

Original Research Article

The impact of cross-border e-commerce pilot zone policies on corporate supply chain resilience

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Abstract: With the rapid development of cross-border e-commerce in globalization and the digital economy, cross-border e-commerce comprehensive pilot zones have become a key platform affecting China's foreign trade transformation and upgrading as well as the supply chain resilience of enterprises. Based on the full sample data of Chinese enterprises from 2010 to 2024, this study adopts a quasi-natural experiment method to explore the mechanism of comprehensive pilot zone policies on corporate supply chain resilience. The results show that the comprehensive pilot zone policies significantly improve enterprises' risk resistance capacity and supply chain response speed by optimizing supply chain resource allocation, thereby enhancing supply chain resilience. The mechanism is reflected in promoting the diversification of supply chain structure, improving the stability of supply relationships and the accuracy of supply-demand matching, affecting supply chain resilience from both security and efficiency dimensions. Heterogeneity analysis indicates that non-state-owned enterprises, high-tech industries, and small and medium-sized enterprises benefit more from the improvement of supply chain resilience, and the policy effect is more prominent in regions with poor digital infrastructure. This study not only provides a theoretical basis for the optimization and implementation of comprehensive pilot zone policies, but also offers practical implications for enterprises to enhance supply chain resilience and risk resistance capacity in future industrial transformation.

Keywords: cross-border e-commerce; comprehensive pilot zone; supply chain resilience; policy effect

1. Introduction

Against the backdrop of profound restructuring of global value chains, multiple uncertainties such as geopolitical conflicts and fluctuations in external demand keep intensifying, posing severe challenges to the supply chain resilience of Chinese enterprises. The Third Plenary Session of the 20th Central Committee of the Communist Party of China explicitly proposed to "improve the system for the resilience and security level of industrial and supply chains". The Outline of the 15th Five-Year Plan for National Economic and Social Development of the People's Republic of China further points out that China should "accelerate the building of a modern industrial and supply chain system that is self-controlled, secure, efficient and more resilient". Against this background, enhancing supply chain resilience has become a core capability for enterprises to withstand external shocks and sustain business operations. It also serves as a crucial underpinning for consolidating the security of industrial chains and advancing high-quality economic development. Accordingly, continuously improving corporate supply chain resilience is not only essential for enterprises to pursue steady global operations and fend off external risks, but also an inherent requirement for fostering a new development paradigm and advancing Chinese-style modernization.

As a new trade form featuring deep integration of the digital economy and the real economy, cross-border e-commerce acts as a vital driver for high-quality foreign trade development and reshaping the global supply chain landscape during the 15th Five-Year Plan period. Characterized by flattened transaction links, expanded market boundaries and intensive operational costs, it effectively breaks geographical constraints and institutional barriers of traditional foreign trade, injecting new momentum into corporate supply chain structural optimization and resilience enhancement. The Implementation Plan for the High-Quality Development of Cross-border E-commerce during the 15th Five-Year Plan Period, issued by the

Ministry of Commerce and other departments, clarifies that China's cross-border e-commerce has entered a new stage of coordinated advancement of "industrial going-global, ecosystem going-global and rule-making going-global". Its profound reconstruction of the supply chain organization model for traditional foreign-trade enterprises opens up brand-new pathways for comprehensively improving corporate supply chain resilience. Statistics show that China's cross-border e-commerce import and export volume reached 2.38 trillion yuan in 2023, rising by 15.6% year-on-year below^[1], demonstrating strong growth resilience and development potential, and becoming a key pillar for stabilizing foreign trade, promoting transformation and strengthening industries.

As a national-level pilot for advancing institutional innovation in cross-border e-commerce in China, cross-border e-commerce comprehensive pilot zones have piloted reforms in customs clearance facilitation, tax incentives and regulatory innovation since the launch of the first batch in 2015, gradually forming a replicable and promotable institutional system and providing solid institutional guarantees for the development of the cross-border e-commerce industry. Against the backdrop of mounting global supply chain risks, can the institutional innovations of comprehensive pilot zones effectively empower enterprises to improve supply chain resilience? What are their core transmission pathways? What heterogeneity exists in policy effects among enterprises of different industries and types? These questions represent not only important theoretical issues to be clarified, but also practical keys to optimizing pilot policies for cross-border e-commerce and helping enterprises improve supply chain risk governance systems.

