

# *The Transformation of Financial Supervision Paradigm under the Background of Financial Technology*

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**Abstract:** While improving financial efficiency and enriching financial products, financial technology has also brought about the generalization of financial risks. The financial rules under the traditional financial supervision paradigm are usually the product of crisis-based legislation and regulation. They are characterized by “command and control” and cannot cope with the pan-financialization brought by financial technology, the frequent financial risks, the endogenous and exogenous financial systems risk and other issues. The transformation of the financial regulatory paradigm is imperative. The new paradigm of financial regulation requires the establishment of a cross-industry risk regulator on top of specialized financial regulators to prevent risks from being transmitted inside and outside the financial system, requires adaptive regulation to rationally distribute finance between financial legislatures, financial regulators and regulated institutions rule-making power, requires experimental supervision to deal with the time-consuming problems of regulatory intervention, requires data-driven supervision, real-time or quasi-real-time supervision of financial technology, and explores new ways to solve the regulatory lag.

## 1. Introduction

A history of financial development is a history of scientific and technological progress. The financial industry and financial supervision have always followed the pace of technological innovation [1]. Financial technology can improve financial efficiency, enrich financial products, and enable consumers and small businesses to obtain financial services that suit their needs at a lower price, more convenient methods and more channels. It can also increase transparency and reduce information asymmetry. To make risks more accurately assessed and better priced [2]. However, financial technology will bring micro and macro financial risks to the financial system, making financial institutions, financial infrastructure or financial sectors vulnerable to financial shocks, and may also have contagious effects and procyclical effects that affect the stability of the entire financial system [3]. . When the financial regulatory paradigm is shaped by changes in the financial ecology, business model, product structure, and business methods, the financial regulatory paradigm itself should also change. Financial technology is having an unprecedented disruptive impact on the financial industry. The current financial regulatory paradigm has not fully adapted to the changes in the financial industry, and its transformation is inevitable [4-6]. Of course, the transformation of the financial regulatory paradigm does not mean completely abandoning the old paradigm, but making

new changes in the development of financial technology based on the original paradigm. It should be pointed out that although the financial regulatory paradigm shift studied in this paper is aimed at financial technology, it is a normal state for financial regulation to face constant changes in the financial industry. Therefore, the specific content of the financial regulatory paradigm shift proposed in this paper is for the entire financial supervision. Also has universal significance.

## 2. Cross-industry risk supervision model based on financial risk generalization reality

Some scholars explore the regulatory issues of financial banks by constructing models. Gennaioli, Shleifer, Vishny modeled the activities of financial institutions and studied the relationship between the shadow banking system and financial stability. The results show that under the assumption of rational expectations, the financial banking system is stable and conducive to the improvement of social welfare. However, in the case of participants underestimating the tail risk, financial banking activities will lead to systemic risks and financial vulnerability, so it is necessary to implement some policy interventions such as monitoring the leverage ratio of the banking financial system.

