The Impact of the "Broadband China" Pilot Policy on the Resilience of Enterprise Supply Chains: A Quasi-Natural Experiment Based on the Difference-in-Differences Model

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Abstract. Improving the resilience of supply chain is an important cornerstone for maintaining the steady development of enterprises, and the "Broadband China" pilot policy and strategy provides new driving force for enhancing the resilience of supply chain of enterprises. Using the panel data of A-share listed companies from 2012 to 2023 as the research sample, this paper empirically examines the impact and mechanism of digital infrastructure construction on enterprises' supply chain resilience by taking the "Broadband China" pilot policy as A quasi-natural experiment. The results show that: (1) The "Broadband China" pilot policy improves enterprises' supply chain resilience, and the conclusion is still valid after the robustness tests such as parallel trend test, placebo test, changing the explained variable, PSM-DID and changing the sample interval; 2) The results of heterogeneity analysis show that in the eastern region, state-owned enterprises and non-job integration enterprises, the supply chain resilience of Chinese enterprises is more significantly affected by the "Broadband China" pilot policy. 3) The results of mechanism analysis show that the "Broadband China" pilot policy enhances enterprises' supply chain resilience by improving enterprises' innovation ability, promoting the establishment of partnership and promoting supply chain synergy. The research conclusions are helpful to provide empirical evidence and management enlightenment for promoting the high-quality development of supply chain of Chinese enterprises.

Keywords: "Broadband China" pilot policy, supply chain resilience, enterprise innovation capability, partnership, supply chain layout.

1. Introduction

In the 21st century, global scientific and technological innovation has entered a period of unprecedented intensity and activity. A new round of scientific and technological revolution is reshaping the world economic pattern. Emerging technologies represented by big data and artificial intelligence have not only reshaped the traditional industrial model, but also become a key engine for high-quality economic development by optimizing resource allocation, improving production efficiency and promoting innovative development. In this context, the construction of a modern infrastructure system matching the digital-intelligence economy has become an important prerequisite to ensure economic growth.

The prosperity of digital-intelligence economy highly depends on the improvement of information infrastructure. Broadband network, as the infrastructure of data transmission and interaction, is the "digital highway" of enterprise digital transformation and intelligent upgrading of industrial chain, providing indispensable support for it. The Chinese government has taken the "Broadband China" pilot policy as an example in its plans to promote digital infrastructure. In January 2014, in order to implement the Notice of The State Council on Printing and Distributing the Strategy and Implementation Plan of "Broadband China", accelerate the improvement of urban broadband development level, and promote the synchronous development of urbanization and information technology in China, the Ministry of Industry and Information Technology issued the notice on The Work Management Measures for Establishing "Broadband China" Demonstration Cities (Urban Agglomerations). It requires organizations at all levels to do a good job in the construction of "broadband China" pilot cities in their regions. Through the establishment of demonstration to achieve a significant improvement in the level of broadband development in the region, its overall broadband

development level and development mode has a great demonstration and leading role for similar areas in the country (urban agglomeration). The "Broadband China" pilot policy began in 2014, and the pilot cities were gradually set up in batches in 2015 and 2016 respectively.

Since the implementation of the "Broadband China" pilot city policy, it has been widely concerned by the academic community, and relevant studies have emerged in an endless stream. The current academic research on the construction of "Broadband China" pilot cities mainly focuses on its economic and environmental effects: First, the economic effect of the construction of "Broadband China" pilot cities plays a positive role in promoting the capacity utilization rate of enterprises (Luo, 2022), promoting the transformation and upgrading of enterprises (Zhang, 2023), improving the total factor productivity of enterprises (Pan, 2023), and enterprise innovation (Zheng, 2023). At the macro level, it also has a profound impact on promoting the coordinated development of urban and rural areas (Zhao, 2025), the development of new quality productivity (Zhang, 2025), and the development of urban digital economy (Hu, 2025). The second is the environmental effect of the construction of "Broadband China" pilot cities, including the impact on carbon emission performance (Liu, 2024), inclusive low-carbon development (Xiang, 2024), green technology innovation (Guo, 202) and other aspects. It can be seen that many scholars' research on the pilot policy of "Broadband China" focuses on the macro level, while the research on the micro level is insufficient, and there is still a gap in the discussion on the level of enterprise supply chain resilience.

