Research on the Digital and Intelligent Transformation of Agricultural Guarantee Based on Fiscal Policy

Peiming Zheng

Guangxi Agricultural Credit Financing Guarantee Co., Ltd., Nanning, Guangxi, China

Abstract: Against the dual backdrop of the in-depth implementation of the rural revitalization strategy and the continuous advancement of fiscal policies supporting agriculture, the state has put forward higher requirements for the "precise supervision" and "maximization of benefits" in the use of fiscal funds. As a key link connecting fiscal funds with agricultural business entities, promoting the digital and intelligent (digital-intelligence) development of agricultural credit guarantees helps build a full-process fiscal fund supervision platform, break down data barriers among government, banks, and guarantee institutions, meet the requirements of "safety–efficiency–precision" in the use of fiscal funds, and address the problems of "difficult and slow financing" faced by agricultural business entities. This has become an important topic for enhancing policy effectiveness. However, at present, China's digital and intelligent transformation of agricultural guarantees still faces systemic challenges such as a weak data foundation, fragmented business processes, and difficulties in model application. In this context, based on the perspective of fiscal policy, this study systematically analyzes the dilemmas faced in the digital and intelligent transformation of agricultural guarantees, draws on advanced domestic and international experience, and constructs a practical path of "system building–data governance–process reengineering–risk control upgrading" to provide practical references for unleashing the effectiveness of fiscal policies in supporting agriculture.

***Keywords*:** fiscal policy; agricultural guarantee; digital-intelligence development.

1. Research Background and Significance

The state has multiple requirements for the use of fiscal funds, aiming to ensure fund security, improve utilization efficiency, and guarantee that fund usage complies with national policies and public interests. Under the current context of relatively tight fiscal funds, the requirement for improving the efficiency of fund utilization is particularly important.

As an important institutional innovation in fiscal support for agriculture, agricultural credit guarantees play a "leveraging" role through the "grant-to-guarantee conversion" mechanism. Their operational efficiency and service quality directly affect the implementation effectiveness of fiscal policies supporting agriculture. Digital and intelligent transformation is an important means and inevitable trend for improving service efficiency and intelligence.

The application of digital-intelligence technology in agricultural credit guarantees helps enhance the effectiveness of fiscal fund supervision and broaden the coverage of fiscal policy benefits. Therefore, the digital and intelligent transformation of agricultural guarantees based on fiscal policy is not only a requirement for implementing the state's mandate for the use of fiscal funds but also a practical necessity for agricultural credit guarantee tools to exert policy effectiveness.

2. Practical Challenges in the Digital and Intelligent Transformation of Agricultural Guarantees

The digital and intelligent transformation of agricultural guarantees essentially involves applying new-generation information technologies — such as big data, artificial intelligence, cloud computing, and blockchain — to systematically reshape and upgrade traditional guarantee business processes, risk management models, and operational service systems. However, during the transformation process, agricultural guarantee companies face multiple and complex challenges arising from internal capabilities, the external environment, and policy implementation.

2.1 Weak Data Foundation for Agricultural Guarantees

(1) Insufficient effectiveness of agricultural data. Agricultural operations are influenced by a combination of natural risks, market risks, policy risks, and operational capability factors, resulting in complex agricultural information. Moreover, the geographical dispersion of agricultural projects, insufficient agricultural technology infrastructure, and generally low educational levels among farmers make agricultural credit data collection costly. Judging from the usage of agricultural credit information data across the region, banks still collect and use agricultural credit data in isolation. Models trained on limited

and potentially low-quality historical data face severe challenges in prediction accuracy, stability, and scalability.

(2) Low quality of historical business data. In the early stages of establishment, most domestic agricultural guarantee companies lacked an agricultural guarantee business information system and, in some cases, even a framework platform for recording guarantee business information. Manual ledgers and non-standardized project materials have led to problems in past business data, such as omissions, errors, inconsistencies, and unstructured paper reports and image files. The high cost of cleaning such data makes them difficult to use directly for model development, thereby constraining digital and intelligent transformation. For example, during the initial stage of its information system construction, Guangxi Agricultural Credit Financing Guarantee Co., Ltd. had shortcomings in historical data governance, which created difficulties in risk control model development and in interfacing with the national agricultural credit guarantee data reporting system.

