



The Mechanism of Internal Financial Supervision on Corporate Financial Risk Control

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Abstract: Against the backdrop of deep digital economy penetration, the emergence of diversified financial formats, and tightening macro financial supervision, market risks, operational risks, compliance risks and new types of financial risks derived from digitalization intersect and spread. External supervision alone fails to meet differentiated risk governance demands of various entities. As an endogenous risk prevention and control carrier of enterprises, internal financial supervision enables refined management covering the full chain of financial accounting, capital management, investment and financing, and internal auditing, constituting a core research direction in financial governance and risk control. This paper systematically reviews relevant literature, sorts out research contexts from four dimensions: conceptual definition, theoretical foundation, traditional transmission mechanisms, and digital technology empowerment. It distinguishes diversified business scenarios including physical enterprises, financial institutions, public institutions, micro, small and medium-sized enterprises (MSMEs), and multinational platforms, and summarizes the implementation paths and practical effects of artificial intelligence and digital financial systems in risk identification, early warning and process control. The paper summarizes the theoretical and practical value of existing literature, analyzes current research deficiencies, and extracts future research directions combining digital finance, green transformation and platform economy. It provides theoretical and literature support for enterprises to build an integrated financial supervision and risk control system, as well as subsequent empirical and case studies.

Keywords: Internal Financial Supervision; Financial Risk Control; Internal Control; Intelligent Risk Control; Risk Early Warning

1. Introduction

Global industrial chain restructuring, platform finance, cross-border e-commerce and green investment and financing have undergone rapid expansion, resulting in continuous expansion of the coverage of corporate financial businesses, rising

transaction complexity and capital scale. Financial risks are characterized by concealment, cross-entity transmission and compound superposition. New businesses spawned by platform economy such as online capital pooling, nested related transactions and digital data assets have broken the boundaries

of traditional offline management and control, rendering traditional risk control models relying on manual review and static annual auditing gradually ineffective (Eichengreen, 2023; Li, 2022). External financial supervision targets unified industry compliance bottom lines with lagging policies, focusing only on major violations rather than segmented links such as budget formulation, daily capital payment, project financial review and asset inventory, making it unable to accurately mitigate risks targeting individual corporate operational weaknesses. Under such circumstances, the internal financial supervision system built based on corporate governance structures can realize closed-loop constraints covering pre-event prediction, in-process interception and post-event review, serving as an indispensable endogenous management tool to hedge diversified financial risks, stabilize cash flow and guarantee sustainable operation (Cai, 2024; Rekunen et al., 2025).

A review of research over the past five years reveals that research scenarios have continuously expanded beyond traditional manufacturing and commercial enterprises to commercial banks, financial institutions, microcredit organizations, public universities, public institutions, multinational groups and supply chain financial platforms. Research methodologies have also been enriched, evolving from early qualitative normative analysis and institutional comparison to quantitative approaches including panel empirical testing, Bayesian statistics, machine learning modeling and multi-case verification. Research perspectives extend to cutting-edge branches such as digital intelligent supervision, ESG sustainable financial governance, crisis emergency risk control and special supervision of green investment and financing (Huang et al., 2025; Tanbour et al., 2026). A large

number of empirical studies reach a unified conclusion: a well-structured internal financial supervision system with clear power and responsibility, full financial process coverage and sound implementation mechanisms can significantly reduce the probability of financial fraud, improve capital allocation efficiency, identify liquidity shortages and credit default hazards in advance, lower the overall corporate financial risk exposure level, and buffer financial shocks from operational fluctuations (Kalevor et al., 2024; Olivia et al., 2024).

Although existing research has accumulated abundant outcomes, it still suffers from prominent structural shortcomings. Most literature focuses on constructing universal risk control frameworks while insufficiently exploring differentiated adaptation mechanisms for entities of various business forms and scales. Digitalization research overemphasizes algorithm model development with weak discussion on practical issues such as institutional restructuring, personnel transformation and data security governance supporting system implementation. Most studies separately analyze the risk control effect of internal financial supervision as a single factor without systematic analysis of multi-dimensional synergy among internal supervision, external supervision, corporate governance and sustainable development. Research on emergency supervision mechanisms under extreme scenarios such as economic downturn and systemic industrial crises remains fragmented, failing to adapt to the complex and volatile current corporate financial operation environment. Based on the above research status, this paper divides core concepts, basic theories, traditional transmission paths of effects and digital technology-enabled supervision systems into four sections

combining literature of the past five years, systematically reviews contributions and overall defects of existing research, summarizes key future research directions, and delivers a theoretical research framework for the impact of internal financial supervision on financial risk control.