In recent years, with the increasingly complex and volatile international situation, the rise of trade protectionism and anti-globalization has brought unprecedented challenges to the supply chain of enterprises around the world. Tariff barriers, technology blockades and logistics blockades caused by international trade disputes further highlight the strategic value of supply chain resilience. In order to cope with the economic crisis in the new era, China has issued a series of policies such as the Decision on Further Comprehensively Deepening the Reform and Promoting Chinese-style Modernization to promote the resilience of enterprise supply chain and enhance its core competitiveness in the international market. Since the 20th National Congress of the Communist Party of China, the Chinese government has attached great importance to the deep integration of the real economy and the digital economy, and is committed to building an institutional system to promote the integrated development of the two, and simultaneously promoting the institutional innovation of modern infrastructure construction. Through a series of policy measures and reform practices, micro entities have continuously improved the resilience and security of industrial and supply chains. In this context, it is of great practical significance to explore how policy tools (such as "Broadband China") can enable supply chain resilience to ensure national economic security and enhance international competitiveness.

Therefore, this paper adopts "Broadband China" as A quasi-natural experiment, constructs a multi-period DID model, and empirically examines the impact and mechanism of digital infrastructure construction on enterprises' supply chain resilience with the panel data of A-share listed companies from 2012 to 2023. It enriches the research topic of enterprise supply chain and plays an important role in promoting the high-quality development of Chinese enterprises.

The marginal contribution of this paper is mainly reflected in the following three aspects: First, in terms of index measurement, there is still some difference from the research paradigm of measuring supply chain resilience of the whole industrial chain of a specific industry in the existing literature. Second, in terms of research content, there is a gap in the current empirical research on how the "Broadband China" pilot policy affects the level of enterprise supply chain resilience. Thirdly, from the perspective of research methods, compared with previous studies, this paper uses the multi-period difference-in-differences model to analyze the impact and mechanism of the "Broadband China" pilot policy on enterprises' supply chain resilience, providing evidence for the research hypothesis.

2. Review of Literature

2.1. Research Process of Supply Chain Resilience

Concept Definition and Theoretical Evolution. The concept of "supply chain resilience" was first proposed by Rice and Caniato (2003), mainly emphasizing the recovery ability of the supply chain after facing disruptions. Subsequently, Christopher and Peck (2004) formally defined it as the ability of the supply chain to return to an ideal or even more ideal state after being disrupted. So far, later generations have deepened their research on supply chain resilience on this basis, providing strong support for more precise and efficient management of supply chains. Subsequently, Ponomarov and Holcomb (2009) innovatively constructed a three-stage theoretical framework for supply chain resilience, decomposing it into the preparation, response, and recovery stages. This literature laid a theoretical foundation for further research in later generations. Liu Yue and Guo Yahong (2022) constructed an industrial chain resilience index system based on dimensions such as the resistance capacity, adaptability, and recovery and reorganization capacity of the industrial chain when facing shocks, and used the entropy method to obtain the industrial chain resilience index of the circulation industry. Wang Zhenzhu et al. (2025) deconstructed the resilience of an enterprise's supply chain from three dimensions: supply chain absorption capacity, response capacity, and recovery capacity. Overall, the resilience of an enterprise's supply chain refers to the ability of the supply chain system to effectively withstand shocks, quickly adapt to changes and restore stable operation when facing internal and external disturbances, unexpected events or uncertainties. This resilience is not only related to the survival and development of individual enterprises, but also a key factor in ensuring the stability of the entire industrial chain and promoting the sustained and healthy development of the economy.

Measurement Methods and Model Construction. In recent years, as the importance of supply chain management in enterprise operations has become increasingly prominent, scholars at home and abroad have shifted their research focus from the pure theoretical level to the more practical practical level. It adopts a variety of scientific methods and tools to conduct in-depth measurement and analysis of the resilience level of the enterprise supply chain. At present, the measurement methods for the resilience level of enterprise supply chains cover a variety of approaches such as quantitative models, indicator systems, and empirical analyses. Taking the comprehensive evaluation method as an example, Zhao Lizhou et al. (2024) combined the Analytic Hierarchy Process (AHP) and BP neural network to construct an evaluation model for the resilience of the supply chain in the petrochemical industry, covering multiple dimensions such as risk resistance capacity, recovery capacity, and adaptability. Zhong Changbao et al. (2022) developed a supply chain resilience scale based on grounded theory, which includes five dimensions: organizational vulnerability, structural robustness, rapid restorability, learning innovation, and sustainable optimization. Their reliability and validity were verified through questionnaires. The construction of an indicator system is also an important method for measuring the level of the supply chain. Zhang Bowei et al. (2025) proposed a dual-effect model of "expanding the industrial chain - stabilizing the industrial chain" for the manufacturing industry and constructed multiple indicators including the matching degree of supply and demand, the efficiency of intelligent production scheduling, and the cross-regional collaborative response time for this purpose. Empirical research including panel data (Zhang Wei et al., 2024) is the most frequently adopted research method in numerous literatures so far and also the measurement method adopted in this paper. Through the effective application of this method, this paper aims to enhance the robustness and universality of the research conclusions, and contribute new insights and evidence to the theoretical research and practical application of supply chain resilience.

