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Discussion on the Influence of Fin-tech on Financial Risk Management

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Abstract: *In recent years, Fin-tech has developed rapidly, has penetrated into various fields of the financial industry, and has created new and unique business models. However, with the rapid development of Fin-tech, it has also brought new risks and strengthened finance. The discussion of the impact of technology on financial risk management is of great significance to the prediction and identification of financial risks. The purpose of this article is to discuss the impact of Fin-tech on financial risk management. The article first analyzes the impact of Fin-tech on the performance of systemic financial risks, analyzes the ways in which Fin-tech affects systemic financial risks, and summarizes its impact. The relevant indicators of the empirical impact of Fin-tech on systemic financial risks are statistically described, including financial stress index, innovation index and correlation index, etc., and the impact of Fin-tech on systemic financial risk is analyzed through the CoVaR method. Experimental data shows that the risk spillover values of Fin-tech on the banking, securities and insurance industries are 22.11%, 12.40%, and 15.76%, indicating that Fin-tech has the greatest impact on the banking industry's risk.*

Keywords: *Financial Risk, Fin-tech Innovation, Risk Management, Risk Control*

1. Introduction

After the outbreak of the global financial crisis, countries gradually realized the tremendous power of the outbreak of systemic financial risks, and increasingly concerned about systemic financial risks [1-2]. In recent years, financial innovation has developed rapidly. On the one hand, it has reduced the cost of financial transactions. On the other hand, financial innovation has improved the efficiency of financial transactions [3-4]. However, with the rapid development of Fin-tech, it also brings potential risks [5]. In this context, research on the impact of the development and changes of Fin-tech on systemic financial risks is imminent.

In the research on Fin-tech and financial risk management, many scholars at home and abroad have come to relevant insights. For example, Fared FS believes that the information function of Fin-tech enables it to balance the contradiction between the sustainability of financial business and financial inclusion and public welfare. Can expand the coverage of financial services [5]; Arif FM believes that the familiarity of market mobile finance and the government's access policies for private enterprises and individuals affect the development of mobile finance [6]; Pakpahan EF proposes two aspects of systemic finance Risk prevention strategies, on the one hand, must establish a sound risk assessment framework, on the other hand, constantly improve the financial management system [7].

This article takes the impact of Fin-tech on financial risk management as the research object. Firstly, it analyzes the channels through which Fin-tech affects systemic financial risks in combination with related theories, and proposes that Fin-tech importantly affects the credit risk and liquidity risk of systemic financial risks, as well as the risk of competition in the same industry [8]. Through the GARCH-CoVaR model, the conditional risk value and risk spillover value of the Fin-tech industry index on the three traditional financial industry indexes of the banking, securities industry and insurance industry are measured, and the risk spillover of Fin-tech innovation on the traditional financial industry is measured with numerical values. Finally, in view of the risks faced by the financial industry and the existing risk management model, countermeasures are proposed to improve the technical level of risk management, strengthen the prediction and prevention of financial risks, strengthen the management of financial business risks, and establish and improve the Fin-tech regulatory system.

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2. Discussion on the Impact of Fin-tech on Financial Risk Management

2.1. Analysis of the Channels through Which Fin-tech Affects Financial Risks

(1) The impact of credit risk and liquidity risk

The impact on credit risk is manifested in that when strict credit screening is performed on customer groups, if the risk return level and credit level of the customer group are limited at the same time, the behavior of controlling credit risk will often limit the credit rating of borrowers who do not meet the standard. The source of funds also brings performance pressure to Fin-tech companies that focus on retail finance [9-10]. Similarly, because Fin-tech also has a certain enhancement effect in the "herding effect", when the market is unstable, it will easily lead to resonance, which will increase the practicality of risks and lead to increased volatility, and ultimately increase the level of systemic financial risk. This transmission path mainly originated from the improvement of service efficiency by Fin-tech. On the one hand, the behaviors of objects participating in transactions in the financial market gradually tend to be similar. On the other hand, the spread of risks accelerates with the increase in service efficiency, which ultimately leads to volatility in the financial market.