2. Core Concepts and Theoretical Foundations

2.1 Internal Financial Supervision

Embedded within the overall corporate internal control framework, internal financial supervision is a comprehensive mechanism of regular verification, constraint, correction and optimization jointly implemented by finance departments, internal audit departments, management and boards of supervisors, covering the full financial process including budget management, monetary capital receipt and payment, cost accounting, investment and financing decision-making, asset inventory, financial statement preparation and related transaction management (Fritze & Jockel, 2025). Based on the evolution of academic literature, scholars divide its connotation into two developmental stages.

The first stage refers to traditional ex post financial supervision, born out of standardized accounting demands in the industrial era. Its core functions were limited to year-end account reconciliation, accounting error correction and annual fraud investigation, adopting manual paper voucher review and one-off annual internal audit as primary supervision tools, with goals confined to ensuring true financial statements and meeting basic external reporting and tax filing requirements without proactive risk prediction capabilities (Ogunsola et al., 2021).

The second stage represents

modern full-process dynamic financial supervision, shaped alongside the popularization of risk management theories and digital management tools. It integrates multiple objectives including risk control, performance evaluation, compliance management and sustainable disclosure, extending supervision links forward to financial review at project initiation and annual budget risk assessment, and backward to follow-up of audit rectification and iteration of supervision systems. Baharom (2025) point out that internal auditors' functions have undergone fundamental transformation in the digital economy, with internal financial supervision adding new responsibilities including intelligent monitoring of massive financial data, identification of digital fraud clues and audit of corporate data security access rights. Nneamaka et al. (2021) clarify the subordinate relationship between the two concepts, confirming that internal financial supervision constitutes the core execution module of the internal control system, while internal control provides the institutional framework for internal financial supervision, and internal financial supervision serves as the core carrier for risk control through internal control implementation.

2.2 Financial Risk Control

Targeting the full chain of four major financial activities: financing, investment, operation and profit distribution, financial risk control forms a closed-loop management system consisting of sequential activities including risk identification, quantitative assessment, dynamic early warning, risk hedging, loss disposal and institutional optimization, which continuously reduces operational financial uncertainty, avoids large capital losses and guarantees long-term corporate financial sustainability (Li, 2022).

Traditional research categorizes

basic corporate financial risks into four types: market risks (asset impairment triggered by fluctuations in interest rates, exchange rates and commodity prices); credit risks (bad debts arising from overdue payments and debt defaults by customers and partners); liquidity risks (cash flow shortages unable to cover maturing debts); and operational risks (capital losses caused by financial staff's procedural errors and illegal operations), with corresponding control methods relying on fixed systems, multi-level manual approval and quarterly regular inspections (Kahihu et al., 2021). With the rise of digital finance, Eichengreen (2023) proposes that platform economy has spawned new digital financial risks including data leakage, algorithm bias, cross-platform capital nesting and impairment of online virtual assets, whose transmission speed and concealment far exceed traditional offline risks, making static manual risk control ineffective.

From a macro perspective, Adeniran et al. (2024) expand financial risk control to the scope of industrial and regional systemic financial risk prevention, emphasizing that micro-enterprise risk control acts as the basic unit of macro financial stability. From a micro corporate perspective, Ngo & Trinh (2025) conduct empirical tests on commercial banks using Bayesian models, whose results show that various financial risks continuously erode profits and shorten operation cycles, and a normalized, systematic financial risk control system serves as an essential guarantee for stable corporate operation.

2.3 Principal-Agent Theory

The separation of ownership and management in modern enterprises inherently creates principal-agent relationships: shareholders as principals pursue long-term stable returns and asset preservation and appreciation, while management as agents focus more on

short-term performance, salary benefits and operational autonomy. Naturally divergent objective functions give rise to severe information asymmetry. Management possesses complete financial data and operational decision-making information, while shareholders cannot track capital flows and real project returns in real time, leaving management incentivized to engage in opportunistic behaviors such as high-risk investment, loss concealment, revenue fabrication and capital embezzlement, all of which directly elevate liquidity, fraud and compliance financial risks (Oradi et al., 2020).

Internal financial supervision narrows information gaps through independent internal audits, separation of power over capital approval, regular disclosure of financial data and collective review of major investment and financing activities, forming rigid constraints on management financial decisions. Hamshari et al. (2021) supplement that professional skepticism of finance and internal audit staff amplifies supervision restraint effects, proactively identifying material misstatements such as management statement manipulation and liability concealment, mitigating financial fraud induced by agency conflicts from the source and reducing capital losses arising from agency costs.

2.4 Enterprise Risk Management Theory

Traditional fragmented risk management only remedies risks after their occurrence without forward-looking prediction and full-process control thinking, resulting in delayed risk disposal and uncontrollable loss scales. Enterprise Risk Management (ERM) theory holds that risks permeate all corporate operational and financial links, requiring risk control to be embedded in the full pre-event, in-process and post-event financial cycle to

build an integrated closed-loop control system covering all businesses and personnel.