(3) Lack of data collection standards. Agricultural guarantee companies lack unified planning and standards for collecting relevant agricultural data — such as land rights confirmation, business scale, operational history, market conditions, policy subsidies, and natural disaster risks. This results in difficulties in data integration and application, making it hard to meet the requirements of digital and intelligent transformation. After the completion of offline business processes, ledgers cannot link specific fiscal policies — such as interest subsidies, risk compensation, and premium subsidies — to each project. In the initial stage of online process design, insufficient consideration was given to the execution nodes, review requirements, and data reporting needs of fiscal policies, making it difficult for policy benefits to be efficiently and precisely transmitted to front-line business operations and end clients.

2.2 High Difficulty in System Model Development and Application

(1) Effectiveness issues in model construction rules. Many rules are derived from past experience. While past experience can help in judging certain problems, it cannot be generalized. From surveys of digital construction in other provinces, it is found that the current rules for agricultural credit guarantee system construction are generally based on static indicators such as collateral value and business scale of the project, without covering dynamic variables such as natural risks, policy adjustments, and market price fluctuations. The way model rules are set directly affects the effectiveness of scenario applications, and models with incomplete dimensions often encounter disconnection issues in practical use. How to develop a scenario-adaptive rules engine and establish a rule iteration mechanism is an unavoidable part of the digital and intelligent transformation of agricultural credit guarantees.

(2) Issues in linking model application with business processes. Agricultural guarantee companies usually adopt a functional organizational structure, where each department (such as business development, risk management, etc.) focuses on its own functional area. Business processes are dispersed across departments, with a lack of effective information sharing and collaboration, resulting in internal "information silos." Traditional agricultural guarantee business operations are mostly conducted offline. This causes fragmented information, making it difficult to form a complete customer profile and a full life-cycle view of projects, thereby hindering the advancement of digital and intelligent transformation. For example, in the case of Guangxi Agricultural Credit Financing Guarantee Co., Ltd., during the process of direct system connection with the Agricultural Bank of China, difficulties in coordinating the business processes of system-connected products led to errors or delays in data transmission.

(3) Issues of model interpretability and scalability. Since agricultural guarantee companies have relatively limited independent modeling capabilities, they often need to rely on external data models as the foundation. Complex machine learning models may become a "black box," making it difficult to explain their decision logic to business personnel, managers, regulators, and clients. This may lead to low internal trust and low external acceptance, affecting the practical application of models. At the same time, some system models have insufficient scalability; their planning and design are based solely on historical experience, without leaving sufficient openness for future development. In addition to building on human historical experience, it is necessary to reserve considerations for subsequent integration with artificial intelligence and other new technologies.

2.3 High Difficulty in Linking with External Data

(1) Obstacles in direct system connection with banks.First, the cost of unified data connection is high. Different partner banks have varying system interface standards, data formats, and security requirements, which result in large workloads, long development cycles, and high costs for interface development. This creates difficulties in data sharing and standard alignment between agricultural guarantee companies and banks, leading to delays in data feedback and errors in data transmission.Second, there are challenges in business process coordination. Online direct connection involves not only technical integration but also the reconstruction of coordinated business processes with banks. Examples include customer information sharing, mutual recognition of credit, online transmission of guarantee letters and related contracts, and the transfer of

compensation funds — each of which poses high coordination challenges. For a single guarantee company to establish direct connections with multiple bank systems, it must coordinate multiple types of business processes, which places high demands on the overall coordination ability of its business management personnel.

(2) Disconnection between fiscal fund flows and information flows.When agricultural guarantee companies establish direct system connections with banks, they often focus on business flows but fail to effectively integrate the processes and data related to the application, review, and allocation of fiscal interest subsidies and risk compensation funds, thereby preventing the formation of a closed-loop data flow of "business–finance–fiscal." As a result, the correlation of fiscal data is weak. Internal business data of agricultural guarantee companies and policy execution data — such as fiscal subsidies and risk compensation — are not effectively integrated. This makes it difficult for agricultural guarantee companies to accurately analyze the efficiency of fiscal fund usage and the extent of business risk supervision, thereby affecting the precision and effectiveness of the digital and intelligent transformation.