(2) Impact on horizontal competition risk

Fin-tech has narrowed the distance between financial institutions, technology companies and companies operating related market infrastructure. As an intermediary between these three types of companies, the financial industry has become more complicated [11]. Technology companies and other non-financial institutions entering the financial industry often have certain limitations in information technology risk management. This imperfection in risk management is also one of the reasons for the risk of cross-contagion between the three types of companies, and it may eventually, the level of systemic risk will rise.

2.2. Analysis of the Performance of Fin-Tech Affecting Systemic Financial Risks

(1) Strengthen the risk itself

1) From the perspective of risk appetite, the application of fin-tech in innovative products has significantly strengthened the high leverage of finance, making fin-tech or Internet finance that actually bear financial risks first face the thorny issue of capital adequacy. At the same time, the innovative nature of Fin-tech has greatly increased the probability of compliance risks and operational risks for financial institutions. The first launch of a product represents the first launch of the most advanced technology in the market, which may enable the sub-optimal product to gain the first-mover advantage in the competition and defeat other competing products, or even the best product.

However, this kind of "trial and error innovation", which is highly emphasized by Fin-tech companies, has caused some immature products to be introduced to the market, which is prone to serious operational risks and compliance issues during the period, leading to neglect of regulatory regulations, and companies even intentional violations of compliance treaties are supported by policies that encourage innovation. At the same time, because Fin-tech has the characteristics of reducing the value of financial institutions' franchise rights and increasing financial institutions' motives for risky operations, the risk appetite of the entire financial system has also increased, and risk "black swan" is more likely to occur.

2) From the perspective of risk accumulation, after the entry of Fin-tech into the financial system, part of the business has undergone complex structural arrangements and program coding, coupled with the strong professionalism of Internet information technology itself, which makes information technology risks further manifested at the same time. Accelerate the speed of risk accumulation, and it is extremely easy to form systemic financial risks. As financial institutions use more new technologies and outsource part of their financial services to relevant technology companies, many technology companies that do not have the corresponding qualifications and have insufficient capital to resist potential risks also enter the financial industry through this channel, thereby increasing the level of information technology risks. As it rises, the difficulty of measurement and evaluation has also increased.

(2) Accelerating and complicating the spread of risks

1) From the perspective of the speed of risk transmission, with the advancement of Internet technology, the number of Internet users continues to increase, and the popularity of online platforms is

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gradually expanding. The penetration and diffusion of new financial products and their risks to the general public has also been greatly accelerated, this makes it easier for investor groups at the end of the "long tail" who are pursuing high yields but lack financial knowledge, risk awareness, and tolerance, to be more prone to individual irrationality and herd behavior. Once risks appear, there are many involved, large impacts, and lack of sufficient capital. Rate supervision, Fin-tech is more likely to produce outstanding solvency problems, resulting in a greater risk of default. Some technology companies that have an important impact on financial stability are also not included in the existing regulatory system, further increasing the speed, concealment, and influence of risk.

2) From the perspective of risk spreading, the rising correlation between financial institutions and technological innovation companies has led to further blurring of industrial boundaries. On the one hand, this integration is conducive to the spread of financial innovation results on a global scale, and on the other hand, the role of the "risk firewall" between the financial industry and the technology industry has been reduced or even disappeared, making risk spread no longer confined to a certain industry.

2.3. Harm of Financial Technology to Financial Risks and Their Causes

(1) Harm

First of all, all economic entities involved in financial transactions suffer severe economic losses. Economic loss is the most intuitive hazard caused by third-party payment financial risks. Once such risk events occur, such as being attacked by hackers or viruses, clicking on false links to jump to phishing websites, etc., for users who make third-party payments, the account and password are stolen, and the amount in the bank card is maliciously Consumption, oneself will suffer serious economic losses. Buyers and sellers who secure transactions through third-party payment platforms can also cause disputes. Third-party payment platforms will also suffer economic losses due to corresponding legal liabilities. It can be seen that Internet finance is closely related to various economic entities. After the occurrence of Internet Fin-tech risks, all economic entities will suffer economic losses, and no one party can easily avoid it.