2. Policy background and literature review

2.1. Policy background for the establishment of cross-border e-commerce comprehensive pilot zones

Since the 21st century, China's foreign trade has entered a critical phase of structural adjustment and momentum transition. Traditional foreign trade is confronted with bottlenecks including solidified channels, high costs and lagged responses. Meanwhile, the rapid growth of cross-border e-commerce is hampered by institutional constraints in customs clearance, tax rebates and settlement. To address the pain points of cross-border e-commerce and explore innovative paths for foreign trade, the State Council officially approved the establishment of China (Hangzhou) Cross-border E-commerce Comprehensive Pilot Zone in 2015, marking a new phase of institutionalized and standardized development for China's cross-border e-commerce. Afterwards, the comprehensive pilot zones followed the progressive reform path of "pilot implementation, phased expansion and experience popularization". Multiple batches of expansions have been carried out. By the end of 2025, the pilot zones have covered 165 cities across 31 provinces, autonomous regions and municipalities directly under the Central Government, forming a multi-level, wide-coverage and collaborative pilot pattern.

With the continuous expansion of pilot scope, policy connotations of comprehensive pilot zones have deepened, forming a policy system centered on institutional innovation, oriented toward industrial integration and bottom-lined by risk prevention and control. Since 2019, regulatory model innovations have kept moving forward, and B2B export facilitation reforms have substantially cut enterprises' customs clearance costs. In 2021, the construction and layout of overseas warehouses were prioritized in policies, serving as a critical instrument to enhance cross-border logistics stability. After 2023, policies further focused on the in-depth integration of "cross-border e-commerce plus advanced manufacturing", driving traditional manufacturers to pursue branded and digital overseas expansion.

2.2. Literature review

2.2.1. Research on policy effects of cross-border e-commerce comprehensive pilot zones

As a national-level institutional innovation pilot for trade facilitation and deepening institutional opening-up in China, the economic effects and transmission mechanisms of cross-border e-commerce comprehensive pilot zones have long been a core research topic for domestic and foreign scholars. At the macro regional level, empirical studies based on multi-dimensional panel data show that the establishment of comprehensive pilot zones releases factor agglomeration dividends via institutional innovation, significantly boosting local economic growth and advancing high-quality regional trade development^[2]. Relying on cross-border e-commerce industrial agglomeration, comprehensive pilot zones drive coordinated

development of related upstream and downstream industries, stabilize regional employment and stimulate urban entrepreneurial vitality, delivering sustained impetus to regional economic growth^[3]. At the industrial level, comprehensive pilot zones build public service platforms for cross-border e-commerce, integrate core production factors including logistics, capital and talent, and advance cross-border trade model innovation. They smooth the integration between manufacturing and e-commerce industries, accelerate digital and intelligent transformation of manufacturing, promote quality upgrading of e-commerce industries, optimize regional industrial structure and improve the global competitiveness of industries^[4]. At the micro-firm level, empirical evidence confirms that policies of comprehensive pilot zones exert significant empowering effects on the high-quality development of cross-border e-commerce firms and related enterprises. Specifically, by improving supporting policies for green trade and tightening environmental supervision, comprehensive pilot zones can elevate firms' environmental performance and facilitate their green and low-carbon transition^[5]. Meanwhile, market expansion opportunities and factor support brought by policy dividends greatly stimulate corporate innovation, exerting positive influences on technological, model and managerial innovation^[6]. Furthermore, existing studies find that the establishment of comprehensive pilot zones raises firms' cost markup by cutting transaction costs and enhancing market pricing power, improving corporate profitability and market risk-resistance capacity^[7].

Three consistent conclusions have been formed regarding the internal transmission mechanisms through which cross-border e-commerce and comprehensive pilot zone policies shape firm behaviors. First, the market expansion effect: Leveraging digital technologies, cross-border e-commerce breaks geographical barriers and market segmentation of traditional trade, helping firms efficiently connect with global clients and supply chain resources, expand international market share and ease domestic market competition pressure^[8]. Second, the information transparency effect: Through supply chain visualization and digital supervision, information asymmetry between firms and their upstream-downstream partners is mitigated, lowering search costs and trade frictions and improving corporate decision-making and supply chain coordination efficiency^[9]. Third, the cost-reduction effect: Intermediate trade links are streamlined to realize scale economies and optimize logistics and distribution systems, cutting production, operation and logistics costs and strengthening corporate market competitiveness^[10].

