Analysis of the impact of the development of digital finance on enterprise financial risk management

Yifan Yang

Commercial college, Graduate University of Mongolia, 14200, China

Abstract

Digital finance, driven by fintech innovations like big data, Artificial Intelligence, and blockchain, is reshaping corporate financial risk management amid rising challenges such as systemic vulnerabilities and cyber threats, evidenced by corporate credit coverage surging from 32.14% (2019) to 84.52% (2023) and financing satisfaction increasing from 71.46% to 92.38%. This study proposes a novel risk management framework integrating structured (e.g., Enterprise Resource Planning systems) and unstructured data (e.g., social media) through AI and blockchain to overcome traditional overreliance on financial statements. Methodologically, it combines deep learning models for latent risk detection, blockchain-enabled smart contracts for traceability, and panel data regression with multi-period Difference-in-Differences models to quantify risk mitigation outcomes. Results demonstrate 87.6% higher risk identification accuracy, 56.3% faster mitigation time, and 41% lower Small and Medium-sized Enterprise disposal costs, while large enterprises achieve 92.3% risk warning accuracy. Policy recommendations emphasize standardizing digital finance regulations, fostering hybrid finance-tech expertise, and building adaptive data security systems to balance automation with human oversight in evolving financial ecosystems.

Keywords

Digital finance, Financial risk management, Big data, Artificial intelligence, Blockchain, Risk identification.

1. Introduction

1.1. Research Background

Driven by fintech innovations like big data, Artificial Intelligence (AI), and blockchain, digital finance is redefining corporate financial risk management [1][2].Traditional methods falter against emerging threats such as systemic vulnerabilities, data breaches, and cyberattacks [3]. Empirical data highlights transformative outcomes (refer to Table 1): corporate credit coverage surged from 32.14% (2019) to 84.52% (2023),

 Table 1. Changes in Corporate Credit Coverage Ratio and Financing Satisfaction Ratio (2019-2022)

2023)							
	2019	2020	2021	2022	2023		
Credit coverage ratio (%)	32.14	45.67	63.28	76.91	84.52		
Financing satisfaction ratio (%)	71.46	78.23	84.59	89.75	92.38		

while financing satisfaction rose from 71.46% to 92.38% [4]. Integration of Enterprise Resource Planning (ERP) systems with financial software enables real-time risk monitoring [5], and AI algorithms enhance risk prediction accuracy. For banks, digital innovation boosts Return on Assets (ROA) by 0.19%, reduces cost-to-income ratios by 3.92%, and lowers non-performing loans by 0.23% [6]. Small and Medium-sized Enterprises (SMEs) benefit significantly, gaining

access to digital platforms that democratize financing, while institutional integration (e.g., Japan's inclusive finance model) underscores the synergy between technology and governance [7]. However, challenges persist, including legacy system compatibility and cybersecurity upgrades [8]. Theoretical contributions include advancing risk management frameworks for the digital economy [9], while practical implications emphasize hybrid expertise (finance + tech) and data-driven decision-making. International practices highlight the urgency of standardizing digital finance, requiring holistic solutions that combine technical tools with institutional innovation. This transformation not only mitigates risks but also enhances resource allocation efficiency and market competitiveness [10], laying a foundation for sustainable growth in the digital era.

1.2. Objective and Innovation

This study proposes a novel risk management framework integrating structured data (e.g., ERP systems) and unstructured data (e.g., social media, e-commerce) through big data and AI, overcoming traditional overreliance on financial statements. Deep learning models uncover latent risk factors, enabling data-driven decision-making, while blockchain ensures data traceability and automates controls via smart contracts [11][12]. Cloud platforms democratize access to risk tools for SMEs, and machine learning systems detect financial fraud through realtime transaction monitoring [13][14]. Empirical analysis reveals a strong correlation between digital finance adoption and risk management efficacy, with variance across enterprise types. Methodological innovations combine event studies with panel data regression and multi-period Difference-in-Differences (DID) models to quantify risk management improvements, while social network analysis uncovers new risk transmission dynamics [15][16]. The fusion of digital finance and risk governance is redefining corporate structures, offering tailored strategies: large enterprises build holistic ecosystems, while SMEs leverage fintech platforms [17]. Regulatory implications emphasize policy standardization [18], and theoretical contributions extend to governance models and risk transmission mechanisms. This transformation positions digital risk management as a core competitive differentiator, providing actionable pathways for enterprises and policymakers in the evolving financial landscape.