Based on this theory, Levytska et al. (2022) propose a risk-oriented internal audit model, advocating the planning of internal financial supervision centered on financial risk points, sorting risk lists covering budgets, capital, investment and financing, and assets, and allocating supervision resources to high-risk businesses to realize forward risk governance. Hidden dangers are identified and disposed before evolving into actual losses, reducing risk occurrence probability and loss scales from the source and fully exerting the risk buffering function of internal financial supervision.

2.5 Institutional Economics Theory

Standardized written internal financial supervision systems constitute formal internal corporate governance institutions that unify corporate-wide financial operation standards, compress discretionary power of posts, reduce manual operational deviations and regulatory loopholes, and lower internal transaction costs and risk disposal costs (Rekunenko et al., 2025). From the perspective of institutional restraint logic, clear supervision systems define financial power and responsibility of each post, approval procedures and accountability mechanisms for violations, forming stable behavioral expectations and reducing uncertainty in financial activities.

Cai (2024) extends the theory to a macro supervision perspective: iterative updates of external financial regulatory policies generate external restraint pressure forcing enterprises to proactively optimize supporting internal financial supervision systems. External regulatory frameworks and internal supervision institutions form a two-way collaborative restraint pattern, jointly

compressing space for financial risk generation.

2.6 Signaling Theory

Information barriers exist between capital markets, credit institutions, suppliers and enterprises, with external entities judging operational stability and risk levels solely based on corporate public financial statements. A standardized and fully implemented internal financial supervision system guarantees truthful and complete financial data as well as full disclosure of risk information, transmitting positive signals of standardized corporate financial governance and controllable risks to the market (Hamed, 2023).

High-quality signals reduce corporate credit interest rates, enhance supply chain cooperation trust and mitigate equity financing discounts, indirectly alleviating financial risks arising from narrow financing channels and high financing costs. Landi et al. (2022) expand the theoretical boundary integrating ESG sustainable development, demonstrating that sound internal financial supervision improves disclosure quality of environmental and social financial expenditures, optimizes capital market judgment of long-term corporate risks, and lowers financial risks related to green investment and financing.

3. Mechanisms of Internal Financial Supervision on Financial Risk Control

3.1 Institutional Restraint Path

For the banking sector, Hanoon et al. (2021) conduct empirical tests using panel data of Iraqi commercial banks, verifying that each tier of improvement in internal financial supervision institutional completeness significantly reduces non-performing credit scales and internal capital misappropriation incidents. Standardized institutions regulate the full process of credit approval and post-loan capital tracking,

lowering liquidity risks triggered by bad debts. For public non-profit institutions, Kalevor et al. (2024) select samples of public universities in Ghana, confirming that unified financial supervision institutions constrain the use of special fiscal, scientific research and infrastructure funds, avoiding unique risks of public institutions including budget overruns, fund interception and misappropriation of special funds. At the compliance control level, Adeniran et al. (2024) focus on strategic risk control of financial institutions, demonstrating that regular internal financial supervision institutions synchronize updates of industrial regulatory policies through periodic compliance self-inspections and financial process adjustments, evading policy compliance risks such as regulatory penalties and business suspension.

Standardized internal control supervision institutions block operational and compliance risks from the source. Complete and hierarchically implemented internal financial supervision systems formulate standardized operational specifications for capital receipt and payment, financial accounting, investment and financing approval, supply chain transactions and special fund usage, clearly dividing post power and responsibility, approval tiers and violation accountability standards, filling loopholes in financial process management and control, reducing manual operational errors and subjective violations at the business initiation stage, and cutting off channels for operational and compliance risk generation.

3.2 Full-Process Closed-Loop Control Path

For MSMEs with weak risk resistance, Zhang (2024) relies on full-process audit early warning to review budget rationality pre-event, track reimbursement compliance in-process

and verify surplus disposal post-event, preventing abuse of scientific research funds and fictitious expenditures. Levytska et al. (2022) propose supporting procedures for risk-oriented auditing, comprehensively sorting high-risk financial nodes and allocating internal audit resources to high-risk businesses to improve pertinence and timeliness of in-process risk identification and interception.