Secondly, it increases the cost of trading activities. Due to the risks in the Internet financial payment field, in order to maintain the security of users' information, third-party payment institutions need to store this information and update the system at any time to deal with external virus intrusions. In the past two years, due to the frequent occurrence of risk events on the third-party payment platform, which caused a lot of dissatisfaction among the public for a while, Alipay purchased capital insurance for users to increase the security of user accounts. This is the first time a third-party payment institution has introduced insurance mechanisms into the Internet finance field. Although it has received a lot of praise, it has virtually increased the cost of transaction activities.

(2) Cause the restriction of the nature of technology

The formation of Fin-tech risks under the Internet has its roots. First of all, it is inseparable from the constraints of the attributes of technology itself. First, science and technology have two sides. No matter what kind of science and technology it is, there are both positive and negative influences. Science and technology are uncertain. This uncertainty often triggers Fin-tech risks. Under different conditions, science and technology play different roles in human society. It may benefit people and may also bring huge risks to people. Under certain conditions, what science and technology brings is welfare. It is still a risk, and it is always difficult for people to predict accurately. For example, for Internet financial companies, big data technology has played an important role in mining high-quality financial customers, but on the other hand, it also prevents customers' privacy from being effectively protected and faces the risk of leakage.

(2) Limitations of human understanding

In the past, the development of science and technology was relatively slow, so people can still predict risks, but in the Internet age, this is not the case. The application of information network technology has created an extremely realistic virtual world for us. Science and technology are more integrated with society. Many of our daily activities have actually involved the application of science and technology, such as using the Internet to collect information and purchasing goods on e-commerce platforms. It can be said that science and technology have deeply penetrated into each of us nowadays, and it has long been integrated with our lives. Under this circumstance, people's sensitivity to Fin-tech risks will be greatly reduced, and they will not be vigilant about Fin-tech risks, making it difficult to detect Fin-tech risks.

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2.4. Improve Financial Risk Management Countermeasures under Fin-tech

(1) Build a comprehensive data security protection system

Using scientific and technological tools to manage financial risks can reduce and diversify the potential information technology risks of financial companies [12]. When managing technical risks, on the one hand, the network platform is set up to monitor network security barriers, on the other hand, the most advanced encryption technology must be used to prevent hackers from stealing passwords. Detect vulnerabilities, update and repair the software in time to prevent criminals from getting stuck.

First, strengthen technical support. The principles of technology are all interconnected and common, and strong technical support is a prerequisite for commercial banks to ensure information security; secondly, strengthen system management, clearly implement emergency plans, strengthen system management of risk management personnel, and prevent operational risks. Optimizing its own management system and system processes, and using static braking; finally, using Fin-tech to deal with new data security issues. The high degree of interconnection between data and information in Fin-tech means is the inducing factor of data security problems, but it is also the way to solve the problem. Use Fin-tech to actively research information security guarantee models, comprehensively use various methods to strengthen the blockchain, the use of cloud computing to build a comprehensive and integrated data security protection system.

(2) Strengthening forecasting and preventing financial risks

1) When making internal forecasts, pay attention to the structure of financial internal control, business models and capital flows, investigate whether the interests of the company related to it harm the social and economic well-being, identify areas that may pose risks and take preventive measures. In external prevention, attention needs to be paid to the impact of Internet technologies, such as big data, blockchain and other technologies in the financial industry. It is necessary to think from a holistic perspective and explore the impact of Fin-tech as a product of financial innovation on the traditional financial industry and other industries. Through micro and macroeconomic risk assessment, early prediction and risk prevention are carried out, and risks brought by Fin-tech are dynamically identified and prevented.

