

Financial Risk Assessment of New Retail Enterprises Based on the Entropy Weight Method A Case Study of Bailian Group

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Abstract

The digital economy is driving traditional retail businesses to accelerate their transformation. The establishment of online platforms, the conversion of shops into smart stores, and the digital upgrading of supply chains require substantial capital investment, whilst the uncertainty surrounding returns on investment further exacerbates the financial risks faced by these businesses. This study takes Bailian Group as its research subject, selects its financial data from 2020 to 2024, identifies financial risks during the corporate transformation phase from three dimensions—financing, investment, and operations—constructs a financial risk evaluation system comprising 12 indicators, and employs the entropy weight method to conduct quantitative measurement. Research indicates that Bailian Co., Ltd. faces issues such as a short-term bias in its debt structure, insufficient safeguards for short-term debt repayment, low returns on external investments and a sustained decline in asset operational efficiency. The comprehensive financial risk of the enterprise exhibits a phased pattern of initial decline followed by a rebound, with financing risk constituting the primary factor affecting corporate financial security. Accordingly, risk prevention and control strategies are proposed in terms of optimizing capital structure, standardizing the full investment process, and refining operational management, thereby providing practical references for the transformation of other traditional retail enterprises.

Keywords

New Retail; Financial Risk; Entropy Method; Bailian Co., Ltd.

1. Introduction

Digital technologies such as big data and artificial intelligence are becoming deeply integrated with the real economy, driving the rapid adoption of new retail models. With data as its core driving force, new retail is reshaping the commercial elements of 'people, goods and venues', and bridging the gap between online and offline consumer scenarios[1]. However, the transition to new retail constitutes a capital-intensive transformation. The development of digital systems, the refurbishment of physical store environments and the establishment of omnichannel supply chains all require sustained financial investment. Given the long payback periods for such projects, financial risks relating to fundraising, investment and operations continue to accumulate as enterprises pursue business innovation [2].

As a state-owned, listed comprehensive retail company in the Yangtze River Delta region, Bailian Co., Ltd. operates across a diverse range of business formats, including department stores, shopping centres, supermarket chains and outlet centres, and possesses extensive physical retail assets. Since the emergence of the 'new retail' concept, the company has launched the 'i-Bailian' online platform, entered into a strategic partnership with Alibaba, advanced the digital transformation of its stores, and created consumer experiences tailored to a younger demographic. Amid these large-scale transformation investments, the company's

debt-to-equity ratio has remained at a high level for an extended period, asset turnover efficiency has come under pressure, and potential financial risks have gradually come to light. Existing literature on 'New Retail' has largely focused on transformation pathways and the optimisation of profit models. Case studies addressing financial risks in retail enterprises are becoming increasingly abundant, with some scholars conducting research on risk identification and management using Yonghui Supermarkets, Tianhong Co., Ltd. and Suning.com as case studies [3–5]. Against this backdrop, this paper selects Bailian Co., Ltd. as a case study to identify and measure the financial risks involved in its 'New Retail' transformation, propose preventive and control measures, and provide practical insights for the transformation of similar traditional retail enterprises.

2. Relevant Concepts and Theoretical Foundations

(I) Core Concepts

1. New Retail Model

New retail leverages internet-based digital technologies to integrate online and offline retail resources, adopting a consumer-demand-centric approach. By employing big data to analyze consumer behavior, it establishes seamless connectivity across online transactions, offline experiences, and logistics delivery, thereby enabling flexible switching among multiple consumption scenarios [6]. Physical stores assume experience-oriented service functions, while online platforms facilitate convenient transactions. Supported by digitalized supply chains, this model reduces inventory losses and enhances overall operational efficiency [7].

2. Financial Risk

Financial risk refers to the possibility that a firm's actual financial outcomes deviate from expectations due to various uncertain factors, resulting in economic losses. Internal causes include imbalanced capital structure, erroneous investment decisions, and ineffective working capital management; external causes encompass macroeconomic fluctuations, intensifying industry competition, and shifting consumer demand [2]. According to the fund flow process, financial risk is categorized into financing risk, investment risk, and operational risk, permeating the entire business operation cycle [8].