(3) Insufficient capability for external data access.The data-sharing mechanisms between agricultural guarantee companies and government departments such as agriculture and rural affairs, finance, taxation, market regulation, and natural resources, as well as with banks, core enterprises, e-commerce platforms, meteorological agencies, and remote sensing institutions, are either underdeveloped or yet to be established. This makes it difficult for agricultural guarantee companies to obtain multidimensional agriculture-related data to support business development, risk prevention and control, and management decision-making.

3. Experience and Lessons

3.1 Standardized Data Construction by the Agricultural Bank of China

The Agricultural Bank of China (ABC) promotes data standardization and business application through a "build through use" strategy.First, it carries out "farmer profiling" work in the field. By having grassroots account managers conduct door-to-door visits and centralized data collection, the collected information is entered into the system to establish farmer credit files. Through online platforms such as "Huinong e-Loan", ABC achieves seamless integration between farmer information profiling and loan issuance, ensuring that business development and standardized data collection are conducted simultaneously, thereby enhancing the effectiveness of data standardization efforts.Second, it has established a data standards management system. In terms of data governance, ABC has built a unified data standards system that covers the full life-cycle management of data standards formulation, release, implementation, and post-evaluation. By unifying data standard specifications, it has established a data management framework and released guidelines such as organizational identification standards and customer information data standards to improve data quality and ensure consistency of standards.Third, it has built an integrated data management platform. ABC has developed a data management technology platform system covering research and development, operations and maintenance, and application, achieving integrated management of data development resources, application system interfaces, and components. For example, it has established a comprehensive application platform that enables the integration of application development, testing, operation, and maintenance across the entire bank.

3.2 Full-Scenario Model Construction by Henan Agricultural Credit Guarantee

In terms of improving the effectiveness of customer service system models, Henan Agricultural Credit Guarantee Co., Ltd. has built an efficient and well-matched risk control system through multi-dimensional technology integration and scenario-based application.First, from the business process dimension, relying on big data, artificial intelligence, cloud computing, and other technologies, the company has developed a risk control engine that covers all products, all channels, and the entire process. This system includes risk management at the pre-loan, mid-loan, and post-loan stages, specifically incorporating modules such as customer profiling, credit evaluation, and risk monitoring.Second, from the project access dimension, the company has developed multiple intelligent risk control models, focusing on 36 dimensions, 279 indicators, and over 1,000 data tags related to customer credit, enterprise background, lending information, and behavioral data. By comprehensively applying technologies such as machine learning, knowledge graphs, digital encryption, and model algorithms, it promotes the application of differentiated big data risk reviews for all customer access. This includes pre-loan customer segmentation and pre-approval models, mid-loan anti-fraud models, personal credit models, comprehensive enterprise models, quota models, and post-loan customer risk monitoring and early-warning models.Third, from the risk monitoring dimension, the company has built a digital credit guarantee risk prevention and control system that combines "model analysis + intelligent risk control." This enables second-level response times for pre-loan reviews and risk assessments of small and batch projects, along with full coverage of dynamic monitoring and risk early warnings in post-guarantee management. It promotes timelier risk monitoring, more precise risk prevention and control, and real-time dynamic linkage between

pre-guarantee investigations and post-guarantee inspections.

3.3 External Data Linkage and Sharing by Zhejiang Agricultural Credit Guarantee

Zhejiang Agricultural Credit Guarantee has built a comprehensive agriculture-related database through multi-source data integration.First, a government-led coordination mechanism. Led by the Provincial Department of Finance, in collaboration with the Big Data Administration, the Department of Agriculture and Rural Affairs, the Taxation Bureau, the People's Bank of China, and other departments, the company jointly established the "Agricultural Credit Evaluation Information Database," clarifying data ownership, responsibilities, and sharing boundaries. In accordance with regulations such as the Zhejiang Provincial Public Data Regulations, it classifies data into "unconditional sharing" and "conditional sharing," and provides institutional grounds for conditions on restricted data sharing and for prohibiting the sharing of certain data.Second, cross-department data aggregation. By aggregating data from multiple departments, including agriculture, industry and commerce, and fiscal and taxation authorities, the company built a new-type agricultural business entity database covering 200,000 entities, compiling more than 200 data tables. The database now covers three million agriculture-related entities, including 170,000 new-type agricultural entities, providing data support for targeted agricultural support and risk assessment. Third, cross-platform interconnection. By integrating nine core systems — including the provincial public data platform, the new-type agricultural entities system, the taxation system, and the PBOC credit system — the company enables real-time data retrieval. Through direct system connection between the bank–guarantee system and partner bank lending systems, it has achieved online processing from application acceptance to loan disbursement.

