Proceedings of Business and Economic Studies, 2025, Volume 8, Issue 2
http://ojs.bbwpublisher.com/index.php/PBES
Online ISSN: 2209-265X
Print ISSN: 2209-2641

A Study on the Impact of Data Assetization on Supply Chain Resilience of SRDI SMEs and the Mechanism of Its Role

Ruohan Kan[1], **Sijia Wang**[2]*

Jiangxi University of Finance and Economics, Nanchang 330013, Jiangxi, China

**Author to whom correspondence should be addressed.*

Abstract: This paper selects the data of China's specialized, special and new "small giants" listed companies from 2011 to 2021, and starts from the key production factor and strategic asset of data assets, empirically examines the impact of data assetization on the supply chain resilience of SRDI SMEs, and examines the impact of data assetization on the supply chain resilience of SRDI SMEs using the role of the mechanism model. Through the mechanism model, the mediating effects of financing constraints and technological innovation are examined, and a path of action is drawn, which provides theoretical evidence and policy recommendations for promoting the digital transformation of SRDI SMEs and improving supply chain resilience.

Keywords: Data assetization; Supply chain resilience; Financing constraints; Technological innovation; SRDI SMEs

Online publication: April 28, 2025

1. Introduction

With the deepening integration of the digital economy and the real economy, specialized, refined, differential, and innovative SMEs (SRDI SMEs) have emerged as pivotal forces in driving innovation and fostering new economic paradigms. However, these enterprises face significant challenges in supply chain management, particularly in adapting to market uncertainties. Against the backdrop of accelerating national data assetization policies, this study addresses a critical question: How can data assetization enhance supply chain resilience for SRDI SMEs? Existing research predominantly examines the financial implications of data assetization or isolated supply chain optimization strategies, overlooking its systemic role in resilience building. To bridge this gap, this paper constructs a novel theoretical framework linking data assetization with supply chain resilience, addressing two core issues: (1) the mechanisms of technological empowerment and value reconstruction, and (2) the heterogeneity of enterprise characteristics and external environments. The possible marginal contributions of this paper are: (1) Theoretical integration: Extending beyond financing-focused studies, this research systematically examines how data assetization integrates internal and external resources to strengthen supply chain resilience. (2) Mechanistic insights: By validating the dual mediating roles of technological innovation and financing constraints, we reveal how data-driven production processes enhance resource utilization and risk response capabilities. (3) Methodological refinement: A three-tier analytical model incorporating regional marketization, policy support, and industry-specific factors is developed to assess the contextual impacts of data assets on resilience.

2. Literature review

2.1. Data assetization

Data assets are data that have application scenarios and have been used repeatedly or continuously for more than one year in the production process. Compared with traditional assets, data assets are characterized by strong versatility, non-consumability, dynamism, and diversity of value creation forms.

Hannila found that integrating IoT data with other data assets (e.g., product, transactional, and interaction data) helps maximize the value of data and supports management decisions [1]. Li *et al.* showed that companies using data assets perform better on ESG metrics [2], with the impact being stronger for firms with low asset turnover, weak market power, high agency costs, missing ESG disclosures, and IT-savvy CEOs. Zhai *et al.* demonstrated that data assetization enhances firms' risk-taking ability and helps them address challenges in business ethics, industry competition, and internal issues [3].

2.2. Supply chain resilience

In economics, "resilience" refers to the ability to withstand and adapt to recover from external risks, as well as the ability of an enterprise to reorganize and transform, and upgrade using internal and external resources. Supply chain resilience refers to the ability to prepare for, respond to, or recover from disruptions in a timely and effective manner to move to a more optimal operating state after the disruption.

Li *et al.* identified six key antecedents in the "supply chain resilience" framework [4], including dynamic capabilities and organizational initiatives, and explored their impact on resilience through factors like resource integration and organizational flexibility. Liang *et al.* found that the three dimensions of supply chain resilience—readiness, alertness, and agility—significantly affect firm financial performance [5]. Sharma Satyendra Kumar *et al.* highlighted those factors like supply chain efficiency [6], collaboration, information technology, complexity, and supplier concentration are key drivers of resilience.