2) Establish a horizontal joint mechanism for financial risk prevention led by local governments

Taking into account the current situation of decentralized functions in financial supervision, it will increase the problem of part of the multi-management, which will not only cause the problem of repeated inspections, increase the cost of law enforcement, but also lead to the phenomenon of mutual excuses. Therefore, it is necessary to build a horizontal joint mechanism for financial risk prevention led by local governments. The Financial Affairs Office will lead by the People's Bank of China, the China Banking Regulatory Bureau and other relevant departments to form a financial risk response and disposal team, and establish a joint financial supervision mechanism to supervise local financial institutions. Reasonable allocation of resources, horizontal integration of the supervisory forces of the China Banking Regulatory Commission and the China Securities Regulatory Commission, strengthening of information transmission and exchanges and collaboration among relevant supervisory authorities, and establishing a decision-making body for joint research and joint management of local financial risks.

(3) Strengthen financial business risk management

The large amount of funds raised through the long tail effect can be invested in mutual funds with low risk and high returns. However, even money market funds must follow the principle of diversified investment in the investment process, optimize their own capital allocation and ensure their safety. At the same time, it is necessary to establish a reasonable reserve ratio to solve the liquidity shortage caused by current or key interest rate changes.

(4) Improve the risk monitoring and early warning model

Early warning is the key to comprehensive risk prevention. When business transformation precedes risk management transformation, the financial industry needs to pay more attention to the importance of risk early warning. The early risk warning mechanism can make the financial sector more predictable and futuristic when measuring credit risk.

The social activities of individual or corporate loan clients are often diverse, and corporate clients are even worse. Corporate activities generally include comprehensive activities in various aspects such

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as economy, technology, management, organization, etc., and there are many uncertainties, which often affect the whole body. A single point of fluctuation may cause the overall operation or financial situation. Post-lending risk management is an important part of credit risk management in the financial industry. Therefore, in order to improve the timeliness and forward-looking of risk monitoring and early warning, the financial industry should focus on improving the post-lending dynamic risk monitoring and early warning model to provide effective support for post-lending risk management Sex tools.

Using dynamic risk monitoring and early warning models, the financial industry can collect relevant data in real time and monitor the trend of risk factors. Set relevant index standard values, calculate the degree of deviation of the risk status through real-time changes in data. Once the result data of serious deviation occurs, the system will capture relevant signals in time and report early warning signals to further integrate individual or corporate customers. Circumstances such as abnormal matters such as operation and finance, public opinion risks, over-financing and other prompts to investigate and verify, so that post-loan managers can find key points in the complicated work, reduce the workload and rationally use their energy on risk items that require further investigation and verification, prepare risk mitigation plans in advance, improve risk mitigation capabilities, and incorporate the timeliness and convenience of technology into the post-loan risk management work, which will help establish a more efficient financial system in the future and effectively improve the credit risk management capabilities of the financial industry. Establish risk monitoring and early warning models, which play a pivotal role in improving supervision efficiency, efficient analysis, and early warning of financial market risks.

(5) Establish and improve the Fin-tech supervision system

1) Enriching financial regulatory measures and means

Regarding the specific regulatory measures of the government, diversified means can be used to make full use of the responsibilities of the regulatory agencies to cooperate. Able to coordinate the use of administrative supervision, market investigation, information collection, and synchronization of on-site and off-site inspections to realize the complete and legal development of evidence collection. Realize the coverage of Fin-tech applied to regulatory agencies, promote the development and exploration of project products such as robo-advisory, smart risk control, and smart quantitative trading, formulate business rules and promote the implementation of supervision in the field of cooperative outsourcing and data governance, with the help of big data In order to improve the regulatory perspective and risk prevention and control. According to the specific status quo in the financial field, a privacy protection system was quickly established to promote the standardization of data applications in financial institutions. It can analyze the artificial intelligence model parameter information of the practitioners and the logic system of financial business, report to the supervisory authority, and promote the strengthening of the trace management policy.