4. Practical Path for the Digital and Intelligent Transformation of Agricultural Guarantees

4.1 Basic Ideas for Promoting Digital and Intelligent Transformation

In the practice of digital and intelligent transformation at Guangxi Agricultural Credit Financing Guarantee Co., Ltd., the following working principles are mainly observed to ensure the scientific, applicable, and sustainable nature of the transformation:

(1) Principle of systematic planning.The first step in digital and intelligent transformation is unified and systematic planning to clarify the goals, path, and implementation steps of the transformation. Sound planning at the early stage can effectively ensure coordinated work across all departments and orderly project implementation. Guangxi Agricultural Credit Financing Guarantee Co., Ltd. adheres to top-level design, formulating a transformation and development plan with a unified architecture, data standards, construction steps, and application requirements from the perspective of overall business strategy, thus avoiding system fragmentation and data silos caused by scattered construction.

(2) Principle of practical priority.Digital and intelligent transformation should follow the principle of "easy first, urgent needs first," prioritizing projects that are easy to implement, low in cost, and quick to yield benefits. This gradually raises the company's level of digitalization and integrates intelligent applications into daily work based on actual business needs, balancing urgency with practicality. Guangxi Agricultural Credit Financing Guarantee Co., Ltd. focuses on business needs, giving priority to building core functional modules that directly support business, following a lightweight implementation concept, and gradually improving system functions under the principle of "usable–easy-to-use–user-friendly."

(3) Principle of gradual progress.Digital and intelligent transformation should adopt a "small steps, quick run, phased advancement" strategy, advancing digital construction in phases and modules to avoid excessive one-time investment and reduce construction risks. Guided by the small steps, quick run approach — rapidly achieving small goals and promoting implementation of various projects in stages — the company ensures that the objectives of each stage are clear, continually summarizes lessons learned, and advances overall transformation. For example, the first step is to establish internal infrastructure and basic business systems; the second step is to build bank direct-connection systems and other front-end sub-management systems; the third step is to develop intelligent applications such as intelligent risk control systems, process automation, and localized AI deployment, ensuring an orderly transformation process.

(4) Principle of full participation.Digital and intelligent transformation is an “all-hands” initiative that should be treated as a key corporate development strategy. Its importance and urgency must be made clear, and company leaders should personally take part in and coordinate the transformation process, inspiring enthusiasm for participation at all levels. From a management perspective, digital transformation can be incorporated into key performance assessments to ensure company-wide participation, role-based implementation, and cross-department collaboration. Guangxi Agricultural Credit Financing Guarantee Co., Ltd. has established a Leading Group for Information Technology and Cybersecurity, headed by the main company leaders, with heads of departments and branches as members. It has also set up a leading group office, headed by

the company leader in charge of IT, to provide high-level organizational support for the transformation.

(5) Principle of continuous iteration.Digital and intelligent transformation is a process of continuous development, iteration, and improvement in order to adapt to changes in business and technology. Enterprises should strengthen tracking of new technologies and trends, and promptly apply, upgrade, and transform digital-intelligence applications across various functional areas to meet development needs. Guangxi Agricultural Credit Financing Guarantee Co., Ltd. maintains dynamic demand responsiveness, regularly iterating functions and optimizing performance, paying attention to the simultaneous optimization of data-driven processes and rule applications to improve data structuring and rule applicability, and continuously iterating risk control models to enhance the intelligence level of risk management.

4.2 Empowering and Enhancing Business Process Efficiency through Digital and Intelligent Transformation

(1) Online and digital processes: from "offline errands" to "one-click processing."By developing a direct customer access function and enabling multi-party system linkage among government, banks, guarantee institutions, and enterprises, Guangxi Agricultural Credit Financing Guarantee Co., Ltd. has achieved full-process online operations — from customer application, document upload, and bank acceptance to guarantee approval. This has shortened the business handling cycle from the traditional 15 working days offline to within 3 working days. In 2024, the platform processed a total of 30,000 business transactions, with an online processing rate reaching 92%, significantly reducing customers' loan application costs.