2.3. Research review

Despite the growing interest in "data assetization" and "supply chain resilience," research at their intersection remains limited. Data assetization in China is still in its early stages, with most studies focusing on macro statistics and value assessment rather than on how it can enhance supply chain resilience. Similarly, supply chain resilience research often emphasizes traditional management strategies, overlooking the potential of data assets. Given that SRDI SMEs are vital to China's economy, understanding how data assetization impacts their supply chain resilience can fill existing research gaps and provide practical solutions for improving resilience in the digital economy, fostering high-quality development.

3. Research hypotheses

Data assetization removes time and space constraints, enabling efficient flow and integration of critical resources such as information, knowledge, and technology within SRDI SMEs' supply chains. By effectively utilizing data assets, companies can access real-time insights on market dynamics, customer demand, and inventory, facilitating comprehensive monitoring and accurate forecasting. This accelerates information transfer, promotes collaboration, and enables resource sharing across the supply chain. As data assetization progresses, enterprise boundaries expand, forming a new value creation model based on data. Sharing data assets fosters collaboration and co-innovation, creating a strategically integrated ecosystem. In this ecosystem, enterprises can quickly identify and leverage complementary resources, building a stable supply chain that responds effectively to market changes and external risks. Based on this, the paper proposes the following hypothesis:

H1: Data assetization helps enhance the supply chain resilience of SRDI SMEs.

Data assetization, a key component of the digital economy, boosts enterprise innovation and supports real economy growth. By transforming data into valuable assets through analysis, orchestration, and governance, it provides clearer usage scenarios and market insights. This process reduces development costs and enhances the adoption of technologies like cloud computing, IoT, and AI, improving operational efficiency and fostering innovation for SRDI SMEs. Data assetization also facilitates collaborative innovation, enabling data sharing across supply chains, improving early warning systems, and reducing disruption losses. Based on this, the paper proposes the following hypothesis:

H2: Data assetization can improve the technological innovation vitality of enterprises, and then enhance the supply chain resilience of SRDI SMEs.

Data assets have significant positive externalities, enabling enterprises to access creditor information at lower costs, enhance trust, and alleviate financing issues for technological innovation. Digital finance has expanded financial services, improved capital utilization, and alleviated enterprise financing constraints. Data assetization boosts transparency, optimizes the information flow between enterprises and capital providers, and breaks data silos. This improves resource allocation, profitability, and financial support, which strengthens supply chain management, production efficiency, and resilience. Based on this, the paper proposes the following hypothesis:

H3: Data assetization can alleviate financing constraints and thus enhance the supply chain resilience of SRDI SMEs.

4. Study design

4.1. Sample selection and data sources

This paper uses data from A-share and New Third Board “small giants” listed companies (2011–2021). The SRDI concept was introduced in the 2011 “Report on China’s Industrial Development and Industrial Policy,” marking 2011 as the sample’s starting point. Based on He *et al*. [7], 786 “small giant” firms were identified, with further sample screening excluding financial industry firms, ST and ST firms, and those with missing data. The final sample includes 398 companies and 1,635 firm-year observations. To address outliers, the paper applies 1% winsorization to continuous variables, using financial data from the CSMAR database.

4.2. Definition of variables

4.2.1. Explained variable: Supply chain resilience (SCR)

This paper measures supply chain resilience using two indicators: supply chain relationship stability (SCRe) and supply chain resistance (SCRn). SCRe, based on Cull *et al*. [8], is the natural logarithm of the ratio of accounts receivable to revenue, where lower values indicate stronger supply chain relationships. SCRn, following Wang *et al*. [9], is calculated using the Herfindahl index, which measures a firm’s dependence on its top five customers. Higher values suggest greater exposure to customer churn risks. The supply chain resilience (SCR) index is calculated as SCR = 0.5 × SCRe + 0.5 × SCRn.