2.2.2. Research on cross-border e-commerce and supply chain resilience

Academic circles have extensively explored determinants of supply chain resilience and reached multi-dimensional consensus. Core influencing factors fall into three categories. First, the external environment dimension: Global value chain restructuring, geopolitical conflicts and public health emergencies directly undermine supply chain stability^[11]. Policies such as trade facilitation and free factor mobility can mitigate supply chain disturbances caused by external shocks^[12]. Second, the industrial and network dimension: The diversity and stability of supply chain networks constitute key determinants of supply chain resilience^[13]. Rational industrial layout and network architecture improve the capacity to withstand shocks and accelerate recovery^[14]. Third, the micro-firm dimension: Firms' resource allocation and collaborative management capabilities determine their capacity to cope with uncertainties, which serves as the core foundation for supply chain resilience.

With the boom of cross-border e-commerce and rising demand for supply chain resilience, scholars have begun to explore the intrinsic nexus between cross-border e-commerce and supply chain resilience and produced valuable findings, laying an important theoretical and empirical foundation for this paper. From the perspective and focus of existing studies, relevant literature presents multi-dimensional expansion. From the perspective of supply chain resilience demands, Yu Jinyan et al. adopt a spatio-temporal heterogeneity perspective, focus on logistics timeliness of cross-border e-commerce, and systematically analyze how logistics efficiency affects supply chain resilience^[15], constructing a logistics-oriented analytical framework for follow-up research. Wang Tian integrates digital industrialization, cross-border e-commerce and supply chain resilience into a collaborative framework. Her research reveals that digital industrialization can boost both regional economic resilience and supply chain resilience by empowering cross-border e-commerce and improving regional resource allocation efficiency, highlighting coordinated development under the digital economy^[16]. From the perspective of export resilience, Chen Qingping empirically tests the transmission mechanism whereby cross-border e-commerce improves supply chain resilience by diversifying market layout, optimizing export product mix and enhancing trade flexibility, disclosing the intrinsic link between

cross-border trade and supply chain resilience^[17]. From the perspective of corporate internationalization, Yang Shenggang further verifies that supply chain optimization serves as the core channel through which cross-border e-commerce enhances firms' internationalization and supply chain resilience, enriching micro-level research outcomes^[18].

3. Theoretical analysis and research hypotheses

3.1. Empowerment of cross-border e-commerce comprehensive pilot zones for the security dimension of corporate supply chains: Structural diversification and relational stability

The security bottom line of supply chain resilience essentially relies on firms' risk-buffering capacity^[19]. By optimizing cross-border resource allocation and smoothing factor flows, cross-border e-commerce comprehensive pilot zones can enhance the structural diversification of supply chains and the stability of cooperative relationships, systematically lifting risk-buffering capacity and forming the core transmission path for resilience improvement in the security dimension.

On the one hand, comprehensive pilot zones expand the boundary of supply chain resources and drive structural diversification. Traditional cross-border enterprises usually rely on a small number of local or fixed partners for supply chain resources. In contrast, platforms of comprehensive pilot zones integrate suppliers and clients from more than 120 countries and regions, enabling enterprises to quickly access new partners. Such expanded resource boundaries reduce supply chain concentration and realize risk diversification, the core objective from the security perspective.

On the other hand, comprehensive pilot zones cut transaction costs and strengthen the stability of supply chain relationships. In traditional cross-border cooperation, cumbersome customs clearance and tax procedures raise cooperation frictions and result in low repeated cooperation rates. Policy instruments including the "single window" and tax exemption for non-invoice transactions in comprehensive pilot zones lower time costs for cooperation procedures. Reduced costs motivate enterprises to build stronger long-term partnerships with core collaborators.

3.2. Regulation of cross-border e-commerce comprehensive pilot zones for the efficiency dimension of corporate supply chains: Supply-demand matching and short-term adjustment pains

On the one hand, comprehensive pilot zones improve the precision of supply-demand matching via information sharing and agglomeration spillovers. In traditional cross-border supply chains, information asymmetry may trigger a 20%-30% deviation between production and demand fluctuations^[20]. The statistical and monitoring systems within comprehensive pilot zones enable real-time exchange of order and consumption data. Enterprises can dynamically adjust production plans based on such data, and precise matching directly elevates supply chain coordination efficiency.

On the other hand, the collaborative adjustment process brought by comprehensive pilot zones entails short-term adjustment pains, which may trigger a temporary decline in operational efficiency. During this period, enterprises need to adapt to new supply chain workflows and reshape partner networks, incurring extra adjustment costs.

