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A Study on the Impact of VAT Rate Adjustments on the Supply Chain Resilience of Manufacturing Enterprises

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Abstract: *As a key component of tax reduction and fee relief policies, VAT rate adjustments have effectively alleviated the tax burden on manufacturing enterprises. Meanwhile, enhancing supply chain resilience in manufacturing has become a crucial measure for China's new development paradigm. This study examines the impact of VAT rate adjustments on supply chain resilience in manufacturing enterprises, using A-share listed manufacturing companies from 2016 to 2023 as a research sample. The findings demonstrate that VAT rate adjustments significantly boost supply chain resilience in the manufacturing sector. Mechanistically, these adjustments enhance resilience through two pathways: reducing supply chain coordination costs and fostering supply chain coordination innovation. This research enriches the literature on the relationship between taxation and supply chain resilience, providing theoretical and practical foundations for optimizing China's VAT system.*

Keywords: *VAT rate adjustment, Supply chain resilience, Collaborative innovation, Coordination cost*

1. Introduction

An analysis of the volatile global economy and geopolitical landscape reveals China's entry into the "VUCA" era (volatility, uncertainty, complexity, and ambiguity). The global integration process faces obstacles, trade protectionism prevails, and unexpected events pose significant challenges to supply chain stability. Issues such as logistics disruptions, supply chain interruptions, and soaring energy and raw material costs have emerged in rapid succession, making supply chain efficiency and security a critical focus for China. The report of the 20th National Congress of the Communist Party of China explicitly stated the need to "strengthen the resilience and security of industrial and supply chains." The Third Plenary Session of the 20th Central Committee further emphasized that to advance comprehensive reforms and promote Chinese-style modernization, it is essential to establish and improve systems for enhancing supply chain resilience and security. This underscores that improving supply chain resilience and ensuring stable operations have become urgent priorities for China to address.

Meanwhile, as China's largest tax category, value-added tax (VAT) covers the entire manufacturing and distribution chain. Through its "chain offset and value-added taxation" mechanism, it directly impacts corporate procurement costs, cash flow, pricing strategies, and supply chain collaboration models. To enhance the overall efficiency of the tax system, China has implemented multiple VAT reform measures, including tax rate adjustments. Starting July 1, 2017, the original 13% tax rate tier was abolished, with all related taxable items incorporated into the 11% rate range. Subsequently, on May 1, 2018, items previously subject to 17% and 11% rates were reduced to 16% and 10%, respectively. By April 1, 2019, the rates were further adjusted, with the 16% and 10% tiers reduced to 13% and 9%.

As a key component of tax and fee reduction policies, VAT rate adjustments significantly enhance corporate cash flow and incentivize increased R&D investment. A thorough analysis of how these adjustments strengthen supply chain resilience in manufacturing firms not only enriches academic research but also provides crucial practical guidance for governments to refine tax relief measures and identify effective strategies to boost supply chain resilience.

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2. Theoretical Analysis and Research Hypotheses

2.1 Impact Analysis of VAT Rate Adjustment on Supply Chain Resilience of Manufacturing Enterprises

Adjustments to VAT rates primarily influence the supply chain resilience of manufacturing enterprises through four key mechanisms: cash flow and working capital effects, resource allocation effects, and tax equity effects. First, VAT rate adjustments create immediate "policy-induced liquidity support" effects. When VAT rates are reduced (e.g., from 16% to 13%), enterprises see lower output tax payments from sales and reduced input tax payments for raw materials, equipment, and services. Given that manufacturing enterprises typically operate continuously, the current VAT payable drops significantly. This means that with unchanged transaction volume and frequency, the net cash payments to the treasury decrease weekly or monthly, converting saved funds into operational cash flow – essentially a one-time unconditional "policy-induced liquidity support". Second, reduced tax burdens and increased cash flow generate direct resource allocation effects. Enterprises can strategically allocate these resources to core areas of supply chain resilience, freeing up capital for investments in automated equipment, industrial IoT systems, and supply chain visualization platforms. This directly enhances early warning capabilities and rapid response to supply disruptions, while also enabling diversified supplier networks, increased safety stock of critical materials, and recruitment of high-end supply chain management talent. These measures strengthen the supply chain's shock-absorbing capacity and foundational resilience. Furthermore, from the perspective of VAT reform, simplifying the tax rate system and reducing rate intensity to enhance tax neutrality are considered critical steps in improving tax system efficiency and boosting economic productivity. For manufacturing enterprises, the reduction of VAT rates and the simplification of tax structure can effectively improve market signal distortion caused by tax system differences, encourage enterprises to upgrade and update production equipment, and optimize production flexibility and anti-interference capabilities. Based on the above analysis, the following hypotheses are proposed:

H1: Adjusting VAT rates can enhance the supply chain resilience of manufacturing enterprises.