Pre-event, in-process and post-event closed-loop supervision dynamically mitigates financial risks across the full cycle. Traditional internal financial supervision only focuses on post-year-end error verification with delayed risk disposal and irrecoverable losses, while modern internal financial supervision constructs a complete closed-loop control model of "pre-event prediction – in-process interception – post-event review and optimization" covering the full financial activity cycle to dynamically mitigate risks. Pre-event supervision relies on budget oversight, financial risk review of new projects and feasibility verification of large-scale investment and financing to reject high-risk projects whose cash flows cannot cover principal and interest or suffer volatile returns, avoiding investment failures at the source. In-process supervision monitors capital flows, accounting changes and related transactions in real time, with systems automatically identifying signals including abnormal large transfers, unsupported transfers and over-budget expenditures to trigger immediate review and transaction interception. Post-event supervision conducts annual internal audits and special financial inspections, sorting annual risk incidents and institutional loopholes to revise supervision systems reversely and form a continuous optimization cycle of risk control (Nneamaka et al., 2021).

3.3 Corporate Governance and

Personnel Restraint Path

Hamshari et al. (2021) conduct empirical research with survey samples of Jordanian enterprises, finding that high professional skepticism among finance and internal audit staff combined with regular internal financial supervision enables rapid identification of financial statement fraud including fabricated revenue, concealed liabilities and non-fair related transactions, drastically lowering fraud occurrence probability. Oradi et al. (2020) conduct research from a management background perspective, proving that CEOs with financial expertise prioritize the construction of internal financial supervision systems, proactively improve internal control institutions and reduce internal control deficiencies, lowering human-induced financial risks from top-tier governance.

As the core execution carrier of internal financial supervision, Ogunsola et al. (2021) construct a hierarchical internal audit risk assessment governance model conducting dual inspections of quarterly special audits and annual comprehensive audits to regularly investigate concealed asset losses, off-balance-sheet capital circulation and financial fraud, forming a long-term risk defense line of corporate governance.

Regulating subject behaviors prevents fraud-related financial risks sustainably. Subjective self-interested behaviors of management and financial staff as well as insufficient professional competence constitute core inducements of financial fraud and material financial statement misstatements. Internal financial supervision forms multi-layered behavioral control mechanisms through post separation, regular rotation, regular internal audit inspections and professional skepticism constraints. Post separation segregates power over cashier and accounting, investment and

financing approval and capital disbursement, accounting recording and asset inventory, eliminating single-person full control over capital. Mandatory annual rotation avoids interest conflicts formed by long-term fixed posts, compressing space for collusive fraud. Regular internal audits periodically inspect accounts, capital and assets to dig out concealed fraud clues promptly.

3.4 Internal-External Collaborative Linkage Path

Rekunen et al. (2025) carry out comparative analysis across multiple economies, revealing that stronger macro financial supervision correlates with higher completeness of corporate internal financial supervision. Internal-external linkage simultaneously reduces individual operational financial risks and industrial systemic compliance risks. Landi et al. (2022) link internal financial supervision with ESG performance control, building special supervision procedures for green investment and financing and environmental expenditure balancing sustainable development goals and green capital risk control. Zhuang & Wei (2023) adopt a regional financial stability perspective, demonstrating that regular corporate internal financial supervision coordinated with regional financial legal supervision blocks cross-entity transmission of corporate risks and prevents regional systemic financial crises.

Linkage with external supervision and performance control amplifies overall risk prevention and control effects. Internal financial supervision is not an independent control mechanism, and can form collaborative linkage with external financial supervision, corporate performance appraisal and ESG sustainable governance to bidirectionally amplify risk control outcomes. Updates of external regulatory policies and on-

site inspections force enterprises to upgrade internal supervision procedures and improve supporting institutions. Well-implemented internal supervision systems help enterprises meet compliance requirements on a regular basis, reducing risks of regulatory penalties and business restrictions, forming a two-way collaborative pattern of "external constraints driving internal optimization, internal implementation

supporting external compliance".

Based on the transmission logic of the four paths: institutional, process, personnel and collaborative, the complete mechanism of internal financial supervision is constructed, illustrated in the framework diagram of the effect mechanism of internal financial supervision on financial risk control as follows:

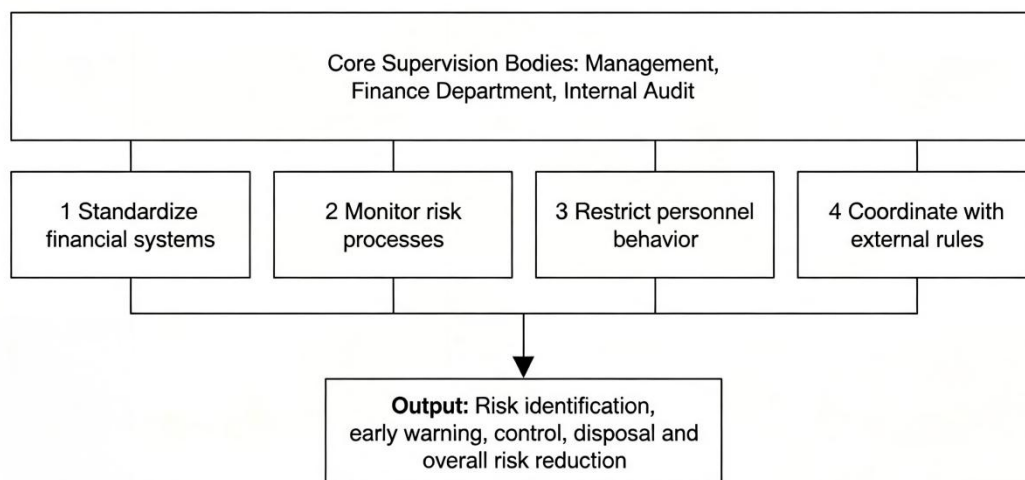


Figure 1. Framework of Mechanism of Internal Financial Supervision on Financial Risk Control

4. Internal Financial Supervision and Financial Risk Control Enabled by Digitalization

4.1 Artificial Intelligence and Machine Learning Algorithms

Fritz-Morgenthal et al. (2022) propose an overall framework of explainable, trustworthy and responsible AI financial risk control to optimize the defects of traditional black-box algorithms including difficult risk tracing and insufficient audit evidence collection. Intelligent systems automatically retain operation tracks and data sources to meet internal audit evidence collection demands and improve compliance credibility of digital supervision. Ogunmokun et al. (2021) construct an AI-driven conceptual model optimizing financial

supervision and corporate governance, with algorithms automatically identifying fraud clues such as abnormal large transfers, implicit capital occupation by related parties and fabricated business payments to push special inspections for internal audits.

Different algorithms adapt to differentiated scenario early warning demands. Huang et al. (2021) embed deep learning into TVP-VAR time series models to dynamically monitor cross-industry macro systemic financial risks, building dual-layer macro-micro early warning systems for groups and financial institutions. Liu & Du (2022) rely on BP neural networks to dig implicit risks of internet finance, accurately identifying risks including online credit, third-party payment capital

pools and maturity mismatch. Tan (2025) construct a machine learning model for cross-border e-commerce to automatically calculate multi-currency exchange gains and losses and monitor cross-border capital reflux, controlling exchange rate and capital detention risks. Okenwa et al. (2024) embed predictive analysis into financial compliance supervision, constructing financial crime early warning models to pre-identify high-risk behaviors such as money laundering and fictitious trade financing.

Construct intelligent risk identification and real-time dynamic early warning models. Artificial intelligence, machine learning and time-series deep learning break through bottlenecks of manual processing of massive financial data, automatically capturing, cleaning and analyzing full data of capital flows, accounting vouchers, investment and financing contracts and related transactions to independently capture concealed, low-frequency and cross-cycle abnormal clues, realizing 7×24-hour uninterrupted monitoring and solving the lag defect of traditional static monthly and quarterly manual inspections.

4.2 Digital Financial Information Systems

Tan (2025) conduct empirical research on enterprise implementation, finding that the launch of standardized internal control information systems fully digitizes the whole internal financial supervision process, with each expenditure and accounting adjustment retaining tamper-proof electronic vouchers. Systems automatically intercept over-budget and over-authority expenditures based on preset rules, significantly lifting supervision effectiveness and lowering operational risks. Zhelev & Kostova (2024) survey various Bulgarian enterprises, demonstrating that digital tools automatically complete voucher entry

and reconciliation between vouchers and accounts, drastically reducing manual accounting errors and basic operational risks.

Financial shared service centers represent mainstream digital carriers. Jiang et al. (2022) conduct special research on financial shared service centers in the digital economy, centralizing all group accounting businesses, unifying audit standards and concentrating supervision resource allocation to improve group supervision efficiency. However, shared service centers feature highly centralized power and standardized procedures, spawning new internal control loopholes including rigid processes, ambiguous power and responsibility and absent cross-regional supervision. Enterprises must supplement special digital supervision rules and hierarchical review mechanisms to offset shortcomings.

Reconstruct the underlying carrier of internal financial supervision operation. Integrated financial internal control information systems serve as the fundamental carrier for digital technology implementation of financial supervision, realizing full online retention of budgets, accounting, capital, audit and asset businesses, online approval of procedures and automatic triggering of supervision nodes, thoroughly transforming offline paper supervision modes and constructing a closed-loop digital supervision system.