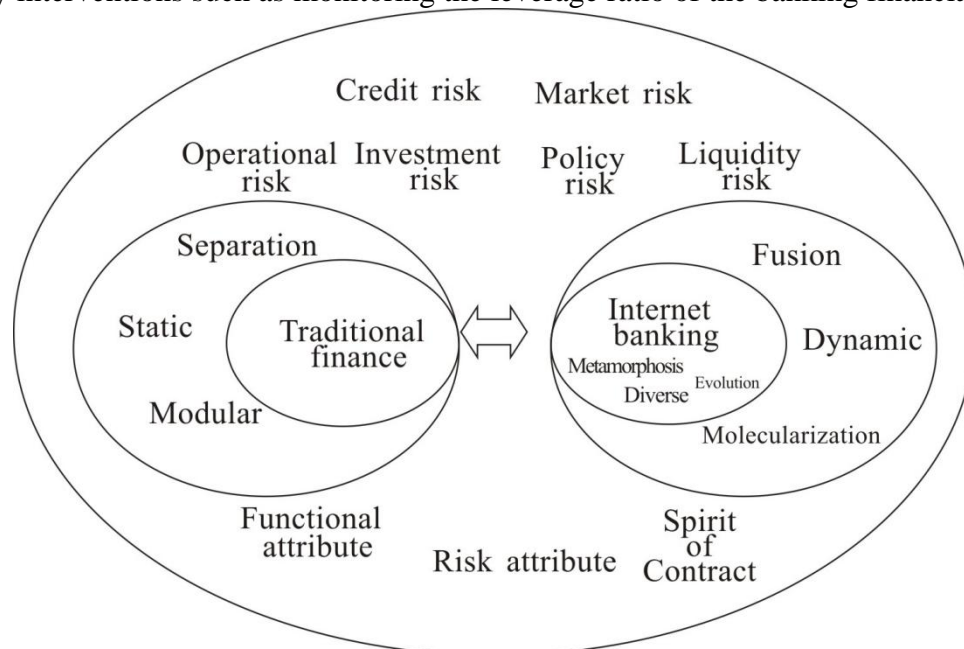


Figure 1 Schematic diagram of generalization of network financial risk

### (1) Construction of basic assumption models

The socio-economic subjects are households, enterprises and banks. A three-phase model is assumed, and the time is chosen to be 0, 1, and 2 respectively. The three-phase model can roughly characterize the behavior of the relevant economy.

The behavioral characteristics of each subject and the determination of the objective function:

#### 1) Family

We assume that the family has a wealth of  $W > 0$  at 0, and the family plans to maximize their wealth through savings or investment.

#### 2) Enterprise

Assuming that the production of the company is completed in two phases, the company needs to make a plan  $I_0$  at time 0. At 2 o'clock, the company can adjust the plan according to the situation.

The adjusted plan is  $I_2$ , but it needs to pay a certain adjustment cost:  $\frac{K}{2}(I_2 - I_0)^2$ , where  $K > 0$ . 1

unit of finished product requires input of  $c$  unit,  $c \in (0,1)$ . From this we can get the wealth function of the enterprise at 2 o'clock:

$$U_E = I_2(1-C) - \frac{K}{2}(I_2 - I_0)^2 \quad (1)$$

It is assumed that the company can abandon production without cost at 2 o'clock, which gives it absolute bargaining power when negotiating with the bank, thus making bank loans default.

### 3) Bank

First, the two channels of bank-to-family contact: First, the family obtains risk-free interest rates in bank savings at 0 o'clock, and assumes that savings will not increase the wealth of the family at 2 o'clock; second, the bank can sell its own loans to the family. combination. The promised return of the bank's loan portfolio at 2 o'clock is  $L$  ( $L > 0$ ). Due to the risk of default, the probability of repossessing the loan is assumed to be  $p \in (0,1)$ , and the return in other cases is 0. Since the family risk is neutral, the price that the family can accept for this loan portfolio is  $PL$ .

Secondly, suppose that the bank has an investment opportunity with probability  $q \in (0,1)$  at 1 o'clock, the investment satisfies: input  $x$ , the return is  $x+f(x)$ , where  $f(\cdot)$  satisfies the paddy field conditions.

Finally, regarding the information structure, we assume that at 1 o'clock, the bank knows the performance of its loan portfolio, and knows exactly whether it will get investment opportunities, and the family cannot know the information the bank has. Regulators can observe the trading behavior of households and banks at 0 and 1 times, ensuring that they can regulate the behavior of banks.