(II) Theoretical Foundations

Financial Risk Management Theory. The complete process comprises risk identification, risk evaluation, and risk response. Financial risk undergoes an evolutionary process from latent accumulation to crisis outbreak. Enterprises are required to implement full-process control by integrating qualitative and quantitative methods to mitigate the impact of risk on operations [8].

Capital Structure Theory. The trade-off theory posits that debt financing yields interest tax shield benefits, yet excessive leverage elevates bankruptcy risk. Enterprises must weigh the benefits of debt against debt-servicing pressure, rationally allocate long-term and short-term debt, avoid financing long-term investments with short-term debt, and balance enterprise value growth with financial security [4].

Financial Ratio Analysis Theory. By calculating interrelated indicators from financial statements and conducting vertical trend analysis and horizontal industry benchmarking, this theory quantitatively reflects solvency, profitability, and operational capacity, identifies abnormal operational signals, and provides data support for risk assessment [5].

3. Current Operational and Financial Status of Bailian Co., Ltd. in the Context of New Retail

(I) Company Overview

Shanghai Bailian Group Co., Ltd. is a state-controlled, listed retail company. Its core business is divided into three major segments: department stores and shopping centres, supermarket chains, and outlet centres, with its stores concentrated in the Yangtze River Delta region. In 2016, the ‘i Bailian’ platform was launched, marking the official commencement of the New Retail transformation and the roll-out of the ‘Bailian to Home’ delivery service. Since then, the company has continued to advance the digital upgrading of its various business formats and integrate membership and inventory data. In 2023, it created experiential spaces such as the ‘Bailian ZX Creative Hub’ and implemented the ‘Digital and Intelligent Outlet’ project, gradually building a New Retail system characterised by comprehensive digitalisation and omnichannel coordination.

(II) Key Financial Position

Table 1. Key Financial Data for Bailian Co., Ltd. (Unit: 100 million yuan)

Items	2020	2021	2022	2023	2024
Total Assets	542.60	578.50	578.00	562.70	563.50
Total Liabilities	327.90	373.70	377.80	366.50	351.30
Net Cash Flow from Operating Activities	43.90	37.23	34.03	36.23	34.25
Operating Revenue	352.20	346.50	322.90	305.20	276.70
Net Profit	7.62	6.33	5.99	-0.57	13.83

Data source: Annual reports of Bailian Co., Ltd., 2020–2024

In terms of assets and liabilities, total corporate assets peaked in 2021 before declining slightly; total liabilities reached a high in 2022 and have declined year by year thereafter, with the debt-to-asset ratio remaining within the 60%–65% range over the long term, indicating relatively high debt pressure. Regarding cash flow, operating cash flow remained consistently positive but the capacity for self-generated cash weakened somewhat; investing cash flow fluctuated significantly, corresponding to capital expenditures on digitalization and store renovations; financing cash flow recorded net outflows for five consecutive years, primarily attributable to principal repayment and dividend distributions. At the profitability level, operating revenue continued to contract, while profits declined initially before recovering; net profit turned negative in 2023 and profitability recovered in 2024, yet revenue decline remains a persistent challenge.

4. Identification of Financial Risks at Bailian Co., Ltd.

(I) Identification of Financing Risks

Table 2. Debt Structure of Bailian Co., Ltd.