2.2 Analysis of the Resilience Mechanism of Supply Chain of Manufacturing Enterprises under the Adjustment of VAT Rate

2.2.1 Pathways for Collaborative Innovation in Supply Chains

Adjustments to VAT rates can alleviate corporate tax burdens and generate cash flow, while also playing a pivotal role in supply chain collaborative innovation. In terms of information sharing, the financial support from VAT rate adjustments enables companies to allocate more resources to joint R&D projects and invest in supply chain information technology (SIT). Such R&D investments significantly enhance supply chain transparency and information sharing, breaking down "information silo" barriers. Consequently, enterprises at each node can make more efficient collaborative decisions and coordinate actions through information-sharing mechanisms and platforms established during collaborative innovation, with informatization being prioritized as a key influencing factor (He Qianqian et al., 2024)[1], highlighting its core role in improving supply chain resilience (Li Zhengdao and Zeng Jia, 2024)[2]. Additionally, VAT rate adjustments can boost collaborative efficiency across supply chain segments by providing financial support (Pan Weihua and Luo Yongheng, 2024)[3], promoting the establishment of collaborative innovation information platforms, facilitating resource and information sharing, and achieving supply chain collaborative innovation. This effectively enhances overall competitiveness and resilience. The strengthened collaborative innovation effect further promotes information sharing among member enterprises, forming a self-reinforcing positive cycle. Based on the above analysis, the following hypotheses are proposed:

H2: The adjustment of VAT rates enhances the supply chain resilience of manufacturing enterprises by incentivizing collaborative innovation across the supply chain.

2.2.2 Supply Chain Coordination Cost Path

When VAT rates are excessively high, enterprises across the supply chain engage in intense bargaining over tax burden allocation between upstream and downstream partners. Companies with stronger bargaining power will shift tax pressure to weaker counterparts by raising product prices. This tax transfer cascades through the supply chain: upstream transfers directly impact downstream cost structures, while downstream players attempt to pass on costs to even lower tiers or end consumers.

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Meanwhile, enterprises strategically transfer their tax burdens through negotiations, considering future tax expectations and cash flow conditions. Such intense bargaining not only creates conflicts between supply chain partners and erodes long-term trust, but also increases management and coordination costs—ultimately weakening supply chain resilience. The lack of trust and cumbersome coordination processes compromise risk-sharing capabilities, exacerbating supply chain vulnerabilities. VAT rate adjustments serve as a "lubricant," reducing negotiation complexity and friction. Clear, unified tax rate reductions decrease uncertainty about future tax burdens, thereby lowering supply chain coordination costs. As a critical factor influencing supply chain resilience (Zhang Shushan et al., 2023)[4] and the critical path (Zhao Ling and Huang Hao, 2024)[5], supply chain coordination costs can drive diversified resource allocation, enhancing risk resilience and adaptability (Wu Qiang and Yao Yuxiu, 2022)[6]. Based on this analysis, the following hypothesis is proposed:

H3: Adjusting VAT rates enhances supply chain resilience in manufacturing enterprises by reducing coordinaT

3. Model Design and Variable Explanation

3.1 Data Sources and Sample Processing

This study investigates the impact of VAT rate reduction policies on corporate supply chain resilience, using all A-share listed manufacturing companies from 2016 to 2023 as the research sample, with data sourced from the Guotai An Database (CSMAR). To ensure robustness of the results, the following samples were excluded: (1) companies with abnormal operations (e.g., ST, *ST); (2) samples with missing key variables; (3) samples with effective VAT rates ≤0; (4) all continuous variables underwent 1% capping treatment. After screening, the final dataset comprised 2,490 manufacturing enterprises, yielding 11,977 valid samples from 2016 to 2023, constituting unbalanced panel data.