In summary, we can get the following behavioral characteristics of the bank: at 1st hour, due to information asymmetry, even if the bank that can recover the loan and has investment opportunities (hereinafter referred to as "good bank") sells the loan portfolio at 1 time, the family will also consider The loan may be sold by a bank that does not receive the loan (hereinafter referred to as "poor bank"). Therefore, there is a problem of adverse selection, which leads to a bank's loan not being properly evaluated, and the selling price is low, so the bank will try to choose Sell the loan at time 0. Assume that the ratio of bank sales loans to total loans at time 0 is  $\lambda \in [0,1]$ . At this point, the bank's objective function is:

$$U_B = PL + QF(\lambda PL) \quad (2)$$

As can be seen from equation (2), banks tend to choose  $\lambda=1$ . Here  $\lambda$  represents the risk-adjusted leverage ratio, and the leverage regulation supervises the supervision. The stricter the supervision, the smaller the value that  $\lambda$  can take.

Under the above assumptions, the wealth distribution of the family at 2 o'clock is as follows:

$$\begin{cases} W + (1+P)\lambda L, P \\ W - \lambda PL, 1-P \end{cases} \quad (3)$$

Assuming that there is no slow sales, the production of the enterprise cannot exceed the ability of the family to pay. The enterprise will choose  $I_2 = W - \lambda PL$  with the probability of  $P$ . Combined with the formula (1), the enterprise should choose  $I_0$  at the moment of 0 to maximize the expected wealth. This tells  $I_0 = EI_2 = W$ , and:

$$U_E = W(1-C) - \frac{K}{2}P(1-P)\lambda^2 L^2 \quad (4)$$

## (2) Total social welfare

Considering the total social welfare problem at time 0, since the expected wealth of the family is constant  $W$  for all  $\lambda$ , without prejudice, we do not consider the family in the total welfare function. The form of the total welfare function is as follows:

$$U_S = U_E + \beta U_B = W(1-C) - \frac{K}{2} P(1-P)\lambda^2 L^2 + \beta[PL + QF(\lambda PL)] \quad (5)$$

It is assumed that for every unit of wealth acquired by an enterprise, the total social welfare can be increased by one unit, but the increase in the wealth of the bank is not necessarily. On the one hand, banks may make money flow to the most needed or most suitable enterprises, and realize the function of financing and financing, so that  $\beta > 1$ ; on the other hand, banks may also flood funds, causing some enterprises to have excess funds due to capital Marginal diminishing effects and demand constraints, output efficiency cannot be maximized. However, some companies are unable to obtain funds, and it is also impossible to maximize output efficiency, so  $\beta < 1$  ( $\beta > 0$ ). In fact, beta is heavily influenced by regulators, and often regulator-directed policies can lead to differences in beta values, so we assume here that beta is an exogenous variable.

Considering the actual situation in China, at this stage, on the one hand, the government of China has stricter credit and financial control over banks. On the other hand, banks are reluctant to lend too much to SMEs, resulting in a large number of SMEs that need funds to obtain loans in a timely manner. In China's social economy, it is assumed that  $\beta < 1$  is more realistic; at the same time, China's economic aggregate is huge and it is in a state of rapid growth for a long time. In the case that domestic financial market construction is not perfect, economic development mainly depends on the expansion of credit, so it can be set Another exogenous variable  $L \gg 0$ .

Substituting equations (2) and (4) into equation (5), solving the first-order condition can be obtained:

At  $\beta qf'(PL) \geq K(1-P)L$ ,  $\lambda=1$  is optimal; in other cases, it satisfies:

$$\beta qf'(\lambda^* PL) = \lambda^* K(1-P)L \quad (6)$$

Among them,  $\lambda^*$  is optimal.

Combined with  $\beta < 1$  and  $L \gg 0$ , it is very unlikely that  $\lambda=1$  social welfare is optimal in China. From this, we conclude that in the absence of shadow banking, effective financial risk prevention can be achieved for traditional financial banks.

