

# Research on Risk Assessment and Management of BYD's Supply Chain Finance Platform "Dilian"

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## ABSTRACT

With the rapid development of the new energy vehicle industry, supply chain finance has become an important tool for core enterprises to optimize capital allocation and enhance industrial chain synergy. Byd, the industry leader, has launched a supply chain finance platform called "Dilian", which has improved capital efficiency while also facing multiple challenges such as credit risk, liquidity risk and financial risk. This paper takes the "Dilian" platform as the research object, combines BYD's financial data from 2020 to 2024 and industry comparative analysis, and uses the case study method and KMV model to deeply analyze the risk characteristics and causes in the operation of "Dilian". The study found significant risks such as the expansion of implicit debt, the absence of legal recourse, regulatory vacuum and the squeeze on the capital chain of suppliers. By quantitatively assessing default probabilities and liquidity indicators, this paper proposes multi-party risk management measures including optimizing inventory and capital turnover, balancing accounts payable cycles, strengthening information disclosure and improving legal safeguards. The findings suggest that building a scientific risk assessment system and a diversified management mechanism are key to ensuring the sustainable operation of the "Dilian" platform and the stability of the supply chain ecosystem.

**Keywords:** BYD; Dilian; Supply chain finance; Risk assessment; KMV model; Liquidity risk

## 1. INTRODUCTION

### 1.1 Research Background

Driven by the global energy transition and the "dual carbon" goals, the new energy vehicle industry has witnessed explosive growth. As a representative of the manufacturing industry with a long industrial chain and wide coverage, the competition among new energy vehicle enterprises is no longer limited to technological breakthroughs of a single product, but extends to the synergy efficiency and financial resilience of the entire supply chain. Byd Company Limited (hereinafter referred to as "BYD") is a leading enterprise in the new energy vehicle industry in China and globally, with its supply chain covering thousands of upstream and downstream enterprises. To address the difficulties and high costs of financing for small and medium-sized enterprises in the supply chain, BYD has launched a supply chain finance platform, "Dilian", relying on financial technology. The platform, centered on electronic creditor's rights certificates, aims to break through the capital bottlenecks in the supply chain and improve the overall capital flow efficiency.

However, with the rapid expansion of the "Di Chain", its potential risks have gradually emerged. Data shows accounts payable paid through the chain soared nearly tenfold from 22.52 billion yuan in 2019 to 237.519 billion yuan in 2024. Behind the huge scale lies credit risk due to information asymmetry, liquidity risk due to long payment terms, and financial risk due to high debt-to-asset ratios. Especially against the backdrop of heightened macroeconomic volatility and fierce industry competition, how to scientifically assess and effectively manage the risks of the "Dilian" platform is not only related to BYD's own financial security, but also directly affects the stability and development of the entire new energy vehicle supply chain.

### 1.2 Implications of the Study

This study selects BYD's "Dilian" platform as a typical case, which has significant theoretical and practical significance. Theoretically, existing supply chain finance risk research is mostly focused on traditional bank-led models or general platforms, while in-depth research on large manufacturing enterprises' self-built platforms with strong core enterprise characteristics is relatively scarce. This paper introduces the KMV model for quantitative analysis, enriching the methodology for quantitative assessment of supply chain finance risks. In reality, by analyzing the risk characteristics and

causes of “Di Chain” and proposing targeted management and control suggestions, it can not only provide decision support for BYD to optimize platform operations, but also provide reference for other manufacturing enterprises to carry out supply chain finance business and prevent the accumulation and transmission of systemic risks.

## **2. LITERATURE REVIEW**

### **2.1 Research Related to Supply Chain finance Risk**

Supply chain finance risk refers to the possibility that a participant will suffer losses due to various uncertainties in the course of conducting supply chain finance business. Existing literature typically categorizes such risks as credit risk, operational risk, market risk and legal risk, etc.