Items	2020	2021	2022	2023	2024
Proportion of Current Liabilities (%)	72.49	65.11	67.31	70.04	70.77
Asset-Liability Ratio (%)	60.43	64.6	65.36	65.13	62.34

Data source: Annual reports of Bailian Co., Ltd., 2020–2024

Bailian Group exhibits pronounced short-term debt concentration, with current liabilities accounting for 70.77% of total liabilities in 2024. Given that new retail stores and digitalization constitute long-term asset investments heavily reliant on short-term debt, the company faces latent risks of financing long-term assets with short-term liabilities and significant pressure from concentrated debt repayment. Its debt-to-asset ratio has remained elevated within the

industry over an extended period. Compared with industry peers, the company's current ratio and quick ratio persistently fall below industry averages, with quick assets insufficient to fully cover short-term obligations. Should operating cash flow fluctuate, the company would be exposed to liquidity risk. While its long-term solvency position remains more stable than that of highly leveraged peers such as Yonghui, there is still room for optimization in its capital structure.

(II) Identification of Investment Risks

Table 3. Bailian Group's Domestic Investment Cash (Unit: 100 Million Yuan)

Report Date	2020	2021	2022	2023	2024
Cash Paid for Acquisition and Construction of Long-term Assets	14.49	15.53	9.14	11.26	10.11
Net Cash Received from Disposal of Long-term Assets	3.45	0.42	0.62	0.11	0.05

Data source: Annual reports of Bailian Co., Ltd., 2020–2024

With regard to domestic investment, between 2020 and 2021, the company increased its investment in smart stores and digital hardware and software, but investment contracted from 2022 onwards; however, funds recovered from the disposal of long-term assets have declined sharply year on year, and it has proved difficult to realise the value of existing capital-intensive assets, resulting in funds being tied up for extended periods and posing a risk of impairment. External investment expanded significantly in 2024, whilst investment returns have remained consistently low. Substantial capital outlays have not yielded commensurate returns, further depleting the company's cash flow and amplifying investment risks.

(III) Identification of Operational Risks

Table 4. Operational Performance Indicators for Bailian Co., Ltd.

Indicators	2020	2021	2022	2023	2024
Total Asset Turnover (times)	0.64	0.62	0.56	0.54	0.49
Inventory Turnover Days (days)	44.73	46.82	51.85	53.08	47.77
Accounts Receivable Turnover Days (days)	8.43	8.45	8.06	8.97	11.09

Data source: Annual reports of Bailian Co., Ltd., 2020–2024

Between 2020 and 2024, the total asset turnover ratio fell from 0.64 to 0.49, indicating a sustained decline in overall asset operational efficiency; the growth in asset size did not translate into a corresponding increase in revenue. Inventory turnover days rose steadily from 2020 to 2023; although they fell in 2024, they remained higher than at the beginning of the period, with the multi-channel model—combining online and offline sales—making it more difficult to coordinate inventory management. Days sales outstanding (DSO) have risen year on year, with the pace of cash collection slowing; multi-channel settlement processes have made working capital management more challenging. The decline in asset turnover efficiency and the slowdown in cash collection constitute the primary operational risks.

5. Comprehensive Evaluation of Financial Risk Based on the Entropy Method

(I) Selection of Evaluation Indicators

In accordance with the principles of systematicity, comparability and practicability, 12 indicators have been selected from the dimensions of financing, investment and operations to construct the evaluation framework. Financing: debt-to-asset ratio (negative), current ratio, quick ratio, interest-bearing debt ratio; Investment: Return on Total Assets, Net Profit Margin, Cost-to-Profit Ratio, Cost as a Proportion of Operating Revenue; Operations: Inventory Turnover Ratio, Accounts Receivable Turnover Ratio, Current Asset Turnover Ratio, Total Asset Turnover Ratio [8]. For positive indicators, a higher value indicates lower risk; for negative indicators, a lower value indicates lower risk.

(II) Brief Steps of the Entropy Method

The entropy method relies on the degree of dispersion of indicators to assign objective weights, thereby avoiding human subjective bias. Steps: ① Standardise and normalise positive and negative indicators; apply a slight shift to avoid logarithmic failure; ② Calculate the sample proportion of each indicator; ③ Calculate information entropy and the coefficient of variation; ④ Derive the weights for each indicator.