## 3. Reasonable response to financial supervision with the right to formulate financial rules

The theory and practice of financial supervision has always tried to resolve the contradiction between the rigidity of financial rules and the dynamics of financial markets. It is expected that financial rules will be flexible enough to accommodate the constant changes in financial markets. The methods proposed by the theoretical and practical circles include principle-based supervision, dynamic supervision, and adaptive supervision. The financial supervision proposed in this paper with the right to formulate financial rules emphasizes that under the circumstances that the information asymmetry caused by financial technology innovation is becoming more and more serious and there is no mitigation, on the basis of ensuring the basic stability of financial legal rules, the regulatory agencies are given the time to obtain The information enjoys greater autonomy in the development and implementation of financial regulatory rules, as well as giving the regulated body the autonomy to achieve compliance through the development of internal rules.

At the level of financial regulatory rules, for those business rules and technical regulatory rules that are closely related to financial market changes, financial regulatory agencies should enjoy

greater power to make rules and market development. For example, the identification of legal new financial services, the adoption of the approval or registration system for financial services, the determination of various regulatory ratios and their elements and parameters, etc., should be formulated by the regulatory body. For example, classification supervision has become a statutory regulatory principle, but which institutions, what kind of business, which risk parameters and regulatory ratios are applicable should be regulated by the regulatory body. In the context of financial technology, regulators should enjoy greater rulemaking power because market uncertainty forces rules to change over time, and financial regulatory rules do not require lengthy procedures like financial legal rules. Although the seriousness and authority of financial regulatory rules will be affected more or less, if they are reasonably dynamically adjusted due to market changes, they should also be able to gain market understanding and recognition from stakeholders. Regulators continue to improve the asymmetry of regulatory information through the regulatory practice of interaction with regulated institutions, so that financial business rules and their technical rules can be adapted to market development reasonably and effectively, and will not become an institutional barrier to financial technology innovation.

Combining these factors, the author believes that financial pilot supervision based on the right to formulate financial rules is an option. The use of experimental supervision of financial technology is that financial regulators exempt from the regulatory requirements for financial technology business within their terms of reference (in some cases, the legislature can also exempt statutory regulatory requirements), reducing existing financial rules, especially financial regulation. The unnecessary barriers to the setting of financial technology innovation business allow financial technology companies and financial institutions to try financial technology business in a risk-controlled environment. Financial pilot supervision with financial rulemaking rights has the following characteristics:

First, the financial pilot supervision of the right to formulate financial rules is a kind of trial-and-error supervision, and effective supervision is achieved through continuous trial and error.

Second, financial pilot regulation with financial rulemaking rights is exempt from certain financial rules.

Third, the purpose of financial pilot regulation with financial rulemaking rights is to test whether the financial innovation business that allows testing is in compliance with regulatory objectives.

Fourth, the financial pilot regulatory process with financial rulemaking rights is a participatory process of rulemaking and continuous revision of rules.

Gradually improve the rules by adding additional information, and establish a pilot process of financial technology supervision. For regulators, the process of learning new technologies, new knowledge, and new experiences from the industry and other participants in an open manner; Institutions are the process of understanding the original intention of the rules of the regulatory body and fostering the awareness of the "rule owner".

#### **4. Conclusion**

The new paradigm of financial supervision is based on the reality of financial risk generalization under the background of financial science and technology. It is proposed to change the concept, system and method of financial supervision from the top level of financial supervision. It has certain universality for both financial supervision in China and abroad. Sex. As an adaptive regulation, the new paradigm of financial supervision requires the rational allocation of financial rulemaking rights, and the expansion of financial regulatory institutions and the rules of the regulated institutions to solve the "pace problem" of financial rules and financial technology innovation. Since the regulators cannot make accurate cost-benefit analysis of the financial technology business

beforehand and cannot accurately determine the timing of regulatory intervention, in the context of financial technology, the financial regulatory paradigm leaves the regulatory technology, and there is no paradigm shift. Using innovative technologies such as big data mining and artificial intelligence, financial regulators can conduct real-time or quasi-real-time supervision of regulated institutions and their personnel, and explore new ways to solve the regulatory lag.

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