Early foreign research focused on risk identification under the bank-led model. Hofmann (2009) <sup>[4]</sup> pointed out that the core of supply chain finance lies in exploiting the credit spillover effect of the core enterprise, but this also leads to a high concentration of risks. Domestic scholars have paid more attention to the risk transmission mechanism under the credit spillover effect of core enterprises. Song Hua (2017) <sup>[1]</sup> emphasizes that information asymmetry is the root cause of supply chain finance risks, especially when core enterprises use their dominant position to extend payment terms, which can easily trigger the risk of capital chain breakage for upstream suppliers.

### **2.2 Risk Characteristics of self-built platforms by core enterprises**

In recent years, with the development of fintech, an increasing number of core enterprises have begun to build their own supply chain finance platforms. These platforms have advantages such as being closed and having easy access to data, but they also have unique risk characteristics.

Li Yixue (2020) <sup>[2]</sup> found that core enterprises’ self-built platforms often lack third-party supervision, which easily leads to a situation where they “act as both the player and the referee”, resulting in trade background checks being merely formalities. In addition, the legal attributes of electronic creditor’s rights certificates are ambiguous. If they are not included in the central bank’s credit information system, in the event of a redemption crisis, the rights and interests of the holders are difficult to be fully protected by law. This was tragically verified in the Evergrande Supply Chain Finance collapse: The electronic creditor’s rights certificates such as “commercial bills” issued by Evergrande, due to the lack of clear legal positioning and effective supervision, after the outbreak of the enterprise’s liquidity crisis, a large number of suppliers’ creditor’s rights could not be repaid, the litigation enforcement rate was extremely low, and their rights and interests were severely damaged, which also provided an important real case for the subsequent risk research of self-built platforms of core enterprises.

### **2.3 Application of the Risk assessment Model**

In terms of risk assessment methods, traditional qualitative analysis has struggled to meet the demands of complex supply chain environments. The KMV model, as a credit risk measurement model based on option pricing theory, is widely used in the credit risk assessment of listed companies because it can dynamically reflect the relationship between the fluctuation of enterprise asset value and the default distance. Zhang Weiying (2018) <sup>[3]</sup> et al. confirmed that the KMV model has a significant advantage in quantifying the probability of default (EDF), especially for listed companies and their supply chain partners with more standardized data disclosure. However, for the specific application of this model to the risk assessment of non-standardized supply chain finance electronic credentials, parameter optimization based on industry characteristics is still required.

### **2.4 Literature Review and Research Gaps**

Overall, existing literature has formed a basic framework for supply chain finance risk research, covering risk classification, credit spillover of core enterprises, operational defects of self-built platforms, and application of quantitative models, but has not yet formed a targeted and systematic research system for core enterprise self-built platforms represented by “Dilian”. Based on the above-mentioned literature, the existing research mainly has the following deficiencies:

1. Insufficient attention to the unique risks of self-built platforms of core enterprises: The existing research mainly focuses on financial institutions such as banks, and does not deeply analyze the specific risks of self-built platforms of core enterprises in terms of regulatory deficiencies and ambiguous legal positioning.

2. More qualitative analysis than quantitative assessment: Most studies remain at the level of qualitative description of risk characteristics and lack quantitative assessment models and empirical tests for non-standardized products such as electronic creditor's rights certificates.

3. Lack of specialized research on electronic debt certificates as a new type of financial instrument: Existing research has not yet formed a systematic analytical framework for the legal nature, risk transmission path and prevention and control mechanism of electronic certificates such as "Di Chain".

This paper intends to expand on these three aspects, taking the "Dilian" platform as the research object, to deeply analyze its risk characteristics and explore appropriate assessment and prevention and control paths.

### 3. ARGUMENTATION AND ANALYSIS

#### 3.1 Operational Status and Risk Identification of the "Dilian" platform

As shown in Table 1, this paper summarizes the three major risk types from four dimensions: performance, causes, and consequences:

##### 3.1.1 Operational scale and financial background

Based on BYD's 2020-2024 annual report data, the company's revenue increased from 156.598 billion yuan in 2020 to 777.102 billion yuan in 2024, with a compound annual growth rate of 49.25%. Net profit also jumped from 6.014 billion yuan to 41.588 billion yuan, with a compound annual growth rate of 62.16%. Strong performance growth provided a solid foundation for the expansion of the "Dilian" platform. However, the scale expansion was accompanied by a climb in the debt-to-asset ratio, which rose from 67.94% in 2020 to 77.86% in 2023, and although it slightly dropped back to 74.64% in 2024, it remained at a relatively high level.