4.2.2. Core explanatory variable: Degree of enterprise data assetization (DA)

Based on the existing studies, this paper takes the texts of laws and regulations related to data assets as the corpus, and uses "information," "network," "digital" and "data" as the seed words to construct the similar word sets of these four seed words using Word2Vec neural network model and deep learning technology. "data" as the seed vocabulary, using Word2Vec neural network model and deep learning technology to construct the similar words of these four seed vocabulary words, and referring to the study of He *et al*. [2], we classify the data assets into own-use data assets (ODA) and transactional data assets (DDA) according to the specific use, so that we can analyze the enterprise data assets more deeply, and then we can analyze the data assets more deeply, so that we can analyze the enterprise data assets more deeply. Thus, the value of enterprise data assets can be analyzed more deeply.

4.2.3. Control variable

Referring to Zhang *et al*. [10], this paper selects the following characteristic variables to further control the potential factors affecting firms' supply chain resilience. These include: firm size (size, natural logarithm of total assets at the end of the year), firm age (EstAge, years of establishment), gearing ratio (LEV, total liabilities /total assets), growth (Growth, growth in total assets at the end of the year/total assets at the beginning of the year), net cash flow (OCF, net cash flow from operating activities/total assets), and return on total assets (ROA), net profit/total assets.

4.3. Model construction

To test the impact of data assetization on the supply chain resilience of SRDI SMEs, the benchmark regression model of this paper is set as follows:

$$SCR_{it} = \beta_0 + \beta_1 DA + \beta_1 Controls_{it} + \varepsilon_{it} \quad (1)$$

In Eq. (2), *i* and *t* denote enterprise and time, respectively; the explanatory variable SCR represents supply chain resilience; the explanatory variable DA represents the degree of data assetization, and the coefficient β_1 denotes the degree of DA's influence on supply chain resilience; controls are an enterprise-level control variable. All regressions control for industry fixed effects (Ind) and year fixed effects (Year).

To test H2 and H3, this paper refers to the mediation effect research method of Jiang [11], and simplifies the mediation effect three-step test model to a two-step method. Set up model (2) to examine the impact of the technological innovation role mechanism, and set up model (3) to examine the impact of the financing constraints role mechanism:

$$InTen_{it} = \beta_0 + \beta_1 DA + \beta_1 Controls_{it} + \varepsilon_{it} \quad (2)$$

$$FC_{it} = \beta_0 + \beta_1 DA + \beta_1 Controls_{it} + \varepsilon_{it} \quad (3)$$

Following Shi *et al*. [12], we measure corporate technological innovation (lnTen) using the ratio of R&D investment to operating income. For financing constraints (FC), we adopt Li *et al*.'s approach, constructing an index from six indicators: cash ratio, firm size (log of total assets), age, liquidity ratio, fixed assets ratio, and accounts receivable ratio. The index is standardized after summation. All other variables align with Model (1).

5. Empirical results and analysis

5.1. Descriptive statistical results

Table 1 shows the results of descriptive statistics of the main research variables. From the overall sample, the standard deviation of supply chain resilience is 9.8785, the maximum value is 49.505, and the minimum value is 0.565, indicating that there are large differences in supply chain resilience among different enterprises; the mean value of “data assets” is 3.3322, the maximum value is 6.3682, and the minimum value is 0, which indicates that the level of data assets of the sample enterprises is generally not high. The data asset level is not high in general.