2) Establish a long-term mechanism for talent introduction and exchange

In order to maximize the role of financial supervision, it is necessary to increase the participation of financial talents. For the field of talent training, the most important way is to cultivate the echelon of financial institutions and build a financial talent pool. At present, most of the recruits of financial supervision departments are graduates who have no experience in financial institutions. It is not easy to find business details and problems when they are engaged in supervision work. They can explore the establishment of business backbones of supervisory institutions to take off posts and rotate jobs in various financial institutions. Exchange mechanism to improve its business quality and management level. Secondly, the staff engaged in the financial supervision and management department must increase the professional quality of financial law, have a deep knowledge and understanding of financial laws and regulations, and be able to supervise the department’s financial activities in accordance with laws and regulations, and achieve strict law enforcement and strict enforcement.

(6) Strengthen the construction of local financial ecology

1) Increase consumer protection

Further improve the legal system for consumer rights protection, accelerate the integration of administrative law enforcement systems, clarify consumer rights financial supervision and labor mechanisms, create multi-dimensional consumer rights protection channels, and gradually build telephone networks, applications, and mini programs. "Matrix rights protection" can increase the convenience of consumer rights protection. Strengthen the training, supervision and assessment of

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marketing personnel of financial institutions, carry out the rectification of illegal acts such as commercial bribery, false propaganda, and consumer fraud, and prevent and control risks in key financial sectors.

2) Promote the construction of local credit system

Construct a multi-departmental joint consultation system, combine the characteristics of data and the actual needs of each department, create a social credit system construction framework that meets the characteristics of most departments, and lay a solid foundation for each department to participate in the construction of the system. Carry out joint financing and credit information sharing services, based on protecting the rights and interests of information subjects, eliminating barriers to information transmission and communication between departments, and quickly realizing the effectiveness of information exchange and credit information system construction.

3) Build a supervisory data information sharing platform

The cross-sharing of regulatory information can identify potential hazards in a timely and effective manner. Therefore, it is necessary to break information barriers, build a financial regulatory information platform, and carry out pilot work on information sharing from local government departments. The government can establish a financial regulatory information and financial operation data sharing mechanism with the People's Bank of China and the China Banking and Insurance Regulatory Bureau, strengthen communication and contact, obtain the latest and most comprehensive regulatory information, complement and improve each other, form a synergistic regulatory effect, and improve local The effect of financial supervision.

2.5. Risk Management Algorithm Based on Clustering Algorithm

This study uses the KNNCF clustering analysis algorithm to perform clustering analysis on violations. At the same time, two measurement methods are used to evaluate the clustering results: information entropy and purity. The lower the information entropy and the higher the purity, the better the clustering effect. Ideally, information $Entropy$=0.0, and purity=1.0,

The information entropy calculation model is shown in formula (1):

$$Entropy=\sum_{i=1}^{k}\frac{n_i}{N}(-\frac{1}{\log l}\sum_{j=1}^{l}\frac{n_i^j}{n_i}\log\frac{n_i^j}{n_i} \tag{1}$$

The formula (2) of the purity calculation model is as follows:

$$Purity=\sum_{i=1}^{k}\frac{1}{N}\,j\max(n_i^j) \tag{2}$$

3. Experimental Research on the Impact of Fin-tech on Financial Risk Management

3.1. Research Methods

(1) Measurement methods and research objects of systemic financial risk measurement indicators

According to the characteristics of our country's systemic financial risk formation, this research starts with the three markets of banking, insurance, and securities to construct a financial stress index.

(2) Measurement method and research object of innovation degree

Based on the characteristics of decentralization of Fin-tech and the promotion of disinter-mediation, direct financing methods can better measure the degree of financing innovation of Fin-tech. At the same time, considering the availability of data, this article selects the number of listed companies as an alternative indicator of financing innovation.

(3) Measurement method and research object of relevance

Relevance refers to the increase in the degree of correlation between the financial industry and related high-tech industries caused by the development of Fin-tech. It includes both the increase in micro-personal associations such as the increase in the application of advanced technology in daily

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activities of financial companies, and the increase in the overall income of high-tech companies the macro linkages in the industry have increased. This paper selects the ratio of high-tech enterprise income to GDP as the overall correlation index; since the development of e-commerce is one of the important ways for financial enterprises to run business and trade at present, the ratio of the total number of enterprises with e-commerce activities is selected as the individual correlation index.