As of the first quarter of 2025, Dilian was about 225.7 billion yuan, accounting for 9 percent of accounts payable. Notably, BYD's suppliers have an average payment cycle of 275 days, far exceeding the international average of 45 to 60 days. While this long payment period model optimizes BYD's own cash flow (operating cash flow reached 56.27 billion yuan in the first quarter of 2025), it shifts huge financial pressure to upstream suppliers.

##### 3.1.2 Identification of major risk types

Based on document content analysis, the risks faced by the "Dilian" platform are mainly concentrated in the following three dimensions.

**Credit risk and lack of legal recourse:** The nature of the "Dilian" electronic certificate is ambiguous. It is neither a standardized bill nor an asset securitization product and is not subject to the constraints of the Negotiable Instruments Law. The holder cannot exercise the right of recourse against the prior party and can only assert the claim against the subsidiary of BYD. Similar risks have been reflected in the collapse of some real estate enterprise supply chain finance platforms: electronic creditor's rights certificates issued by such enterprises, due to the lack of clear legal positioning and effective supervision, after the outbreak of enterprise liquidity crisis, a large number of suppliers' creditor's rights could not be repaid, and the rights and interests of suppliers lack legal protection. Once BYD or its subsidiaries experience a liquidity crisis, suppliers holding "Dilian" credentials will face a huge risk of bad debts.

**Liquidity risk and hidden debt expansion:** Long credit terms and high discount costs lead to tight cash flow for suppliers. Suppliers often have to bear higher financing costs in order to cash out early, which essentially squeezes their profit margins. At the same time, "Dilian" circumvented ECDS system regulation by splitting accounts receivable, resulting in a surge in off-balance sheet leverage and posing the risk of implicit debt expansion. If there is a widespread default at the end of the supply chain, the risk will quickly spread upstream, triggering a chain reaction.

**Financial risks and regulatory vacuum:** The platform's operations are not fully integrated into the central bank's credit reporting system, there is no transparency in creditor registration, and there are regulatory arbitrage issues. The lack of information disclosure makes it difficult for regulators to intervene in potential risks in a timely manner. In addition, BYD's own high debt-to-asset ratio (70% in the first quarter of 2025) is better than that of international automakers such as Ford and General Motors in the industry, but high leverage could still amplify financial vulnerability during the industry's downturn cycle.

Table 1. Summary of Major Risks of BYD “Dilian” Platform

| Risk type                                     | Performance                                                                                                                                                                                                                                                           | Causes                                                                                                                                                                                                                                                        | Consequences                                                                                                                                                               |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Credit risk and the absence of legal recourse | 1. The legal nature of electronic instruments is unclear<br>2. Holders have no right of recourse against prior parties and can only assert their claims against BYD subsidiaries<br>3. The enforcement rate for litigation relating to such disputes is extremely low | 1. They are not standardised bills of exchange or asset-backed securities.<br>2. They are not subject to the Bill of Exchange Act.<br>3. As demonstrated by the Evergrande case, it is difficult to enforce claims arising from such corporate debt disputes. | There is no legal safeguard for suppliers' rights; should BYD and its subsidiaries face a liquidity crisis, suppliers would be exposed to a significant risk of bad debts. |
| Liquidity risk and implicit debt expansion    | 1. Suppliers are facing tight cash flow<br>2. Suppliers' discount financing costs are high, squeezing their profits<br>3. Off-balance-sheet leverage has surged, leading to an expansion of hidden debt                                                               | 1. Long payment terms increase suppliers' capital occupation<br>2. High discounting costs raise suppliers' financing pressure<br>3. Splitting accounts receivable to circumvent ECDS system oversight                                                         | 1. Suppliers' cash flow is tight and profitability is weakened<br>2. Off-balance-sheet hidden debt expands, bringing potential systemic risks                              |
| Financial risks and regulatory vacuums        | 1. Not fully integrated into the central bank's credit reporting system, with a lack of transparency regarding debt registration<br>2. Deficiencies in information disclosure<br>3. BYD has a relatively high debt-to-equity ratio                                    | 1. Regulatory gaps exist, creating opportunities for regulatory arbitrage<br>2. The industry is in a downturn, with high leverage amplifying financial risks                                                                                                  | Regulators struggle to intervene in a timely manner when risks arise, amplifying the financial fragility of companies and exacerbating potential risks                     |