Driving Factors: Endogenous and Exogenous Analysis. At present, the research on the influencing factors of the resilience level of enterprise supply chains mainly focuses on two aspects: internal and external. The internal level includes digital and intelligent capabilities (Gao Xuepeng, Zhao Rongrong, 2025;) Li Xiaomei, Liu Mengxue, 2025; Xin Daleng, Qiu Yue 2025; Yu Chunjiao, Wang Fengyi, 2025) Organization Management and Process Optimization (Ponomarov and Holcomb,

2009), Human Resources and Professional Competence (Zhang Shushan, Gu Cheng, 2024), etc. From an external perspective, market regulation and government support are important ways to influence the improvement of the resilience level of an enterprise's supply chain. Existing studies have shown that changes in market demand can greatly affect the resilience of an enterprise's supply chain, such as the occurrence of natural disasters and emergencies (Naghshineh and Carvalho, 2024) and the emergence of customized demands (Rahman et al., 2024). In the face of complex changes in the external environment, The government is needed to carry out macro-control (Zhang Wukang et al., 2025; Yin and Zhao, 2024) to promote the improvement of the resilience level of enterprise supply chains.

2.2. Research Process of Supply Chain Resilience

The "Broadband China" pilot policy is a powerful macro-control measure for the government to promote the resilience of enterprise supply chain. In August 2013, The State Council officially issued the "Broadband China" Strategy and Implementation Plan, positioning broadband network as a "national strategic public infrastructure" for the first time, and putting forward a three-stage development framework: comprehensive speed up stage (to the end of 2013), promotion and popularization stage (2014-2015), optimization and upgrading stage (2016-2020). The policy has entered the pilot deepening period. According to the strategic deployment, the Ministry of Industry and Information Technology and the National Development and Reform Commission will carry out the "Broadband China" pilot program in 120 cities (groups) in three batches in 2014, 2015 and 2016 respectively. From 2017 to 2020, the policy entered a period of efficiency improvement. In January 2017, the Ministry of Industry and Information Technology released the 13th Five-Year Plan for information and Communication Industry, namely the Development Plan for Information and Communication Industry (2016-2020), proposing that by 2020, the overall scale of information and communication industry will be further expanded and the comprehensive development level will be greatly improved. We have achieved all the goals of the "Broadband China" strategy, basically built a new generation of high-speed, mobile, secure and ubiquitous information infrastructure, and initially formed a networked, intelligent, service-oriented and collaborative modern Internet industrial system. After 2021, the strategy will continue. On the basis of the early pilot, the policy focus will shift to the next generation of technologies such as "10 gigabit optical network". In April 2025, in accordance with the Notice of the General Office of the Ministry of Industry and Information Technology on Carrying out the Pilot Work of Ten Gigabit optical Network, in order to orderly promote the pilot application of ten gigabit optical network in China, the Ministry of Industry and Information Technology launched 168 ten gigabit optical network pilot projects, focusing on industrial parks, smart communities and other scenarios, promoting network delay to millisecond level, supporting industrial Internet, AI computing power and other high-end applications.

Based on the above discussion, although many scholars have begun to pay attention to the effect of China's national policies on supply chain resilience, and have begun to link the "Broadband China" policy with enterprise development, they have not further explored the impact of the "Broadband China" pilot policy on the level of enterprise supply chain resilience. Based on this, this paper regards the "Broadband China" pilot policy as a policy impact, and deeply investigates its impact and mechanism on the level of enterprise supply chain resilience.