References

- [1] WANG Xing, ZHAO Zhengchi. Research on Consumer Satisfaction Evaluation of China's Import Cross-border E-commerce: A Case Study of Tmall Global[J]. China Business Journal, 2025(6): 64-67.
- [2] WANG Lirong, RUI Lili. The Impact and Heterogeneity of Cross-border E-commerce Comprehensive Pilot Zones on Regional Economy: From a Counterfactual Perspective[J]. South China Journal of Economics, 2022(3): 53-73.
- [3] YUAN Qigang, JI Yongsheng. How Does Cross-border E-commerce Affect Labor Employment: A Quasi-natural Experiment Based on Cross-border E-commerce Comprehensive Pilot Zones[J]. Industrial Economics Research, 2023(1): 101-114.
- [4] HE Mei, WANG Yanmei. Digital Trade and Manufacturing Employment: Evidence from Chinese A-share Listed Companies[J]. Research on Economics and Management, 2023(9): 66-84.
- [5] ZHANG Bingbing, ZHANG Yewei. Does Greater Openness Lead to Greener Performance: Cross-border E-commerce Comprehensive Pilot Zones and Improvement of Corporate Environmental Performance[J]. International

Trade, 2023(10): 16-27.

[6] SHI Yaru, YU Jinping. Cross-border E-commerce Reform and Firm Innovation: Quasi-natural Experiment from the Establishment of Cross-border E-commerce Comprehensive Pilot Zones[J]. *Journal of International Trade*, 2023(4): 37-55.

[7] LI Li, LIU Lu, XIA Youfu. The Establishment of Cross-border E-commerce Comprehensive Pilot Zones and SMEs' Cost Markup: Evidence from Small- and Medium-sized Listed Enterprises[J]. *Journal of Beijing Technology and Business University (Social Sciences)*, 2023(6): 21-33.

[8] MENG Tao, WANG Chunjuan, FAN Penghui. Research on High-quality Development Strategies of Cross-border E-commerce from the Perspective of Digital Economy[J]. *International Trade*, 2022(10): 60-67.

[9] WANG Huacheng, LIU Junyong. Research on Enterprise Performance Evaluation Models: Also on the Selection of Enterprise Performance Evaluation Models in China[J]. *Management World*, 2004(4): 82-91+116.

[10] LI Li, LIU Lu, XIA Youfu. The Establishment of Cross-border E-commerce Comprehensive Pilot Zones and SMEs' Cost Markup: Evidence from Small- and Medium-sized Listed Enterprises[J]. *Journal of Beijing Technology and Business University (Social Sciences)*, 2023(6): 21-33.

[11] Benjamin T, Mark S, Jerry B. Supply chain resilience in a developing country context: a case study on the interconnectedness of threats, strategies and outcomes[J]. *Supply Chain Management: An International Journal*, 2017(6): 486-505.

[12] Kauppi K. Extending the use of institutional theory in operations and supply chain management research: Review and research suggestions[J]. *International Journal of Operations & Production Management*, 2013(10): 1318-1345.

[13] XIAO Jianhua, LIU Xia, SHUAI Shuai. Optimization Model and Algorithm of Resilient Supply Chain Network Based on Node Failure and Demand Uncertainty[J]. *Statistics & Decision*, 2018(17): 50-53.

[14] ZHANG Wei, LI Hangyu, ZHANG Ting. Measurement of China's Manufacturing Industrial Chain Resilience and Its Spatiotemporal Differentiation Characteristics[J]. *Economic Geography*, 2023(4): 134-143.

[15] YU Jinyan, ZHANG Yingnan, LIU Weidong. Spatiotemporal Heterogeneity of Global Cross-border E-commerce Logistics Resilience under the Impact of the COVID-19 Pandemic[J]. *Geographical Research*, 2021(12): 3333-3348.

[16] WANG Tian. The Impact of Digital Industrialization and Cross-border E-commerce Development on Regional Economic Resilience[J]. *Commercial Economy Research*, 2023(16): 185-188.

[17] CHEN Qingping. Cross-border E-commerce Enhances China's Export Resilience: Mechanism and Empirical Evidence[J]. *Jianghuai Tribune*, 2023(6): 103-113.

[18] YANG Shenggang, XIE Jinyuan, CHENG Cheng. Cross-border E-commerce, Supply Chain Optimization and Corporate Internationalization: Empirical Evidence Based on Big-data Text Analysis[J]. *Journal of International Trade*, 2023(10): 1-18.

[19] XU Qianyu. Can Cross-border E-commerce Help Enterprises Diversify Supply Chain Allocation? Quasi-natural Evidence from Cross-border E-commerce Comprehensive Pilot Zones[J]. *World Economy Studies*, 2025(9): 120-134+137.

[20] Martin R, Gardiner B. The resilience of cities to economic shocks: A tale of four recessions and the challenge of Brexit[J]. *Papers in Regional Science*, 2019(4): 1801-1833.