(2) Establishing standardized bank–guarantee direct connection to streamline digital collaboration channels.In 2022, Guangxi Agricultural Credit Financing Guarantee Co., Ltd. and the Agricultural Bank of China (ABC) fully launched the bank–guarantee direct connection project, which has now been iterated to its third phase. This has effectively broken down data barriers in the bank–guarantee business process, improving business approval efficiency from 5 working days to within 24 hours. Through the online direct connection, a total of RMB 4.132 billion has been issued. On this basis, the company continues to expand the scope of bank–guarantee direct connection cooperation, establish standardized interfaces for direct connections, and promote system construction with multiple partner banks to achieve real-time information exchange across all business processes — pre-guarantee, mid-guarantee, and post-guarantee. For example, in cooperation with ABC, after the direct connection, guarantee loan disbursement efficiency improved by 70%, and the deviation rate of guarantee loan information dropped from 12% to 1.5%.

(3) Intelligent application of management rules: from "post-event handling" to "pre-event prevention."By integrating systems and linking data from government, banks, guarantee institutions, and enterprises, the company can monitor in real time the fund flows of guarantee projects, detect abnormalities in operating data, and track changes in credit information. Mandatory constraint rules are set so that when triggered, the system automatically sends risk alerts to business personnel, enabling immediate risk intervention. For example, if monitoring detects that a customer has transferred agricultural loan funds to projects unrelated to the loan purpose — such as real estate or stocks — the system will automatically freeze subsequent disbursements and issue an early warning.

4.3 Steadily Building Risk Control Models Based on Own Reality

(1) Construction of intelligent risk control models to gradually break subjective "experience dependence."Integrate information such as the credit records of agricultural business entities, production and operation data (e.g., planting and breeding scale, input-output ratio), market conditions (e.g., fluctuations in agricultural product prices), and policy environment (e.g., subsidy policy adjustments) to build evaluation models covering entity credit, operational capability, industry risk, and policy risk. Using big data analytics and machine learning algorithms, quantitatively assess customer risk status, repayment ability, and willingness. Guangxi Agricultural Credit Financing Guarantee Co., Ltd. has developed risk control models that comprehensively consider customer credit records, operational status, upstream and downstream cooperation stability, and industry market changes to improve risk assessment accuracy.

(2) Establishing evaluation and feedback systems to realize effective model utilization.Build an evaluation indicator system and feedback mechanism to effectively monitor model operation status. The construction of risk control models can follow two approaches: on one hand, directly adopting mature and validated experience, for example, Henan Agricultural Credit Guarantee Company has developed three main categories of risk control models — credit screening, big data screening, and quota calculation — along with several sub-models tailored to different business scenarios. Although they may lack specificity, these models effectively avoid output errors caused by design flaws; on the other hand, design and train models with specific targets according to own business characteristics, continuously testing, modifying, and adjusting during training to ensure model applicability and stability before deployment. Functionally, these models should support automatic adjustment and updates. Regardless of approach, a multi-dimensional evaluation system and feedback mechanism must be

established so users can timely and accurately grasp model performance.

(3) Human-machine combined hierarchical management to match risk and efficiency requirements.Based on factors such as business scale and risk level, establish a hierarchical evaluation mechanism combining human judgment and machine analysis. For small-scale inclusive businesses, use preset risk rules and models for automatic evaluation; for large or complex projects, apply a "human + intelligent" evaluation mode. For example, Guangxi Agricultural Credit Financing Guarantee Co., Ltd. automatically completes risk assessment and approval via intelligent risk control models for projects under RMB 500,000; for projects between RMB 500,000 and 1 million, risk assessment and approval combine intelligent models with authorized approvers; for projects between RMB 1 million and 3 million, the risk control model plus a risk review committee conduct the evaluation and approval; for projects exceeding RMB 3 million, internal and external risk review committees jointly review to ensure scientific and rigorous approval.

