

Research on Rural Financial Risk Early Warning Based on BP Neural Network

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Abstract: In recent years, China's rural financial system reform has made some achievements, and has also played a positive role in promoting the healthy development of the entire national economy. However, the current rural financial risk is still relatively prominent, which restricts the development of rural construction. This paper expounds the basic connotation of BP neural network. Then, the characteristics of rural financial risk based on BP neural network are analyzed. Finally, the paper puts forward some suggestions to improve rural financial risks, in order to provide reference for the reform of China's rural financial system.

1. Research Background

1.1 Literature review

Jin Yaobin pointed out that China's existing legal system, the legal system of rural finance is not yet perfect. Therefore, it does not play a normative role in rural finance. Rural financial supervision is closely related to the development of agriculture, countryside and farmers (Jin, 2012). Yang Daguang and other scholars believe that rural financial development has been in a slow state for a long time due to the imperfection of risk sharing and compensation mechanism. They believe that through the establishment of a sound rural credit guarantee system, the rural financial market will be developed. By increasing government support, and further enhancing the development of agricultural insurance, we can fully play the role of loan interest rate risk compensation (Yang and Chen, 2010). Bai Jishan and others pointed out in the study that the size of rural financial risk is closely related to the quality of rural financial ecological environment. To monitor the indicators of rural financial ecological environment, and then to play a good early warning role in rural financial risks (Bai and Wen, 2011). Sun Gang and others believe that with the rapid development of China's rural economy, the demand for rural informal finance is also increasing. There are also many implicit and explicit problems and risks in the development of rural informal finance. These problems have also led to the slow development of rural economy, which has seriously restricted the healthy operation of rural economy. Correctly dealing with the risks of rural informal finance and doing a good job of prevention are the key issues in the current process of rural financial development. Facing the rural informal financial risks, we should seek benefits and avoid disadvantages, and play a service role in the rural economic development of underdeveloped areas (Sun et al, 2017). Dong Wenjie found that under the background of the global financial crisis, China's rural financial risk problem is becoming increasingly obvious. To some extent, the problem of rural financial risk has become an obstacle to the current rural economic development, and even has a great negative impact on the healthy and sustainable development of the entire national economy. China is a typical dual economic market. For developing China, establishing and improving the rural financial risk prevention system has a great positive role (Dong and Yan, 2010).

1.2 Purpose of research

Rural finance is the core of modern rural economic development. The construction of new socialist countryside and the development of modern agriculture are inseparable from the support of

rural finance. In the process of healthy development of national economy, rural finance and rural economic development play an important role (Xu, 2011). However, because of the large financial risks in China's rural areas, the representative of FAO also pointed out that China's rural finance is in a crisis in the "international financial forum". If we can not take corresponding measures to China's rural finance, it will reduce the support of China's rural economic development, and even threaten social security and stability (Yu et al., 2010). Therefore, China should analyze the rural financial problems from the perspective of risk early warning. By understanding the basic connotation of BP neural network, we can solve the rural financial problems under the background of BP neural network, and provide guarantee for the healthy and stable development of rural finance.

2. Basic Connotation of BP Neural Network

BP neural network is a multi-layer feedforward neural network trained by error back propagation algorithm, which was proposed as early as 1986. The most typical artificial neural network is BP neural network. After several years of development, BP neural network is also a widely used application network (Ding et al., 2016).

BP neural network has the same characteristics as artificial neural network. First, BP network is composed of many neurons, which can approach almost any complex non-linear relationship. Secondly, BP neural network is a continuous way of learning, which can realize the learning of uncertain systems through simple learning methods. Thirdly, BP neural network uses the method of distributed information processing, and then realizes the operation of massive data. As a result, the speed of computation has been greatly increased. Fourthly, BP neural network has fault-tolerant characteristics. Based on BP neural network, a small amount of error will not have a significant impact on the prediction results. At the same time, some of the neurons receive external damage, which will not affect the whole, but also achieve self-correction error. Fifth, BP neural network has the functions of self-learning, self-adaptation and self-organization. Through self-adaptive and self-organizing ability, we can constantly learn and improve our functions in the use process. BP neural network can even expand and develop knowledge by innovative ability, which can exceed the original designer's knowledge level.

In addition, because of its special structure, BP neural network has unique functions that general artificial neural network does not have. Firstly, it has strong non-linear mapping ability, which is the biggest characteristic of BP neural network. Because the neurons of BP neural network can realize any non-linear mapping between input and output by using Sigmoid differentiable function, and its arbitrary accuracy can approximate a non-linear function. Secondly, associative memory function is also one of the remarkable features of BP neural network. It can use the previously stored information and related learning mechanism to realize the training of self-adaptive ability, so it can guarantee the integrity of the original data. Finally, the strong recognition and classification ability is also one of the unique characteristics of BP neural network. BP neural network has great advantages and vitality in function approximation, pattern recognition, classification and data compression.

