Application of QGA-BP Neural Network in Debt Risk Assessment of Government Platforms

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ABSTRACT

How to correctly understand the existence of local government debt, study its risk classification and impact, give full play to the "dual nature" of debt with a full-caliber indicator system, and avoid debt risks to the greatest extent. That is the research direction of this article. In order to improve the accuracy and efficiency of risk assessment and effectively reduce the debt risk of government platform companies, a risk assessment method based on optimized back-propagation (BP) neural network is proposed. First, the method uses quantum genetic algorithm (quantum genetic algorithm, QGA) to adjust and determine the initial weight and threshold of BP neural network and realize the optimization of BP neural network model parameter setting. Then, the QGA-BP debt risk assessment of government platforms is verified that it performs well in the debt risk prediction of government platform companies, and its prediction accuracy and prediction speed are improved.

KEYWORDS

Government Platform Debt, QGA-BP Neural Network, Risk Assessment

INTRODUCTION

Local government debt risk has always been a topic of great concern in China's economic development (Menguy, 2023). In response to such concern, this paper explores targeted measures for effectively controlling local government debt risks and ensuring the sustainable development of the Chinese economy. According to Misra et al. (2023), it is necessary to establish a warning mechanism for local government debt risk in advance. This mechanism can help us better predict the *borrowing repayment risk* of future debts and take corresponding response measures to reduce potential risks. However, in practical operations, predicting debt risk involves complex influencing factors, among which the key influencing factors in the borrowing process are crucial. To address this issue, this article introduces the QGA optimized BP network, a new method applied to government platform debt risk assessment.

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This article verifies the effectiveness of the model through experimental data, and the results show that compared with traditional GA-BP models, the QGA-BP model not only solves the problem of iterative redundancy, but also avoids arbitrary trap problems, significantly improving the accuracy of government platform debt risk assessment. This discovery provides powerful tools and methods for the government in debt management and risk control.

LITERATURE REVIEW

Around 2010, against the backdrop of the complicated international financial environment, China was forced to implement an economic stimulus plan to maintain domestic and international economic and financial stability (Wijayanti et al., 2023). Local governments rely on corporate local financing platforms to expand debt to cope with the impact of economic downturn risks, avoiding the requirement that local governments do not have debt issuance. Under this circumstance, the growth of local debt is accelerating, which is not only concerning to financial regulators and other relevant units, but also gradually gaining interest from academic circles. Based on the gradual development of the subnational debt problem and ongoing research on it, calls for further reforms have grown (Wang, 2023).

A landmark milestone in reforming the problem was the new budget law, which came into effect in 2015 and loosened previous rules that local governments could not carry out debt and bond issuance. This has brought new changes to the structure of Chinese government bonds. That is, debt securitization, in which local governments in China obtain the right to issue bonds and use the bond market to issue local government bonds for financing. In addition, the original debts of local governments have also been gradually cleaned up. For example, debts in the form of bank loans in the past have been replaced with local government bonds. Through systematic local debt clean-up, local debt has shifted from a gray recessive state to an explicit one, which is conducive to the government's comprehensive control and management of debt problems (Honnesh, 2023).

Since the debts of China's central government and local governments have been unified in the form of bonds, the risk assessment that only focused on the central government's debt in the past is no longer suitable for the current new government debt structure (Gubareva & Umar, 2023). Academic research has responded to the new phenomenon of government debt securitization. For example, government debt securitization is gradually included in the research field of government debt risk, which has also maintained such attention in recent studies. When the debt is gradually replaced by bonds, some studies directly use local government bonds as the research subject to analyze government debt risks, but the overall research paradigm is still affected by the traditional research path and does not have any impact on the financial attributes of government bonds and the corresponding risks are examined (Gao & Wan, 2023). However, some studies believe that government bonds, as liquid assets, will have an impact on government debt credit and default behavior (Buthelezi & Nyatanga, 2023).

Recent studies on government debt risk have also incorporated the financial attributes and risks of government bonds into the research framework (Misra, 2023). However, many of these studies focused more on examining debt risk from the perspective of finance than on incorporating the risk of government bonds into the research perspective (Bremer & Bürgisser, 2023). Studies focusing on government bonds as the main body of research often lack financial and other non-financial risk factors. This is related to the research difficulties caused by the insufficient accumulation of data related to local government bonds. However, as the current issuance of local government bonds continues to grow, together with other types of bonds, China's bond market has been pushed to the scale of one trillion yuan (Johnson & Yushkov, 2023). Under the circumstance that the scale of government bonds continues to increase and the operation of government bonds has accumulated relatively sufficient data, now is the right time to systematically investigate the new phenomenon of government debt securitization and, based on the current research theories, incorporate it into the analytical framework of government debt risk research (Kasal, 2023).

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