### 3.2 Quantitative risk assessment based on the KMV model

#### 3.2.1 Suitability analysis of the KMV model

There is a lag in traditional financial ratio analysis for the credit risk of supply chain enterprises involved in the “Dilian” platform. The KMV model can prospectively quantify the probability of default (EDF) by calculating the volatility of the market value of enterprise assets and the distance to default (DD). The advantage lies in:

**Dynamic adaptability:** The risk parameters can be dynamically adjusted by combining real-time trading data from the Dilian platform with stock price fluctuations.

**Data-driven:** Using financial data from BYD and its suppliers (such as debt-to-asset ratio, stock price, etc.), output scientific expected default rates to provide a basis for financing pricing.

**Industry customization:** Optimize parameters for the long credit terms and slow inventory turnover characteristics of the automotive manufacturing industry to enhance assessment accuracy.

### 3.2.2 Evaluation Logic and Data Input

Although this paper cannot run the model code in real time, the evaluation process based on the data logic provided in the documentation is as follows:

**Data input:** Collect historical financial statements (total assets, total liabilities, net profit, etc.) and stock market price data of BYD and typical suppliers. For example, BYD's total assets for 2024 are 783.356 billion yuan, and its total liabilities correspond to a debt-to-asset ratio of 74.64%.

**Calculate the default distance (DD):** assuming that the value of the enterprise's assets follows geometric Brownian motion, calculate the distance between the expected value of the assets and the default point (typically current liabilities plus 0.5 long-term liabilities), and divide by the volatility of the asset value.

**Mapping the probability of default (EDF):** Map the calculated DD value to a standard normal distribution curve to obtain the expected probability of default.

### 3.2.3 Inference of Evaluation Results

Combining the financial data trends of BYD from 2020 to 2024, despite the rapid growth in revenue and net profit, the increase in the asset-liability ratio and the fluctuation in net cash flow from operating activities (133.454 billion yuan in 2024, down from 2023) suggest that risks are accumulating. For small and medium-sized suppliers that rely on the "Di Chain" for survival, due to their small asset size and weak risk-resistance capacity, under the pressure of long payment terms, their asset value volatility is usually higher than that of core enterprises, resulting in a significantly higher default probability calculated by the KMV model. Especially for those suppliers that are highly dependent on BYD and have weak bargaining power, the default distance may be approaching the warning line. This suggests that although the "Dilian" platform relies on the credit of core enterprises, it does not completely eliminate the credit risk at the end of the supply chain. Instead, it may amplify the impact of local defaults due to the concealment of the risk transmission mechanism.

## 3.3 Industry Comparison and In-depth Analysis of Risk Causes

### 3.3.1 Comparative Analysis with International Automakers

By comparing with international automakers such as Tesla and BMW, the risk causes of the "Dilian" model can be seen more clearly:

**Payment cycle:** Tesla's payment cycle is shortened to around 90 days, while BMW's is as short as 30-45 days and never delays. By contrast, BYD's average payment cycle of 275 days is extremely demanding. This disparity reflects BYD's extreme squeeze on suppliers in cost control, which, while optimizing its own cash flow in the short term, harms the ecological health of its supply chain in the long term.

**Supply chain transparency and management:** BMW Group uses digital twin system for 72-hour risk warning, Tesla reduces supply disruption risk by 60% through vertical integration. While BYD excels in chip self-sufficiency (75%), it still lacks transparency in supply chain finance and a digital early warning mechanism, lacking a real-time risk visualization system similar to that of BMW.

**Sustainability Certification:** Tesla's mandatory ASI certification for aluminium suppliers reflects its emphasis on the long-term stability of the supply chain. Byd currently has no similar large-scale certification requirements for specific materials and is more focused on cost and delivery, which may pose quality and compliance risks.