3. Characteristics of Rural Financial Risk Based on BP Neural Network

Under the background of global environment, capital is affected by many uncertain factors in the process of operation, which leads to the loss of value or income, which is called financial risk. At present, the main financial institutions providing financial services in rural areas are postal savings bank, Agricultural Bank and rural credit cooperatives. To a certain extent, these financial institutions have many problems, such as non-performing loans, high loan concentration, moral hazard and capital outflow. Generally speaking, the formal financial supply in rural areas is seriously inadequate, the structural contradictions are obvious, the financial ecology is relatively weak, and the guarantee risk is relatively large. There are also many uses of Internet financial gimmicks to handle insurance and deposit business, resulting in illegal fund-raising problems.

BP neural network is widely used in various fields, and has achieved good results. Especially in rural financial risk prevention. Firstly, from the point of view of the noise between the early warning indicators and the early warning results and the alarm means adopted, it is an optimal process. Secondly, from the perspective of pattern recognition, rural financial risk early warning is a process of recognition and classification. Thirdly, from the mapping relationship between early warning indicators and early warning results, it is a function approximation process. BP neural network is good at optimization, pattern recognition and function approximation. However, rural financial risk early warning has its shortcomings in these aspects. Because of the late start of relevant research on rural financial risk early warning, there are still some problems in the disclosure of risk information which are not standardized and sound enough. BP neural network has the ability of self-learning, self-adaptation and self-organization, which can make the system more flexible. In financial risk assessment, BP nerve can make financial risk change with the change of environment through associative memory function.

4. Suggestions on Improving Rural Financial Risks

4.1 Perfecting the protection mechanism of rural property rights

For farmers, the most important property is the land contractual management right and the right to use homestead. These two powers are also the guarantee for rural financial institutions to carry out related work smoothly. Therefore, in order to improve the rural financial risk, we must start with the establishment of a sound rural property rights protection mechanism. First of all, we should consider the land rights of farmers. We should further clarify and distribute the ownership relationship among land ownership, contractual rights and management rights. Then on this basis, the evaluation mechanism of rural land management right is constantly improved. In order to achieve the purpose of increasing the value of land protection, it is necessary to effectively evaluate the land management rights and the attachments on the land. Finally, through the construction of a fair, fair and open platform for the transfer of land management rights in accordance with the law, we can provide a strong guarantee for its mortgage and other related businesses. On this basis, we will formulate the financing system and corresponding policies for real estate or rural land. In this way, we can realize the incremental expansion of “dual-right” mortgage loan, and provide guarantee for the healthy and sustainable development of rural financial business.

4.2 Strengthen the rural insurance business

In order to effectively disperse rural financial risks and ensure the smooth development of rural insurance undertakings. First, we need to set up an insurance development fund. On the basis of previous financial subsidies, farmers'subsidies and excess subsidies should be increased. Secondly, commercial insurance companies should be encouraged to enrich the relevant business content of agricultural insurance, or the state should establish professional agricultural insurance companies. At the same time, aiming at the main risk problems facing the countryside, we should formulate relevant insurance products to meet the needs of the countryside, and then establish a multi-subject and multi-level rural insurance business network. Thirdly, we should pay more attention to the improvement of the reinsurance market system. The State formulates preferential tax policies, encourages commercial insurance companies to support agricultural reinsurance business, and enhances risk compensation capacity. Finally, we should combine the actual risks faced by rural financial institutions, implement scientific and reasonable risk differential rates, and give full play to the incentive role of deposit insurance system. Furthermore, it can reduce the operational risk and optimize the capital assets at the same time. Through the internal control of financial institutions, reduce rural financial risks.

4.3 Deepening the reform of rural financial supply side

By optimizing and promoting the pace of rural financial supply-side reform and development, we can effectively disperse and resolve rural institutional financial risks. In order to meet the

diversified needs of farmers for financial products, the structure of rural financial products is constantly optimized. To increase supply, we must first analyze the development of rural real economy and demand, and then promote the development of entrepreneurship finance and inclusive finance. On the basis of investment-credit linkage, we should improve the financial service model in order to achieve differentiated and refined risk pricing. Perfect financial institutions such as banks, trusts and insurance, and build a good cooperation mechanism so as to achieve the goal of sharing financial risks. Secondly, through the improvement of green credit mechanism, green finance can be realized. Risk environment and risk cost of rural finance are important factors affecting the development of green finance. Give full play to the role of green credit mechanism, solve rural surplus capacity, increase financial support in the field of green, energy saving and environmental protection energy. Finally, based on Internet finance, with the help of big data and other science and technology to improve the management of rural financial business and related services. By improving the efficiency of resource allocation on the supply side of rural finance, we can improve the ability to identify rural financial risks.

4.4 Strengthen rural financial supervision

The imperfection of rural financial supervision system has led to many problems of inadequate rural financial supervision. Therefore, it also affects the stable development of new socialist countryside construction. Under the new situation, the rural financial supervision system also faces many challenges. At present, China's rural financial supervision must strengthen the monitoring of rural financial institutions, reduce the problem of non-performing loans, and timely risk warning. Because rural finance has the characteristics of high risk, it should be strictly supervised by law. Relevant institutions collect and digest non-performing loans through monitoring data. At the same time, through improving the rural financial supervision system, promulgating relevant documents, standardized management of lending behavior. Joint public security, banking supervision and other departments to carry out relevant regulatory work, thereby reducing illegal fund-raising activities. By reducing the outflow of rural funds, we can reduce the risk rate of rural financial term mismatch.

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