3.2 Model Setting

To examine the impact of VAT rate adjustments on corporate supply chain resilience, this study constructs the following benchmark regression model:

$$SCR_{it}=\alpha_0+\alpha_1 VAT_{it}+\alpha_2 X_{it}+\mu_i+\lambda_t+\varepsilon_{it} \quad (1)$$

The dependent variable $SCR_{it}$is supply chain resilience, where represents the firm and time respectively, while the independent variable is the effective VAT rate. Control variables include fixed effects for individual firms and time, with the random disturbance term. To examine how VAT rate adjustments affect manufacturing supply chain resilience—specifically whether such adjustments influence collaborative innovation and coordination costs to impact firm resilience—we construct the following model based on prior research:

$$SCE_{it}=\gamma_0+\gamma_1 VAT_{it}+\gamma_2 X_{it}+\mu_i+\lambda_t+\varepsilon_{it} \quad (2)$$

$$SCC_{it}=\beta_0+\beta_1 VAT_{it}+\beta_2 X_{it}+\mu_i+\lambda_t+\varepsilon_{it} \quad (3)$$

The sum of these variables serves as an intermediary variable, representing the collaborative innovation and coordination costs in the supply chain. As per the theoretical assumptions outlined earlier, the expected coefficients are significantly negative and positive respectively, thereby validating Hypotheses 2 and 3.

3.3 Definition of Variables

3.3.1 Dependent Variable: Supply Chain Resilience

Drawing on Yao Zhenghai's (2025)[7] methodology, this study develops a five-dimensional evaluation framework for corporate supply chain resilience (SCR) encompassing adaptability, resilience, recovery capacity, human capital, and governmental capacity.

3.3.2 Explanatory variables

The core explanatory variable is the effective VAT rate (VAT), defined as the ratio of a company's actual VAT paid to its operating revenue, following Liu Xing's (2018) [8]methodology. The actual VAT paid is estimated by reversing the company's VAT cash outflow.

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3.3.3 Mediating variables

Drawing on He Jiali's (2025)[9] methodology, this study measures supply chain collaborative innovation (SCE) through the patent pool of jointly filed patents by enterprises. As supply chain coordination costs (SCC) are difficult to quantify directly during collaboration, we approach to assess these costs by analyzing how production deviates from demand fluctuations. The specific calculation method is as follows:

$$Cost\_Coor_{it}=\frac{\sigma(Production_{it})}{\sigma(Denand_{it})}\text{-}1 \tag{4}$$

$$Production_{it}=Cost_{it}+Inv_{it}\text{-}Inv_{it\text{-}1} \tag{5}$$

The standard deviation of the representative variable and the corresponding coefficients indicate the volatility of corporate production and demand, respectively. Corporate production volume is calculated using Equation (2), where represents the operating cost and represents the net inventory value at year-end. Corporate demand is modeled using the operating cost as a proxy variable. A smaller deviation in supply-demand fluctuations within the supply chain indicates lower coordination costs for supply-demand alignment.

3.3.4 Control variables

This paper identifies key control variables that may influence the supply chain resilience of manufacturing firms, including firm size (Size), debt-to-asset ratio (Lev), revenue growth rate (Growth), fixed asset proportion (Fixed), board size (Board), equity concentration (Top1), return on equity (Roe), and Tobin's Q (Tobinq).

4. Empirical Analysis

4.1 Benchmark Regression Results

The benchmark regression results presented in Table 1 demonstrate the average impact of VAT rate adjustments on supply chain resilience. Column (1) in Table 1 shows the regression results without control variables, while columns (2), (3), and (4) present the results after sequentially incorporating basic financial characteristics, corporate governance levels, and profitability/operational capabilities, respectively. All regression models account for firm-specific and year-fixed effects. The results indicate that the core explanatory variable VAT exhibits a significantly negative correlation with the dependent variable SCR at the 1% significance level, confirming that reducing VAT rates enhances supply chain resilience. The adjusted regression coefficient (-0.5158) remains statistically significant at the 1% level, indicating that a 1% decrease in VAT rates increases supply chain resilience by 0.5158. This confirms Hypothesis H1: VAT rate adjustments promote supply chain resilience improvement.

