.

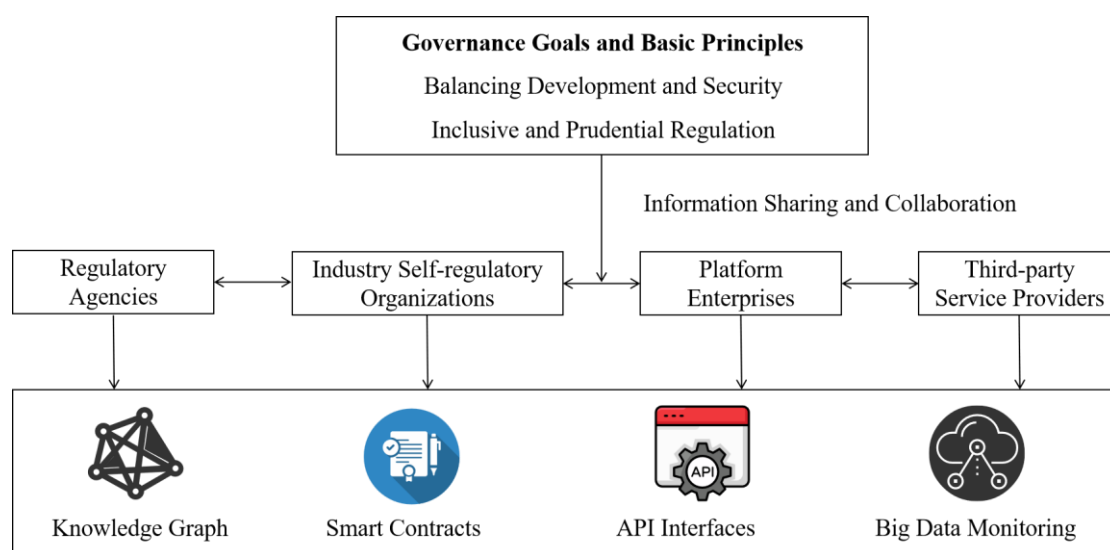


Figure 2 Collaborative governance and regulatory technology empowerment framework

### (3) Innovation of regulatory technology application tools

The in-depth application of regulatory technology is the key path to improve the effectiveness of risk management. Regulators should actively introduce cutting-edge technologies such as big data monitoring, knowledge mapping and smart contracts, and reshape regulatory tools and business processes. Big data monitoring tools can collect and analyze massive transaction data in real time, and help supervisors find abnormal capital flows and potential illegal clues in time. Knowledge mapping technology enables regulators to accurately identify hidden related transactions and interest transfer behaviors by building a complex related network among financial institutions, corporate shareholders and actual controllers. Smart contracts are applied to the coding transformation of regulatory rules. When the business indicators of financial institutions touch the preset risk threshold, the system will automatically trigger early warning or limit trading orders, so as to realize the transformation from punishment after engagement to intervention in the event. Regulators should promote the establishment of standardized application program interfaces, require financial institutions to access core business data to the regulatory system in real time, and improve the timeliness of regulatory information.

### (4) Financial consumer rights protection mechanism

Financial innovation not only improves service efficiency, but also intensifies information asymmetry between financial institutions and consumers. The governing body should force financial institutions to fulfill their full information disclosure obligations and explain the income characteristics and potential risks of products to consumers in easy-to-understand language. In order to protect data privacy, regulators need to strictly implement the principle of minimum data collection and standardize the collection, storage and sharing of user data by financial institutions. In terms of algorithm governance, the regulatory authorities should establish an algorithm filing and auditing system, requiring financial institutions to regularly evaluate the fairness of credit approval and product recommendation algorithms. The diversified solution mechanism of financial disputes needs to further broaden online rights protection channels, solidify electronic evidence by using blockchain and other technical means, and reduce the cost of consumer rights protection.

## 5. Conclusions

Focusing on financial innovation under the background of digital economy, this article combs its development model, risk characteristics and governance mechanism. The research shows that

digital technology has three modes: technology-driven, scene fusion and platform ecology. This evolution of business forms has also changed the logic of risk generation and evolution. The risk of financial innovation is characterized by strong concealment, instantaneous outbreak and high correlation. Through the cross-layer conduction of technology, business and market, it forms the resonance effect of the superposition of technology risk and financial risk.

In the face of complex risk forms, the traditional single supervision model has been difficult to adapt to the development needs of digital finance. It is an inevitable choice to build a risk management mechanism for overall development and safety. Penetrating supervision can effectively identify the underlying assets and real risk exposure, and eliminate cross-market regulatory arbitrage. In-depth application of regulatory technology transforms punishment after the event into intervention during the event, which improves the timeliness and accuracy of risk monitoring. Strengthening financial consumer protection and algorithmic governance will help alleviate information asymmetry and maintain market fairness and stability.

In the future, the financial governance system needs to continuously adapt to the pace of technological evolution. Regulators, industry organizations and market players should deepen cooperation. While encouraging financial technological innovation, relevant departments should stick to the bottom line of no systemic risk and realize the overall stable operation of the financial system.

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