3. Theoretical Analysis and Research Hypotheses

3.1. The pilot policy of "Broadband China" and Supply chain resilience

The improvement of supply chain resilience plays a crucial role for enterprises to adapt to the complex and changeable social environment and promote their sustainable development. At present, China's supply chain construction is faced with problems such as incomplete, unstable and weak, especially the phenomenon of "broken chain," which has seriously weakened the resilience of supply chain (Wang and Chen, 2025). To improve the stability and competitiveness of supply chain, it is

necessary to strengthen the ability of supply chain to "supplement", "strengthen" and "extend". Taking Li Ping and Zhu Jiazhe as an example, they believe that in today's international environment with increasing uncertainty, the resilience of enterprises to deal with adverse events has become more important (Li and Zhu, 2021). The implementation of the "Broadband China" pilot policy is conducive to promoting the improvement of digital infrastructure, thus promoting the improvement of enterprise supply chain resilience. First, the implementation of the "Broadband China" pilot policy is conducive to promoting the innovation capacity construction of enterprises. The implementation of the pilot policy of "Broadband China" has promoted the agglomeration and development of information technology and software technology in various regions. The easy availability of information technology reduces the cost of knowledge acquisition and significantly enhances the data-driven ability of enterprises, thus reducing the cost and enhancing the ability of innovation of enterprises. Secondly, the implementation of the "Broadband China" pilot policy has promoted the establishment of cooperative partnerships, which has significantly affected the resistance and adaptability of enterprises' supply chains as well as their ability to recover and restructure. Through the interconnection of broadband networks, enterprises are able to communicate more effectively with suppliers and customers, respond quickly to market changes, and enhance the overall stability and anti-risk ability of the supply chain. Third, the implementation of the "Broadband China" pilot policy is conducive to promoting the optimization of supply chain layout and enhancing the resilience and competitiveness of enterprise supply chain. The stable broadband network ensures that enterprises can quickly adjust production plans, ensure material supply, and effectively respond to market fluctuations and risks and challenges in the face of emergencies. At the same time, relying on advanced broadband technology, enterprises can more conveniently obtain high-quality resources around the world and expand market space. Based on the above analysis, we propose the following hypothesis:

H_1: The pilot policy of "Broadband China" promotes the enhancement of the resilience of enterprises' supply chains.

3.2. Mode of Action

The "Broadband China" Pilot Policy, Enterprise Innovation Capabilities and Supply Chain Resilience. The implementation of the pilot policy of "Broadband China" has brought about the construction of digital infrastructure such as broadband network and data center, which has further promoted information sharing and open source of resources, injected inexhaustable power into enterprise innovation, and promoted the flow of knowledge elements inside and outside enterprises. Innovation is a subject that all enterprises must face in the process of development.As the first driving force for development, it can facilitate the organization to have a flexible response mechanism, so as to effectively deal with the complex and changeable external environment. The adoption of digital technology and digital production process, as the innovation results of enterprises, can enable them to make early warning and response faster before the emergence of crises, avoid the dysfunction of the original system in the new situation, reduce the loss caused by the impact of crisis events to a certain extent, strengthen the ability to predict and respond to crisis events, and thus improve their risk prevention level. It further improves the resistance of enterprise supply chain (Yu and Wang, 2025). In recent years, the upgrading of various technologies has been accelerated. Take deepseek as an example, its emergence has changed the existing AI pattern. Innovative development can enable enterprises to grasp the initiative of development, not be abandoned by the market, and adapt to the requirements of the market. Improve the adaptability of the supply chain. In view of the above analysis and research, this paper proposes the following hypotheses:

H_2 : The pilot policy of "Broadband China" enhances the resilience of the supply chain by boosting the innovation capabilities of enterprises.

The Pilot Policy of "Broadband China", the Establishment of Partnerships and Supply Chain Resilience. The implementation of the "Broadband China" policy has made information regionalization prominent, and the agglomeration of various resources and information (Chen et al.,

2024) has enhanced the cooperation intention of enterprises in the region, which is conducive to promoting the establishment of cooperative partnerships. Moreover, the development of information technology has reduced the cost of exchanging resources among various organizations, and the expansion of cooperative network has become more significant. The establishment of enterprise partnership can improve enterprise R&D intensity and innovation output, and constantly cross the boundary of external resources; It helps to reduce the operating cost and transaction cost of enterprises, thus improving the total factor productivity and contributing to the sustainable development of the supply chain of enterprises (Zhang, 2018). In addition, when enterprises are threatened and challenged by the external environment, the establishment of extensive cooperative network can help enterprises mobilize resources of all parties and rise rapidly, improve the recovery and restructuring ability of enterprise supply chain, and further enhance the resilience of enterprise supply chain. Based on the above analysis, this paper proposes the third hypothesis:

H_3: The "Broadband China" pilot policy enhances supply chain resilience by promoting the establishment of partnerships.