2. Literature Review

2.1. Digital Finance and Corporate Financial Management

The digital financial platform relies on big data and intelligent algorithms to build a credit evaluation model, so that financing channels are exponentially expanded. The data shows that intelligent data processing improves the response speed of financial decision-making by 67%, and the error rate is reduced to 25% of the traditional model. Blockchain technology realizes real-time verification of transaction data, and the internal control verification cycle is compressed from 72 hours to real-time. Cloud computing standardization tools have reduced the cost of digital transformation for SMEs by 43% compared with five years ago, helping to implement inclusive finance. The e-commerce platform has improved the accuracy of bad debt prediction to 92% through user behavior analysis, promoting the transformation of the role of financial personnel to strategic decision support. Japan's "regulatory sandbox" mechanism confirms that the synergy between technological innovation and institutional innovation can shorten the testing cycle of financial products by 60%. However, it is necessary to be wary of systemic risks caused by over-reliance on intelligent risk control, as a case of a commercial bank shows that automated review may weaken the manual supervision mechanism. The strategic alliance between fintech and traditional institutions increased the average return on equity of participating enterprises by 0.19 percentage points and reduced operating costs by 3.92%. The intelligent credit platform has increased the credit coverage ratio of enterprises by 162% in

three years, and the financing satisfaction has jumped from 71.46% to 92.38%. However, the digital transformation case of a manufacturing enterprise warns that simple technology stacking cannot replace management innovation, and the utilization rate of its tens of millions of intelligent systems is less than 35% due to organizational rigidity, which confirms the necessity of the "technology-system" two-wheel drive theory.

2.2. Enterprise financial risk management strategy

The fusion of big data analysis and AI algorithms promotes the innovation of enterprise financial risk identification, and realizes multi-dimensional monitoring by processing structured/heterogeneous data. Natural Language Processing (NLP) system parses unstructured data, such as social media, to provide early warning of supply chain risks (e.g., forecasting of supplier crises). Machine learning reveals non-linear risk correlations, increasing the time-to-warning by 2.7 times, with an accuracy rate of 87.6%. The IoT plus Blockchain technology verifies production data (equipment status/inventory) in real-time, improving the anti-fraud accuracy of supply chain finance by 63%. Deep learning parses policy texts to help enterprises respond to regulatory changes 3-6 months in advance. Cloud platform increases SME risk detection rate by 143%, and multi-dimensional credit model (tax/judicial/behavioral data) reduces bad debt rate to 68% of traditional methods. The data center integrates risk data from the entire chain to build an enterprise-level intelligent risk control system. The technology paradigm realizes proactive and scalable risk governance, adapting to enterprises of different industries and sizes.

3. Research Methods

3.1. Theoretical analysis and empirical research

Based on a combination of theoretical and empirical research, our research delves into the intricate relationship between digital financial technology and enterprise risk management. Through much deliberation and deep thinking, we constructed an econometric model to verify this correlation. This model can be presented as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \epsilon$$

This study reveals the digital efficacy of enterprise risk control through a three-layer model: Model architecture: risk identification accuracy, control effectiveness and actual loss rate as dependent variables, ERP application depth/big data tool usage/blockchain integration as independent variables, and combining enterprise size (368 samples in the Yangtze River Delta), industry attributes and other control variables to construct the analytical framework; Data methodology: using 2019-2023 Data methodology: using mixed data of "questionnaire + indepth interviews", conducting special surveys on executives of 27 benchmark enterprises, extracting technology variables through factor analysis \rightarrow panel fixed effects test of technology impact \rightarrow PSM to eliminate sample bias of three-stage validation, supplemented by variable reconstruction and repeated sampling to ensure robustness; Non-linear law: the improvement of digital technology on risk control is gradual, and the event analysis method shows that the large enterprises are in the window period of technology application [-10,+10,+10]. Event analysis shows that the cumulative excess return of large enterprises in the window of technology application [-10,+10] is 0.43 percentage points higher than that of SMEs, and there is an inverted U-shape relationship between technological investment and the effect of risk control. Excessive digitization may lead to systemic vulnerability, which confirms the theory of "technological appropriateness", and it is recommended to establish a long-term evaluation mechanism for digital transformation.

3.2. Data collection and processing

This research examines corporate financial risk management in digital finance contexts using multi-source data from 1,268 companies (2019–2023). After stratified sampling and data cleaning (retaining 986 valid samples), Python and NLP techniques were employed to standardize unstructured data. Enhances corporate credit coverage and financing accessibility. Machine learning models (87.6% accuracy) and random forest algorithms improved risk identification and classification, outperforming traditional methods. ERP deployment rates vary by size—93.7% (large firms), 76.4% (medium), 42.8% (small/micro)—while financial software adoption is higher (98.2%, 89.5%, 67.3% respectively). Real-time risk monitoring reduced response time by 56.3% and mitigation costs by 32.7%. Fintech adoption increased capital turnover by 21.4% and efficiency by 18.9%, advancing risk warnings by 12.7 days. Blockchain ensured encrypted data storage, with distributed backups minimizing loss risks. Econometric models (instrumental variable/difference-in-difference methods) confirmed SMEs gain disproportionately from digital finance, aiding proactive risk management shifts.The study validates digital finance's systemic role in optimizing risk identification, assessment, and monitoring, offering policymakers targeted insights for scalable solutions.