4.3 New Digital Financial Risks Derived from Digital Transformation and Supporting Digital Supervision Mechanisms

While digital technologies strengthen traditional risk control capabilities, they spawn new digital financial risks including data leakage, algorithm bias, abuse of system access rights and online transaction fraud. Mhlanga (2024) point out that all core corporate financial and customer capital

information is stored online under big data environments, generating security hazards including hacker intrusions, confidential data export by internal staff and arbitrary access right authorization. Internal financial supervision must add modules for hierarchical access right review, system operation log audit and special data encryption inspection, conducting regular special supervision of data security. Zhang et al. (2026) construct a balanced digital supervision framework from dual perspectives of internal and external information disclosure, expanding supervision coverage and identification accuracy relying on digital systems on one hand, and establishing algorithm review and internal audit procedures for system operation and maintenance to periodically verify intelligent model bias and inspect background operation records, hedging new risks brought by digital tools on the other hand.

4.4 Application of Digital Internal Financial Supervision

No unified standard exists for implementation effects and optimal construction modes of digital financial supervision, regulated by multiple

factors including industrial attributes, asset scale, digital investment and operation regions. Huang et al. (2025) conduct threshold effect empirical research confirming a significant scale threshold for enterprises: large financial groups and leading physical enterprises with sufficient capital and digital infrastructure can fully release risk control efficiency through full-process AI intelligent supervision systems. MSMEs are constrained by capital, technology and professional personnel, unable to unlock value through complete intelligent systems due to excessive input costs. Panjaitan et al. (2024) study Indonesian Islamic banking, proving that systems must add special compliance verification modules to adapt to business demands combining characteristic religious compliance and digital transformation.

Synthesizing three digital empowerment paths: AI intelligent risk control, digital information systems and hedging supervision of new digital risks, the supporting logic framework of digital technologies for internal financial supervision and financial risk control is shown in Figure 2 below:

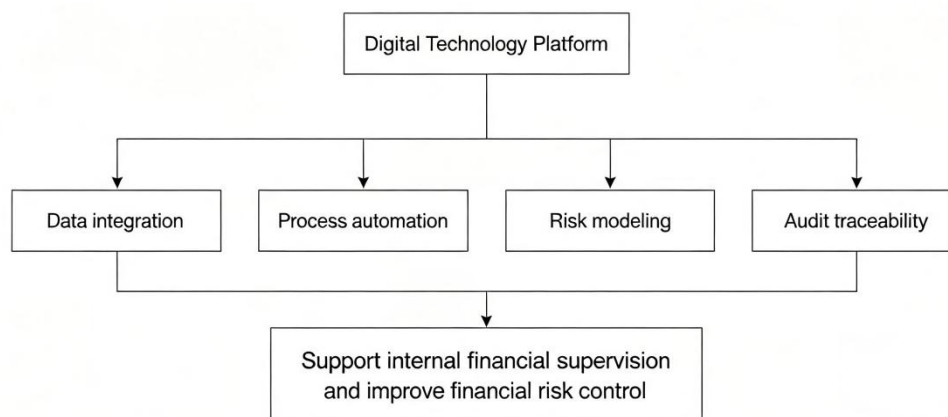


Figure 2. Supporting Logic Framework of Digital Technologies for Internal Financial Supervision and Financial Risk Control

5. Expansion under Heterogeneous Scenarios and Special Perspectives

5.1 Heterogeneity of Industries and Enterprise Scales

The strength of risk inhibition effects and supervision priorities of internal financial supervision feature significant regulatory differences,

requiring differentiated supervision systems for entities of various industries and scales. Financial industries (commercial banks, microfinance, Islamic finance) are characterized by high leverage, rapid capital circulation and strong risk contagion, with internal financial supervision adding special control modules for credit approval, liquidity positions and customer fund isolation (Ngo & Trinh, 2025; Kahihu et al., 2021). Public universities and public institutions mainly rely on fiscal allocations, with supervision focuses on budget control, special fund earmarking and infrastructure fund auditing (Kalevor et al., 2024). Threshold effect empirical research by Huang et al. (2025) confirms that enterprise scale positively regulates risk control benefits of digital financial supervision, with larger scale generating more prominent risk reduction effects from digital investment.

5.2 Green Finance and Sustainable Development Perspective

Dual carbon goals drive rapid expansion of green investment and financing, extending internal financial supervision to brand-new fields including green project capital control and ESG information disclosure risk control. Kushnir et al. (2023) build a digital financial monitoring system integrating sustainable economy and green finance, focusing on supervising usage of green subsidies and low-carbon project special funds to prevent misappropriation of green funds and fictitious green investment. Landi et al. (2022) empirically verify a significant negative correlation between ESG ratings and corporate financial risks, proving that sound internal financial supervision guarantees truthful and complete disclosure of environmental and social expenditures, optimizing market risk pricing. Oman et al. (2024) adopt a macro supervision perspective of central bank ecological transition,

proposing optimized paths for internal financial supervision adapting to green industries and low-carbon transformation enterprises, providing macro institutional basis for physical enterprises to build special green supervision frameworks.