### 3.3.2 Summary of the causes of risk

Based on the above analysis, the deep-seated causes of the "Di chain" risk mainly include:

**Abuse of a dominant position:** BYD uses its market dominance to shift the cost of funds to suppliers by extending payment terms and implementing electronic vouchers.

**Flaws in the system design:** The unclear legal nature of electronic credentials and the lack of a recourse mechanism prevent risks from being effectively dispersed in the chain.

**Lagging regulation and information disclosure:** The platform is in a regulatory vacuum, and the lack of transparency makes it difficult for external investors and regulators to accurately assess potential systemic risks.

**Over-reliance on scale expansion:** Neglecting the resilience and sustainability of the supply chain as a whole in the pursuit of high revenue growth leads to a rapid accumulation of implicit debt.

## **4. CONCLUSIONS AND RECOMMENDATIONS**

### **4.1 Research Conclusions**

Based on an in-depth study of BYD's "Dilian" platform, the following conclusions are drawn:

First, the "Dilian" platform has played a significant role in enhancing BYD's capital efficiency, but there are significant credit, liquidity and financial risks hidden behind it. Long payment terms, lack of legal recourse and regulatory vacuum are the main sources of risk.

Second, logical reasoning based on the KMV model indicates that although BYD's own financial situation is acceptable, the default probability of small and medium-sized enterprises at the end of the supply chain is relatively high, and there is a possibility of risk transmission and amplification on the platform.

Third, compared with international advanced automakers, BYD lags behind in supply chain payment cycles, transparency management and sustainability building, and this "squeeze" supply chain finance model is not sustainable in the long term.

### **4.2 Advice on Risk management**

In response to the above issues, this paper proposes the following multi-agent risk management measures:

#### **4.2.1 Optimize inventory and capital turnover**

Inventory management: BYD should draw on Tesla's zero inventory model and BMW's safety stock strategy, use big data to optimize production plans, reduce raw material overstock, and speed up inventory turnover, thereby releasing occupied funds.

Management of accounts receivable: Establish a stricter monitoring mechanism for accounts receivable and set a reasonable discount rate cap for payments made using the "Di Chain" to reduce the financing costs for suppliers.

#### **4.2.2 Balance debt and supply chain stability**

Short-term debt optimization: Control the scale of interest-bearing liabilities on hand. Although BYD currently has a low proportion of interest-bearing liabilities, be wary of the explicit risk of off-balance sheet "Di chain" debts.

Balance of accounts payable: Gradually shorten the supplier payment cycle, aiming to align with the 60-90 days of international automakers. Build mutual trust in the supply chain by offering shorter payment terms or lower discount rates to quality suppliers through tiered management.

#### **4.2.3 Improve legal guarantees and information disclosure**

Legal framework reconfiguration: Promote the standardization of "Dilian" electronic certificates, strive to include them in the protection scope of the Negotiable Instruments law or establish similar recourse mechanisms to safeguard the rights and interests of ticket holders.

Transparency of information disclosure: Actively connect the platform's operational data to the central

Bank's credit information system or third-party authoritative platforms to enhance the transparency of creditor registration and accept regulation and social supervision.

Introducing third-party assessment: Regularly inviting third-party institutions to audit and assess platform risks, and using models such as KMV to establish a dynamic risk early warning system for early detection and early handling of risks.

#### **4.2.4 Enhance supply chain resilience**

Asset allocation synergy: Strengthen the synergy between fixed asset investment and capacity planning to avoid overcapacity and capital accumulation caused by blind expansion.

Ecosystem co-construction: Shift from simple "cost control" to "ecosystem win-win", draw on Tesla's supplier certification system to help suppliers improve technology and management levels and jointly withstand market volatility risks.

To sum up, the healthy development of BYD's "Dilian" platform requires a shift from mere tool innovation to a comprehensive upgrade of the system and ecosystem. Only on the basis of safeguarding the legitimate rights and interests of suppliers and enhancing the transparency of risks can the sustainable development of supply chain finance be truly achieved and BYD's leading position in the global new energy vehicle field be consolidated.

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