Table 1. Summary statistics

	N	Mean	Standard deviation	Median	Min	Max
SCR	1635	17.86	9.8785	15.6925	0.565	49.505
DA	1635	3.4149	0.5899	3.3322	0	6.3682
ODA	1635	3.3834	0.5648	3.3322	0	6.3333
DDA	1635	0.506	0.8033	0	0	4.8903
Size	1635	12.0454	0.6771	11.9959	10.5238	14.2978
EstAge	1635	17.1584	5.0967	17	2	45
LEV	1635	0.2954	0.1582	0.2704	0.0467	0.7522
Growth	1635	0.1706	0.2586	0.109	-0.2115	1.5304
OCF	1635	0.0432	0.0609	0.0439	-0.1364	0.2032
ROA	1635	0.0505	0.0594	0.0501	-0.1882	0.2177

5.2. Data assetization and supply chain resilience for SRDI SMEs

The regression results of model (1) are shown in **Table 2**. From column (1), the regression coefficient of DA is significantly negative at the 1% level, indicating that data assetization helps to promote the supply chain resilience of SRDI SMEs. The results in columns (2) and (3) show that the regression coefficients of ODA are significantly negative at the 5% level, and the regression coefficients of DDA are significantly negative at the 1% level, which shows that both data assets for personal use and transactional data assets can help to improve the supply chain resilience of SRDI SMEs, and H1 has been verified. H1 is validated.

Table 2. Results of the benchmark regression analysis

Variable	(1)	(2)	(3)
	SCR	SCR	SCR
DA	-1.3404***		
	(-2.7125)		
ODA		-1.3149**	
		(-2.5356)	
DDA			-1.1536***
			(-3.6710)
cv	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
N	1635	1635	1635
adj. R^2	0.1106	0.1101	0.1128

Note: *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively, with *t* statistics in parentheses, as in the table below.

5.3. Examinations of the mechanism of data assetization and supply chain resilience of SRDI SMEs

The regression results of model (2) and model (3) are shown in **Table 3**. The regression results in **Table 3** show that data assets (DA, ODA, DDA) significantly enhance technological innovation and supply chain resilience at the 1% level (columns 1–3). Technological innovation improves adaptability, helping businesses better manage supply chain uncertainties, thus verifying H2. Columns (4)–(6) demonstrate that data assets significantly alleviate financing constraints, with DA, ODA, and DDA having negative coefficients at the 1% and 10% levels. By easing financing constraints, data assets enable firms to secure the financial support needed for smooth supply chain operations, verifying H3.

Table 3. Mechanism analysis

Variable	Technological innovation			Financing constraints		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
DA	0.0040***			-0.0123***		
	(4.4165)			(-3.4631)		
ODA		0.0040***			-0.0123***	
		(4.2157)			(-3.3141)	
DDA			0.0027***			-0.0049*
			(4.1282)			(-1.8965)
cv	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
N	1635	1635	1635	1635	1635	1635
adj. R^2	0.1838	0.1828	0.1822	0.5704	0.5702	0.5686

5.4. Robustness tests

5.4.1. Endogeneity test

Since disclosing the top five customer or supplier information is optional, some firms may not disclose it, causing potential self-selection bias. To address this, the paper applies the Hechman two-stage model, with the first stage using disclosure (Discl) as the dependent variable. The results in **Table 4** show that the IMR coefficients are significant, and the coefficients for DA, ODA, and DDA remain significantly positive at the 1% level.

Table 4. Heckman's two-stage regression results

Stage 1		Stage 2	
DA	-1.3240***		
	(-2.6699)		
ODA		-1.2944**	
		(-2.4868)	
DDA			-1.1743***
			(-3.7289)

Table 1 (Continued)

	Stage 1	Stage 2		
IMR		-0.0128*	-0.1153**	-0.5646**
		(-1.9069)	(-2.2076)	(-2.3073)
cv	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
N	1592	1592	1592	1592
R^2	0.1068	0.1228	0.1224	0.1254

5.4.2. Exclusion of alternative interpretations

(1) The Ministry of Industry and Information Technology (MIIT) released the first batch of “small giants” enterprises with specialties and specialties in 2019, so the post-2019 samples are excluded from the regression, and the results of Column (2) As shown in column (2) of **Table 5**, the regression coefficient of DA is still significantly negative at the 1% level, suggesting that data assetization still enhances supply chain resilience during periods of weak policy support. (2) Related studies have pointed out that digital transformation can improve supply chain resilience [13,14]. We introduce two control variables in the baseline model: the share of digitization technology in intangible assets (DCG1) and the composite index of digital transformation in the CSMAR database (DCG2). Columns (3)–(4) of **Table 5** show that the coefficients of DA are significantly negative at the 5% and 10% levels, respectively, after controlling for the digitization process, confirming that the uplift effect of data assetization is independent of digital transformation factors.