3.2. Research Objects

This paper selects the rate of non-performing loans and the growth rate of short-term loans in order to measure the financial pressure brought by banks from two aspects of credit risk and liquidity risk. At the same time, it uses the ratio of fiscal deficit to GDP to examine the potential of government credit to bank credit.

This paper measures the financial product innovation and financing method innovation, overall and individual correlation indicators in 28 sample provinces in my country from 2017 to 2020.

4. Data Analysis on the Impact of Fin-tech on Financial Risk Management

4.1. Analysis of the Innovation and Systemic Financial Risk Level of Fin-tech

After using the GARCH model to estimate the mean and standard deviation of the one-step forward prediction, the t-quantile under the 95% confidence level is obtained, and the VaR sequence of each indicator is calculated by calculation, and the VaR value is obtained by taking the median. The specific results are as follows are shown in Table 1.

Table 1: VaR value calculation results

Index	Predicted mean	Forecast standard deviation	Var value(q=5%)
Fin-tech	0.3829	10.9941	-5.7921
Banking	0.3130	2.8590	-3.2744
Securities industry	0.2661	6.0521	-5.4126
Insurance	0.3941	6.2141	-4.3579

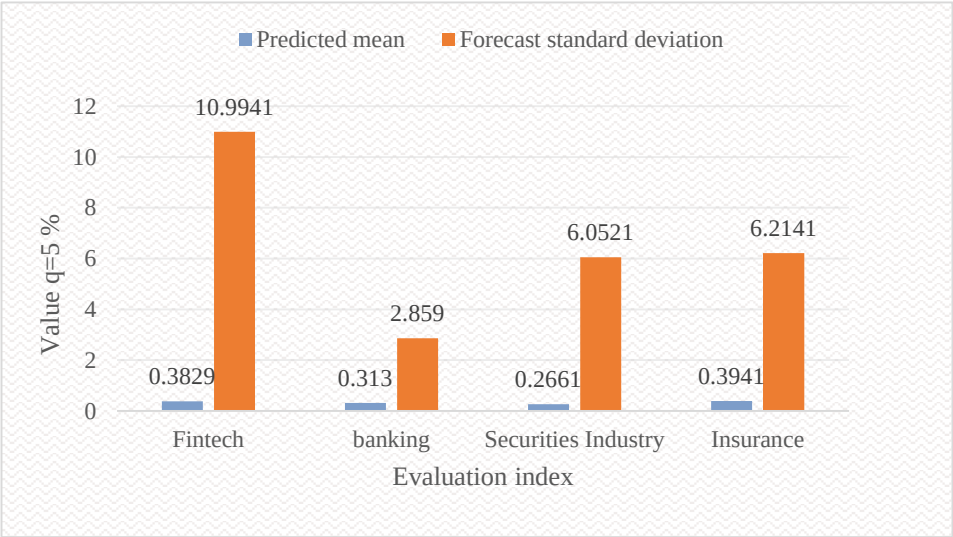

Figure 1: Comparison of VaR values in various industries

It can be seen from Figure 1 that as an emerging industry field, Fin-tech has a relatively high level of risk value. Investors have a high risk of stock investment in the Fin-tech industry, but at the same time, the average predicted value is also significantly higher than the traditional financial industry. This also shows that in financial investment, high returns are always accompanied by high risks, especially in emerging fields, which have obvious characteristics of high risk and return compared to traditional fields. As a sub-industry with the largest asset level in the financial industry, the banking industry has strong resistance to risks. From the perspective of stock price movements, the banking industry also has the smallest volatility. Therefore, the value at risk of the banking industry is at the lowest level.