Table 1 Benchmark Regression Results

	(1) SCR	(2) SCR	(3) SCR	(4) SCR
VAT	-0.4671***	-0.5169***	-0.5062***	-0.5158***
	(-2.7494)	(-3.1369)	(-3.0760)	(-3.1333)
size		0.1463***	0.1445***	0.1445***
		(8.7945)	(8.7838)	(8.6188)
lev		-0.1292***	-0.1267***	-0.1135**
		(-2.8889)	(-2.8075)	(-2.5070)
growth		0.0243***	0.0242***	0.0184**
		(2.8705)	(2.8750)	(2.1076)
fixed		-0.2018***	-0.1964***	-0.1899***
		(-3.4467)	(-3.3824)	(-3.2422)
board			0.0837**	0.0839**
			(2.3746)	(2.3795)
top1			0.0205	0.0213
			(0.8634)	(0.8930)
roe				0.0418
				(1.3860)
tobinq				0.0056*
				(1.7016)
Constant	1.0139***	-2.1512***	-2.3676***	-2.3919***
	(173.6704)	(-5.8322)	(-5.8293)	(-5.7799)
individual fixed effect	YES	YES	YES	YES
time fixed effect	YES	YES	YES	YES
Observations	11,977	11,977	11,977	11,977
R^2	0.877	0.882	0.882	0.882

Note: The values in parentheses are t-values; *, **, and *** indicate significance at the 10%,5%, and 1% levels, respectively. The same applies below.

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4.2 Mechanism Testing

Table 2 presents the regression results of the reporting mechanism. Column (2) shows the regression results between the effective VAT rate and supply chain collaborative innovation, where the core explanatory variable coefficient is significantly negative at the 10% level, indicating that a reduction in VAT rates can enhance supply chain collaborative innovation, consistent with the previous hypothesis. Column (3) presents the regression results between the effective VAT rate and supply chain coordination costs, where the core explanatory variable coefficient is significantly positive at the 1% level. Since supply chain coordination costs are measured by supply-demand deviation—a reverse indicator—reducing the VAT rate can lower these costs, thereby validating H2 and H3.

Table 2 Regression Results of Mechanism Test

	(1) SCR	(2) SCE	(3) SCC
VAT	-0.5158***	-12.1509*	0.4406***
	(-3.1333)	(-1.8094)	(4.6198)
size	0.1445***	1.9149***	0.0038
	(8.6188)	(3.1583)	(0.7413)
lev	-0.1135**	-1.6123	0.0389**
	(-2.5070)	(-1.0269)	(2.2897)
growth	0.0184**	-0.6428*	-0.0003
	(2.1076)	(-1.6481)	(-0.0541)
fixed	-0.1899***	-0.2859	-0.0259
	(-3.2422)	(-0.1153)	(-1.1725)
board	0.0839**	-1.5944	-0.0325**
	(2.3795)	(-0.9212)	(-2.4383)
top1	0.0213	2.0535**	0.0049
	(0.8930)	(1.9646)	(0.5924)
roe	0.0418	1.0088	0.0867***
	(1.3860)	(0.7176)	(5.6115)
tobinq	0.0056*	0.3950**	0.0047***
	(1.7016)	(2.4266)	(2.8927)
Constant	-2.3919***	-39.6574***	-0.0860
	(-5.7799)	(-2.7058)	(-0.7093)
individual fixed effect	YES	YES	YES
time fixed effect	YES	YES	YES
Observations	11,977	11,977	11,977
R^2	0.882	0.809	0.469

5. Conclusion and Policy Recommendations

5.1 Promoting VAT Reform to Release Policy Dividends

To enhance supply chain resilience and effectively reduce manufacturing tax burdens, China's value-added tax (VAT) rates for the manufacturing sector require further optimization. Lowering VAT rates directly reduces output tax burdens for manufacturers, strengthening their supply chain adaptability. This not only improves the VAT system but also reinforces corporate supply chain resilience. Through comprehensive analysis of tax burdens across industries and supply chains, the current three-tier VAT system could be streamlined into two tiers at an appropriate time, ensuring a clearer and more rational tax structure. Special attention should be paid to how VAT rate adjustments impact industry ecosystems and market competition dynamics. Such reforms should balance tax simplification with fair market competition while alleviating corporate burdens.

5.2 Strengthening Collaborative Tax Reduction Policies to Promote Corporate R&D Innovation

Given that supply chain collaborative innovation and coordination costs mediate the relationship between VAT rate adjustments and manufacturing enterprises' supply chain resilience, it is essential to expand the reach of coordinated tax reduction policies. This can be achieved by lowering the thresholds for VAT credit refunds and VAT additional deduction policies, while increasing the deduction ratio for VAT additional deductions. By optimizing the VAT deduction mechanism, broadening the scope of deductible R&D expenditures, and refining corporate cost structures, we can channel resources toward R&D innovation and critical supply chain segments. This ensures that VAT rate adjustments synergize with related tax relief policies to maximize their impact, ultimately establishing a comprehensive, chain-wide tax incentive mechanism.

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