Table 5. Results of robustness test

	(2) SCR	(3) SCR	(4) SCR
DA	-2.5863***	-1.0948**	-0.8462*
	(-4.1536)	(-2.2521)	(-1.6550)
DCG1		-4.0232**	
		(-2.2927)	
DCG2			-0.0093***
			(-3.6671)
cv	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
N	767	1620	1620
R^2	0.1003	0.1136	0.1181

6. Further analysis: Heterogeneity test

6.1. Nature of enterprise

(1) In grouping firms by size, regression results from columns (1)–(2) of **Table 6** show that data assetization significantly enhances supply chain resilience in larger firms but has no significant effect in smaller

ones. Larger firms benefit from more advanced data capabilities, greater access to resources such as talent and capital, and a central role in the supply chain, allowing them to integrate data into R&D and manufacturing more effectively.

(2) In terms of industry, the analysis in columns (3)–(4) reveals that data assetization's impact on supply chain resilience is more pronounced in manufacturing firms. These firms typically have strong technological foundations (e.g., smart factories, industrial internet), enabling them to incorporate data assets efficiently into supply chain management, which often involves longer chains and external supplier networks. This leads to enhanced transparency and efficiency, strengthening overall supply chain resilience.

Table 6. Results of heterogeneity analysis of firm characteristics

	(1) Large enterprise size	(2) Small enterprise size	(3) Manufacturing	(4) Non-manufacturing
DA	-1.6700***	-0.7766	-1.7547***	-0.8030
	(-2.6911)	(-0.9609)	(-3.2979)	(-0.5791)
cv	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
N	814	806	1465	155
adj. R^2	0.1392	0.0967	0.1159	0.0663

6.2. External environment

(1) Using the Economic Policy Uncertainty (EPU) index, this study measures the impact of economic policy uncertainty on supply chain resilience. As shown in columns (1)–(2) of **Table 7**, data assets significantly enhance supply chain resilience in high-policy-uncertainty environments. In such conditions, businesses face greater risks and inefficiencies, but data assets help analyze complex information and utilize tacit knowledge, allowing companies to adapt and collaborate more effectively to manage risks.

(2) Based on the marketization index from Wang *et al*. [15], the study divides firms into high and low marketization groups. The results in columns (3)–(4) of Table 8 indicate that in low-marketization regions, data assets have a stronger impact on supply chain resilience. Firms here rely more on data to manage information asymmetry and competition, benefiting from more time and policy support for data asset investments.

Table 7. Results of heterogeneity analysis of the external environment

	(1) High economic policy uncertainty	(2) Low economic policy uncertainty	(3) High level of marketization	(4) Low level of marketization
DA	-2.7836***	-0.7371	-0.6611	-2.5776***
	(-3.7686)	(-1.2113)	(-0.9400)	(-3.4358)
control variables	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
N	531	1089	770	850
adj. R^2	0.0735	0.1244	0.1085	0.1525

7. Conclusion and policy implications

This study demonstrates that data assetization improves supply chain resilience in Chinese SRDI SMEs by reducing financing constraints and boosting innovation. The effect is stronger in large firms, manufacturing sectors, regions with high economic policy uncertainty, and low marketization levels.