5.3 Supervision under Economic Crisis and Cyclical Fluctuation Scenarios

Financial risks break out intensively under extreme scenarios including macroeconomic downturn, industrial systemic crises and drastic market fluctuations, further highlighting the risk hedging and operational buffering value of internal financial supervision. Tanbour et al. (2026) adopt Palestinian banking crises as case studies, demonstrating that banks with hierarchically complete internal financial supervision systems suffered significantly smaller liquidity gaps and non-performing loan scales during crises compared with peers with weak internal controls. Regular supervision can reserve cash flow buffers in advance and strictly control high-risk credit lending to reduce losses from extreme shocks. Stellinga (2020) adopt a macroprudential policy perspective proposing endogenous pro-cyclical characteristics of financial risks: enterprises blindly expand during economic upturns accumulating liability risks, and regular internal financial supervision can counter-cyclically constrain excessive investment and financing to hedge cumulative cyclical risks. Zhuang & Wei (2023) construct a regional financial risk early warning model integrating legal systems, proving that regular corporate internal financial supervision coordinated with regional financial supervision and legal constraints blocks cross-industry and cross-regional transmission of risks from individual enterprises and prevents regional financial crises.

6. Discussion

First, a complete basic theoretical analysis framework has been established. Scholars clearly define conceptual boundaries and subordinate relationships among internal financial supervision, internal control and financial risk control, relying on four classic theories: principal-agent theory, enterprise risk management theory, institutional economics theory and signaling theory to decompose four risk transmission paths: institutional, process, personnel and internal-external collaborative, forming a complete basic theoretical analysis system of "internal financial supervision – financial risk control" and providing unified theoretical support for subsequent empirical research (Fritze & Jockel, 2025). Second, research scenarios continue to diversify, covering profit and non-profit entities, financial and physical industries, local and multinational enterprises, and regular operation and crisis fluctuation scenarios, generating differentiated empirical conclusions by scenario to meet theoretical reference demands of various operating entities. Third, research methodologies keep iterating and innovating, with traditional qualitative normative analysis deeply integrated with quantitative tools including panel regression, Bayesian statistics, machine learning modeling and multi-case comparison. A large number of intelligent early warning model outcomes enrich theoretical systems of digital intelligent supervision. Fourth, research closely follows global economic development frontiers, forming complete cutting-edge branch research centered on digital economy, green finance, platform economy and ESG sustainable governance, providing practical implementation basis for enterprises to cope with new digital and green investment-financing financial risks.

Existing literature as a whole suffers from the problem of homogeneous universal framework research dominating while insufficient excavation of differentiated internal action mechanisms for heterogeneous scenarios. Most outcomes only construct universal supervision and risk control systems, with scattered research on exclusive adaptation supervision mechanisms for emerging special business forms including private MSMEs, cross-border e-commerce platforms, green low-carbon enterprises and Islamic characteristic financial institutions, lacking systematic comparative analysis of multiple entities. Digitalization research over-focuses purely technical development such as algorithm model construction and risk early warning indicator design, with shallow discussion on practical implementation issues including internal institutional restructuring, functional transformation of finance and internal audit staff, balance between digital software and hardware input costs and benefits, and online data security governance during digital supervision system implementation, generating obvious disconnection between technical theoretical research and real corporate operation practices. Most existing studies separately analyze the risk inhibition effect of internal financial supervision as a single factor without systematic sorting of multi-dimensional coupling and collaborative mechanisms among internal supervision, external financial supervision, corporate governance structures and ESG sustainable governance, failing to form an integrated multi-layer risk control theoretical framework. Meanwhile, the vast majority of research selects samples from stable regular operation cycles for analysis, with fragmented research on emergency control procedures and long-term risk hedging mechanisms of

internal financial supervision under extreme scenarios including economic downturn, industrial systemic crises and regional financial shocks, failing to form a unified complete crisis-oriented supervision theoretical system.

Internal financial supervision constitutes an irreplaceable endogenous core governance tool for enterprises to control various financial risks. The four transmission paths: institutional restraint, full-process closed-loop control, personnel behavioral governance and internal-external regulatory collaboration jointly form a complete traditional supervision and risk control system, capable of continuously inhibiting various traditional financial risks including operational, compliance, fraud, liquidity and credit risks across the full chain of business sources, operational processes and post-event rectification, serving as the core starting point of regular corporate risk control.

Digital technologies including big data, artificial intelligence and integrated financial information systems act as important enabling carriers for upgrading internal financial supervision, optimizing traditional supervision models from three dimensions: risk identification efficiency, supervision coverage breadth and real-time early warning capacity. Nevertheless, digital transformation is not risk-free, simultaneously spawning new financial risks including data leakage, algorithm decision bias, abuse of system access rights and online transaction fraud. Enterprises cannot solely pursue technical implementation, and must build supporting special digital supervision, data security audit and regular algorithm verification mechanisms to balance benefits of technical empowerment and hidden new digital risks.