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4.2. Impact of Fin-tech on the Risk Spillover Value of the Traditional Financial Industry

A negative spillover value at risk indicates a positive spillover effect. On the contrary, a positive spillover value at risk indicates a negative risk spillover effect. Through calculation, the results of the Co VaR value of each industry are shown in Table 2:

Table 2: The risk spillover value of Fin-tech to the traditional financial industry

	Co var value	△ covar value	% covar value
Banking	-4.0184	-0.7280	22.11%
Securities industry	-6.1024	-0.6749	12.40%
Insurance	-5.0347	-0.7321	15.76%

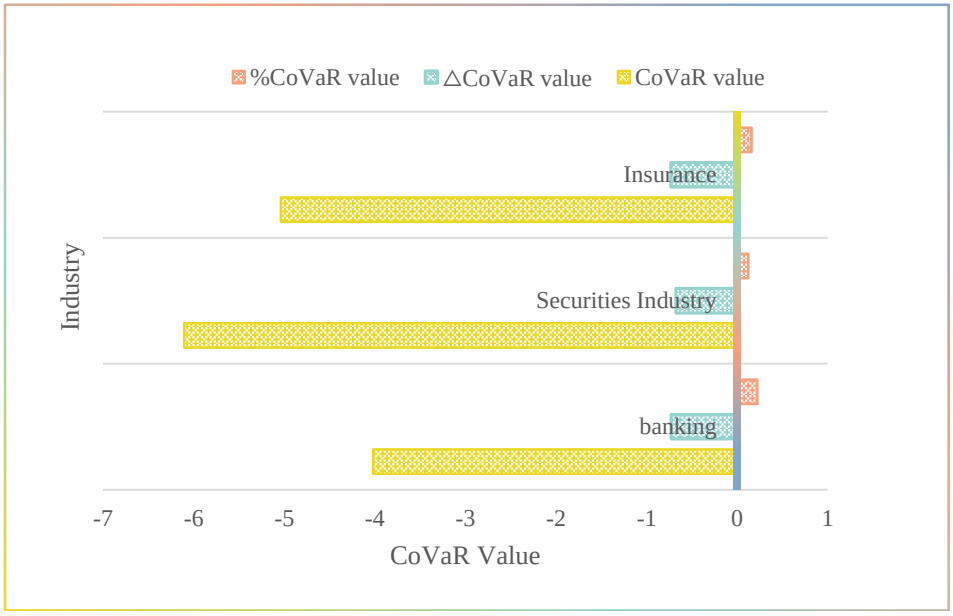

Figure 2: The risk spillover value of Fin-tech to the traditional financial industry

Looking at Figure 2, we can see that when the Fin-tech industry suffers extreme losses, the conditional value at risk of the traditional financial industry is all negative, which means that the Fin-tech industry has a positive risk to the banking, securities, and insurance industries. Spillover effects, that is, Fin-tech, have increased the risk-taking of the banking, securities and insurance industries. The risk spillover value of Fin-tech to various industries in descending order is the banking, insurance and securities industries. This shows that while Fin-tech innovation improves the operating efficiency of the traditional financial industry, it also increases the possibility of risk transmission.

5. Conclusion

The rapid development of Fin-tech has affected investors' investment rationality, making the boundary between finance and non-financial even more unclear, and speeding up and complicating the spread of financial risks. Analyzing the possible risks of Fin-tech companies and improving the level of risk prediction and control of Fin-tech companies has important theoretical and practical significance. This paper analyzes the impact of Fin-tech on systemic financial risks, and selects representative indicators that effectively measure systemic financial risks as a research sample to conduct empirical research, in order to provide useful suggestions for the development of Fin-tech in various countries and the prevention of systemic financial risks. The innovation of Fin-tech is positively correlated with the level of systemic financial risk, and this effect is mainly achieved through financial product innovation. The impact of Fin-tech on the level of risk through innovation in financing methods is not obvious. Fin-tech has a positive risk spillover effect on the traditional financial industry, and the risk spillover value on the banking industry is the largest. That is to say, when Fin-tech companies face extreme risks, they have the strongest risk transmission to the banking industry.

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