(III) Analysis of Evaluation Results

Table 5. Summary of Dimension Weights and Composite Scores

Indicator Group	Comprehensive Weight	2020	2021	2022	2023	2024
Financing Risk	0.3894	0.1941	0.0358	0.185	0.1825	0.316
Investment Risk	0.3208	0.195	0.1842	0.0775	0.0597	0.222
Operating Risk	0.2898	0.2487	0.2078	0.1385	0.0814	0.0619
Comprehensive Score	-	0.6378	0.4278	0.401	0.3236	0.5999

Financing risk carries the highest weight and constitutes the primary factor affecting corporate financial security. The financing risk score rose markedly in 2024, underscoring contradictions in debt structure. Investment risk declined initially before rebounding, with profitability recovering yet asset turnover continuing to drag on performance. Operational risk scores declined year by year, with inventory management improving, while receivables and current asset turnover continued to deteriorate. The composite score exhibited a pattern of initial decline followed by a rebound: it fell to near the moderate-risk threshold in 2023 and rebounded to the sub-severe risk range in 2024, indicating that financial risk in new retail transformation does not decline unidirectionally, and that multiple risks may resurge during the deepening phase of transformation.

6. Financial Risk Prevention and Control Measures

(I) Optimizing the Capital Structure

Optimize the debt maturity mix and appropriately increase equity financing. Utilize targeted share issuance to introduce strategic investors, raise the proportion of medium- and long-term debt, align with the long-term project cycles of store operations and digitalization, and avoid financing long-term investments with short-term debt. Coordinate cash flows across financing, operations, and investment to control cash consumption from investment activities. Expand diversified financing instruments such as supply chain finance and convertible bonds.

(II) Standardizing the Full Investment Process

For internal investment, comprehensively review existing assets. Revitalize low-efficiency and idle heavy assets through transfer and leasing; direct new investment toward digitalization of core operations and renovation of core stores, conduct thorough input-output assessments, and establish a full-lifecycle asset evaluation mechanism. For external investment, strengthen pre-investment due diligence. Prioritize projects that generate synergies with the core retail

business and eliminate blind cross-industry expansion; conduct monthly post-investment tracking of project profitability and cash flow, implement timely stop-loss measures for underperforming projects, set investment scale red lines linked to operating cash flow and debt-servicing capacity. Prioritize the use of operating surplus funds for investment, reduce the use of debt funds for investment, and prevent investment risks from transmitting to the financing side.

(III) Refined Operational Management

Leverage digitalization to integrate online and offline inventory, apply big data demand forecasting to implement sales-driven procurement, accelerate the clearance of slow-moving inventory, and conduct regular inventory impairment testing. Establish a customer credit grading system, control the scale of credit sales, strengthen accounts receivable collection, and reduce bad debt risk. Dispose of low-efficiency assets, phase out loss-making stores, concentrate resources on core business development, connect supply chain data links, and enhance collaborative efficiency. Build operational risk early-warning mechanisms, monitor receivables, inventory, and total asset turnover indicators, facilitate cross-departmental data sharing, and prevent operational risks from transmitting externally.

7. Conclusion

Taking Bailian Co., Ltd. as a case study, this paper employs the entropy method to identify and quantitatively assess the financial risks associated with its new retail transformation. The study found that Bailian Co., Ltd. faces issues such as the short-term nature of its debt on the financing side and insufficient capacity to meet short-term debt obligations; heavy asset utilisation and relatively low returns on external investments on the investment side; and a decline in total asset turnover efficiency on the operational side. The comprehensive risk score indicates that financial risks exhibit a phased pattern of initially declining and then rebounding, with financing risks being the primary source of risk.

Traditional retail enterprises are advancing their new retail transformation. Digitalisation and the upgrading of retail scenarios require substantial capital investment; whilst pursuing business transformation, enterprises must simultaneously improve their financial risk management. They should optimise their capital structure, standardise investment decision-making and enhance asset operational efficiency to achieve synergy between transformative development and financial security. As this paper constitutes a single-case study, future research could expand the sample size to explore the practical application of digital early-warning tools.

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