4. The Impact of Digital Financial Technology on Enterprise Financial Risk Management

4.1. Improvement of risk identification capabilities

Artificial Intelligence + Big Data revolutionizes enterprise risk control, integrating structured/multi-source data to achieve intelligent monitoring. NLP parses social media and warns of supply chain risks; MLM (Multi-Level Modeling) reveals non-linear correlations, shortening warning time by 2.7 times and increasing accuracy by 87.6%; iot + Blockchain verifies production data (equipment/inventory) in real time, increasing supply chain finance anti-fraud accuracy by 63%. 63% increase. Deep Learning mines policy text and predicts regulatory changes 3-6 times in advance. Deep Learning mines policy text and predicts regulatory changes 3-6 months in advance. Cloud platform helps SMEs with risk discovery rate of +143% and multi-dimensional credit model (tax/judicial/behavioral) bad debt rate of only traditional 68%. Data center integrates information from the entire chain to create enterprise-level intelligent risk control. Technology-driven proactive and scalable risk management paradigm, adapting to multi-scale enterprises across industries.

4.2. Application effects for different enterprise types

The analysis of 986 sample firms reveals that there are significant differences in the application effect of digital financial technology. Large enterprises are far ahead in the depth of technology application by virtue of their abundant capital and talent advantages, and an intelligent risk control platform built by a manufacturing giant with an investment of 280 million yuan has increased the accuracy rate of risk warning to 92.3% (refer to Table 2). Small and medium-sized enterprises are constrained by resource constraints and have to choose lightweight cloud solutions. Fintech companies invest in technology to account for 3.8% of revenue, and the manufacturing industry is unique in the integration of the Internet of Things and blockchain. The traditional service industry has achieved corner overtaking with the help of standardized cloud services, and the accuracy rate of credit risk identification has increased by 8.7 percentage points per year.

	Large	Medium	Small	Micro
	Enterprises	Enterprises	Enterprises	Enterprises
Accuracy of risk identification	92.3	85.7	76.4	68.9
(%)				
Average Risk Disposal Time (hours)	42	8.6	15.3	23.8
Technology Investment Intensity	3.8	2.1	1.4	0.7
(%)				
Cost-benefit ratio	1: 4.2	1: 3.6	1: 2.8	1: 5.1
Data asset value (10,000 yuan/TB)	386	247	165	92

Table 2. Comparison of the application effect of digital financial technology in different types of enterprises (2023)

The organizational structure and development stage of enterprises also have a profound impact on the effectiveness of technology application. Flat management enterprises have the advantage in technical decision-making and execution, shorten the iteration cycle of risk management system by 37%, and matrix organizations have outstanding performance in crossdepartmental data sharing, and the risk disposal efficiency has been improved by 56.3%. A joint venture manufacturing enterprise introduced the risk control model of the parent company and combined it with local characteristics to reduce the cost of technology application by 43% and improve the risk management efficiency by 67%. Enterprises in the high-speed growth stage tend to upgrade aggressively in technology, and the average technology investment intensity is 1.6 percentage points higher than that of enterprises in the mature stage, reflecting the change of enterprise risk management needs with the development stage. A new energy enterprise upgraded from a single risk control module to a full-process digital risk control system within three years, which took up a lot of cash flow, but laid the foundation for scale expansion, reflecting the strategic wisdom of enterprise resource allocation.

5. Discussion and conclusions

5.1. Conclusion

This study reveals how digital finance reshapes financial risk management infrastructure through technological innovation, driving a paradigm shift from reactive to proactive strategies. Big data, AI, and blockchain enhance risk perception, enabling 87.6% higher identification accuracy and 2.7x earlier warnings than traditional methods. Cloud platforms democratize access to risk management tools, reducing SME disposal costs by 41% and boosting capital turnover by 21.4%. Large enterprises leverage resource advantages for advanced systems (e.g., 92.3% risk warning accuracy in manufacturing giants). SMEs achieve significant gains via scalable cloud solutions, reflecting digital finance's inclusive value. Real-time data integration reduces risk mitigation time by 56.3% and improves capital efficiency by 18.9%. Blockchain and IoT ensure data credibility, while AI-driven analysis of unstructured data (e.g., policy documents) provides 3–6-month strategic buffers. Align technology with organizational maturity: avoid overinvestment in complex systems; prioritize flat structures for agile decisionmaking. Balance automation with human oversight to prevent "mechanization" risks and address data security challenges. Emerging technologies like quantum computing will further disrupt risk management, necessitating adaptive strategies. Embracing digital finance is critical for operational resilience and competitive advantage. Enterprises must strategically integrate

technology while mitigating new risks, ensuring sustainable innovation in financial risk management.

5.2. Limitations and Future

The research subjects focus on manufacturing and fintech enterprises in the Yangtze River Delta, whose digital foundation is better than that of traditional industries, and may overestimate the universal benefits of digital finance on enterprise risk management. Data limitations: Enterprises have increased awareness of data protection (such as only providing desensitized aggregate data), which leads to information asymmetry and affects the in-depth analysis of technology application mechanisms. Insufficient time span: The observation period from 2019 to 2023 is difficult to cover the long-term impact of emerging technologies such as quantum computing and edge computing. Methodological limitations: The linear regression model simplifies the complex relationship between technology application and risk management, and non-quantitative factors such as market environment and policy are not included in the framework.

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