The findings offer the following policy implications: (1) Integrate data assets into supply chain management. Governments should refine data accounting standards under the Data Element X Three-Year Action Plan (2024–2026) [16]. Firms need cross-department data governance frameworks to enhance transparency. Manufacturing SMEs could adopt IoT and blockchain through targeted subsidies. (2) Enhance data-driven financial services. Regulators can leverage the Fintech Development Plan (2022–2025) to promote bank-SME data sharing and expand blockchain-based data collateral pilots [17]. Financial institutions should develop real-time transaction-driven supply chain finance tools. (3) Foster data-enabled innovation ecosystems. Local governments should build industry-specific data spaces and incentivize AI-driven forecasting models. Tax breaks for R&D data utilization can further stimulate innovation.

Funding

National Undergraduate Training Program for Innovation and Entrepreneurship (D202410120257422558)

Disclosure statement

The authors declare no conflict of interest.

References

[1] Hannila HR, Harkonen S, Haapasalo H, 2022, Data-driven Begins with Data; Potential of Data Assets. Journal of Computer Information Systems, 62(1): 29–38.

[2] Li Y, Zhang Y, Geng L, 2024, Digital finance, Financing Constraints and Supply Chain Resilience. International Review of Economics and Finance, 96(PA): 103545.

[3] Zhai Y, Liu B, Wang Y, et al., 2024, Research on Influencing Factors of Medical Health Big Data Assetization from the Perspective of Data Lifecycle. Journal of Intelligence, 43(1): 183–190.

[4] Li W, Ma Y, 2022, How to Construct an Effective Mechanism for Supply Chain Resilience? Contemporary Economic Management, 44(12): 27–38.

[5] Liang L, Li Y, Chen S, 2023, Examining the Effect and Mechanism of Digital Inclusive Finance on Enterprise Green Technology Innovation. Statistics and Decision, 39(11): 168–173.

[6] Sharma SK, Routroy S, Singh RK, et al., 2024, Analysis of Supply Chain Vulnerability Factors in Manufacturing Enterprises: A Fuzzy DEMATEL Approach. International Journal of Logistics Research and Applications, 27(5): 814–841.

[7] He Y, Chen L, Du Y, 2024, Can Data Assetization Alleviate Financing Constraints of "Specialized, Refined, Differential, and Innovative" SMEs? China Industrial Economics, (08): 154–173.

[8] Cull R, Xu L, Zhu T, 2009, Formal Finance and Trade Credit During China's transition. Journal of Financial Intermediation, 18(2): 173–192.

[9] Wang Y, Ma Y, Cheng P, 2024, Cross-border E-Commerce Empowers the Enhancement of Corporate Supply Chain Resilience: Micro-evidence from Chinese Listed Companies. World Economy Studies, (06): 105–119 + 137.

[10] Zhang S, Hu H, Sun L, et al., 2021, Supply Chain Digitization and Supply Chain Security Stability-a Quasi-Natural

Experiment. China Soft Science, (12): 21–30 + 40.
[11] Jiang T, 2022, Mediating and Moderating Effects in Empirical Studies of Causal Inference. China Industrial Economy, (05): 100–120
[12] Shi, K, Sun Y, Li K, 2024, The Impact of Digital Finance on Supply Chain Resilience: Empirical Evidence from Manufacturing Enterprises. Journal of Industrial Technological Economics, 43(02): 142–151.
[13] Song D, Liu F, Ding W, 2024, Corporate Digital Transformation and Supply Chain Resilience: A Social Network Analysis Perspective. Journal of Southeast University (Philosophy and Social Science), 26(05): 47–60 + 149 + 2.
[14] Yuan Y, Wu D, 2025, Corporate Digital Transformation and Supply Chain Resilience: A Supply Chain Spillover Perspective. Systems Engineering—Theory & Practice, 1–22.
[15] Wang X, Hu L, Fan G, 2021, China Provincial Marketization Index Report (2021), Social Sciences Academic Press, Beijing.
[16] Zhang S, Gu C, 2024, Corporate Digital Transformation and Supply Chain Resilience. South China Journal of Economics, (08): 137–158.
[17] Hu C, Li Y, Zheng X, 2022, Data Assets, Information Uses, and Operational Efficiency. Applied Economics, 54(60): 6887–6900.