The risk inhibition effect of internal financial supervision is not fixed,

continuously regulated by multiple factors including industrial operational attributes, corporate asset scale, macroeconomic cycles and external financial regulatory policies, with no universal standardized supervision system adaptable to all enterprises. Financial institutions, public institutions, MSMEs and multinational groups feature drastically different operational logics, capital structures and risk points. All types of market entities need to build hierarchical differentiated exclusive supervision frameworks matching their own business characteristics and resource constraints, avoiding supervision failure or cost waste caused by copying universal internal control systems.

From a macro financial governance overall perspective, external financial supervision and green transformation policies continuously force enterprises to optimize internal financial supervision institutions, forming a dual-layer collaborative risk control pattern of external policy constraints and internal supervision implementation. Future corporate financial risk control will no longer be limited to single internal financial management behaviors, but a systematic long-term governance project coordinated by multiple dimensions including digital technologies, internal corporate governance, macro regulatory policies and sustainable development goals. Enterprises need to connect linkage channels between internal supervision and external compliance, ESG management and macro policy requirements to build a long-term integrated risk control system.

7. Conclusions and Future Prospects

Through systematic review of literature on internal financial supervision and financial risk control, this paper clarifies conceptual connotations, basic theories, traditional

effect transmission paths, digital technology empowerment mechanisms and expanded research on heterogeneous scenarios, integrating empirical and case research conclusions across multiple industries to form complete hierarchical research summaries. Overall, existing research has built relatively mature theoretical analysis frameworks, clearly verified the inhibitory effect of internal financial supervision on various financial risks, and extended to cutting-edge research fields including digitalization, green finance and crisis emergency response, yet the research system still suffers from structural shortcomings unable to fully adapt to complex and volatile current corporate operation environments. Detailed core conclusions are as follows: First, relying on four transmission paths: institutional restraint, full-process closed-loop control, personnel behavioral governance and internal-external regulatory collaboration, internal financial supervision runs through the full pre-event, in-process and post-event financial activity chain, mitigating various traditional corporate financial risks across multiple layers including sources, processes and post-event rectification, serving as the core and most stable endogenous support mechanism of financial risk control. Second, digital tools including big data, artificial intelligence, machine learning and integrated financial information systems can significantly lift risk identification accuracy, supervision coverage scope and early warning timeliness of internal financial supervision, yet digital transformation simultaneously spawns new financial risks such as data security and algorithm bias. Enterprises must build supporting special digital supervision and data security audit mechanisms to realize two-way balance between technical empowerment and new digital risk

governance. Third, the risk inhibition effect of internal financial supervision features prominent heterogeneity, regulated by industrial attributes, enterprise scale, operation scenarios and macro regulatory policies, with no unified universal framework applicable to all entities. Fourth, although current research in this field has formed a complete basic theoretical system, obvious shortcomings exist in four domains: exclusive supervision mechanisms for differentiated scenarios, practical governance of digital implementation, multi-dimensional element collaborative coupling and emergency supervision under extreme crisis scenarios, generating disconnection between theoretical research and real corporate risk control practices unable to fully adapt to complex and diversified corporate financial risk control demands under the background of digital finance and green low-carbon transformation.

Future academic research can focus on three core directions for in-depth expansion: First, continuously deepen research on heterogeneous differentiated mechanisms. Target special operating entities including MSMEs, cross-border e-commerce platforms, green low-carbon physical enterprises and Islamic characteristic financial institutions, compare optimal construction modes of internal financial supervision for enterprises of various asset scales, property rights and industrial types, clarify transmission mechanisms of regulatory effects by internal corporate characteristics, and build exclusive financial supervision and risk control theoretical systems divided by scenario and entity. Second, prioritize research on practical governance of digital supervision implementation, breaking the limited perspective of single algorithm early warning model development, systematically explore

supporting internal institutional restructuring, functional transformation of finance and internal audit staff and balance mechanisms of digital input costs and benefits during implementation of intelligent financial supervision systems, and construct complete supporting constraint systems for new digital risks including data leakage, algorithm bias and out-of-control system access rights. Third, comprehensively expand research on multi-agent multi-dimensional collaborative control systems, integrate

four core dimensions: internal financial supervision, external financial supervision, ESG sustainable governance and modern corporate governance, analyze internal paths of mutual coupling and linkage empowerment among various elements, and build a long-term collaborative financial risk supervision and prevention system covering both regular stable operation cycles and extreme scenarios including economic crises and industrial shocks.

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