Additionally, advance business process reconstruction under digital and intelligent transformation:First, comprehensively review business processes to eliminate internal data silos. Deeply analyze each step and node in existing processes to identify critical points and bottlenecks, diagnose problems, and find improvements; introduce advanced technologies such as cloud computing, big data, and artificial intelligence to redesign business processes, achieving automation and intelligent transformation. This promotes the shift of Guangxi Agricultural Credit Financing Guarantee Co., Ltd. from traditional experience-dependent business modes to digital intelligence era modes, improving internal information flow efficiency and collaboration, shortening approval cycles, and enhancing operational efficiency.Second, improve performance evaluation mechanisms aligned with digital and intelligent transformation goals. Incorporate digital transformation tasks into performance assessments to encourage full staff participation, guide employees to shift focus from mere business handling to effective data collection and analysis, and incentivize decision-making assisted by digital intelligence technologies for efficient, automated, and intelligent output.

4.4 From Data Standardization to the Construction of a Data Governance System

(1) Establish unified data standards.Create a multi-dimensional data collection framework covering agricultural business entities' basic information, production data, credit records, etc., deeply integrating data collection standards with business processes. Strictly regulate collection scope, frequency, and other elements; clarify data formats, field definitions, and coding rules for guarantee business information systems, client online application platforms, and other systems, ensuring data timeliness, usability, and specificity to achieve seamless data connection and sharing. For example, Guangxi Agricultural Credit Financing Guarantee Co., Ltd. integrates multi-source data such as customer operating transactions, credit reports, and asset certificates through unified data standards during digital construction, providing precise support for business analysis and decision-making.To ensure data quality, establish sound data verification and update mechanisms:For verification, develop input validation rules, set up issue reporting and traceability processes, and introduce diversified verification methods such as professional outsourcing;For updates, build dynamic tracking mechanisms, updating data at fixed intervals or via automatic synchronization to ensure data reflects policy changes, market environment, and business needs in real time, continuously enhancing data exchange value.

(2) Build dual data channels of "self-collected + external sources". Internal system collection: Through 13 municipal offices and other grassroots outlets of Guangxi Agricultural Credit Financing Guarantee Co., coordinate with village-town-county-city grassroots government departments and partner bank outlets to jointly conduct "New Farmer Profiling — Credit Express" data collection. Use proprietary platforms such as client applications and business information systems to accumulate and collect structured data on customer basic information, operational data, and transaction records.External data sources: Establish data sharing with departments including agriculture and rural affairs, finance, taxation, market supervision, leading enterprises, etc., to obtain data such as land ownership confirmation, policy subsidies, tax records, and enterprise registration information. For example, connect with the Ministry of Agriculture and Rural Affairs' new agricultural business entity direct reporting system to obtain basic entity and production data. Simultaneously, independently build multi-dimensional data cross-validation functions by industry characteristics and customer groups to continuously improve data authenticity and validity.

(3) Establish a dynamic data governance mechanism.

Clarify responsibilities and standards: Assign data governance responsibilities at each stage, and if third-party companies are involved, clarify data cleaning rules and standards before work begins to ensure orderly governance;Implement classified management: Set differentiated management standards for categories such as core and auxiliary data by importance, and internal and external data by source, to achieve precise data control;Strengthen data processing: Remove redundant or outdated data, correct errors, and store properly, using systematic and standardized data governance to improve utilization efficiency and transform data into resources supporting digital and intelligent transformation;Deepen historical data

governance: Given the importance of historical data — especially the large-scale data resources accumulated by Guangxi Agricultural Credit Financing Guarantee Co. through “archiving and registration” efforts — establish a dedicated governance system. Focus on inventory classification and data cleaning by thoroughly cataloging data types, volume, and distribution; clean redundant and erroneous data; identify missing data elements during sorting to achieve data supplementation and improvement, building a healthy data ecosystem;Construct a dynamic governance mechanism: Develop a data quality assessment system with indicators covering accuracy, completeness, timeliness, and consistency, and regularly verify and govern data; establish data correction mechanisms combining manual review and algorithmic verification to promptly label and correct errors or missing data, such as improving customer credit data accuracy.Furthermore, treat data as a core asset: establish a data asset catalog clarifying sources, uses, and ownership; explore data sharing service models to provide operational references for cooperative clients, decision-making analysis for government departments on agricultural credit, and risk assessment services for financial institutions, promoting the transformation of data asset value.

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