The "Broadband China" Pilot Policy Enhances Supply Chain Resilience by Promoting the Optimization of Supply Chain Layout. The implementation of the pilot policy of "Broadband China" has promoted the development of digital technology and intelligent technology, and can empower the optimization of enterprise supply chain layout through the dynamic optimization mechanism, functional positioning mechanism, information coordination mechanism and capability optimization mechanism (Wu and Lu, 2024). By adopting advanced information technology and supply chain management system, the visibility, response speed and flexibility of the supply chain should be improved, so as to enhance the ability of the supply chain to cope with external risks and challenges (Feng, 2025). Technologies such as real-time data analysis, Internet of Things technology and cloud computing can help enterprises realize real-time monitoring and adjustment of supply chain, so that efficient and flexible organizational structure and collaboration mechanism can further promote the improvement of supply chain adaptability. The continuous optimization of reasonable supply chain layout can improve the efficiency of enterprise operation to a considerable extent and promote the sustainable development of enterprises. Based on the above analysis, this paper puts forward the fourth hypothesis:

H_4: The pilot policy of "Broadband China" enhances supply chain resilience by promoting the optimization of supply chain layout.

4. Theoretical Analysis and Research Hypotheses

4.1. Data Sources and Sample Selection

This paper selects A-share listed companies from 2012 to 2023 as the research sample. Among them, the data of "Broadband China" comes from the list of "Broadband China" demonstration cities published on the official website of the Ministry of Industry and Information Technology of the People's Republic of China, and other variables are all from the CSMAR China Economic and Financial Research Database. This paper processes the original data as follows: (1) Eliminate the samples of companies with ST and *ST; (2) Eliminate the samples with missing data; (3) Underpin continuous variables by one to ninety-nine percent. Finally, 19,299 company-year data were obtained.

4.2. Model Building

Since the implementation of the "Broadband China" pilot policy in 2013, China has selected 117 demonstration cities in 2014, 2015 and 2016 respectively. These 117 cities are regarded as having implemented the "Broadband China" policy at a relatively high level. In order to study the impact of the "Broadband China" pilot policy on the resilience level of enterprises' supply chains, this paper establishes the following model:

$$Recov_{it} = \beta_0 + \beta_1 Treated_{it} + \beta_2 DID_{it} + \alpha Controls_{it} + \delta_{it} + \eta_{it} + \varepsilon_{it} \quad (1)$$

Where explained variable $Recov_{it}$ is the supply chain resilience level of enterprise i in year t; *Treat* is regional dummy variable; if the city where the sample enterprise is located is a pilot city of "Broadband China," the value is 1; otherwise, the value is 0; DID_{it} represents the policy dummy variable of "Broadband China" strategy; $Controls_{it}$ represents the situation of a series of control variables of enterprise *i* in year *t*; δ_{it} and η_{it} denote year fixed effects and industry fixed effects, respectively. ε_{it} is the random error term. α and β are the estimated coefficients, among which this paper mainly focuses on β_2, and its economic meaning is the impact of the "Broadband China" pilot city policies on the supply chain resilience of listed enterprises.

4.3. Variable Measurement and Explanation

Variable Explained. The explained variable in this paper is supply chain resilience, that is, the ability of the supply chain to recover to the original state or a more ideal state after being disturbed.

As for the measurement methods of enterprise supply chain resilience, according to the research of Wang Zhenzhu et al. (2025), this paper further divides enterprise supply chain resilience into the following three categories: ① Resistance of supply chain, that is, the ability of supply chain to cope with external shocks; (2) The response ability of supply chain, that is, the shock response and risk response ability of supply chain; (3) The resilience of the supply chain refers to the ability of the supply chain to return to the normal state after external shocks. According to the availability of data, this paper takes resistance and resilience as the two key indicators of enterprise supply chain resilience, and looks for corresponding indicators from these two dimensions to measure the explained variable supply chain resilience from different perspectives.

The concept of supply chain resilience refers to the ability of supply chain system to adapt to the new environment and restore stable operation after the end of external shock event. This capability reflects the elastic recovery characteristics of the supply chain after it deviates from the original operation trajectory when it suffers from external influences. Therefore, the degree of deviation or fluctuation of the supply chain in response to external shocks can be used as a significant indicator of its resilience. According to Zhang Shushan and Gu Cheng (2024), this paper uses the residual (the difference between the actual value and the estimated value) to capture the changes and reactions of enterprises' economic performance in different periods. The larger the value is, the stronger the resilience of the enterprise supply chain is.

$$Perform_{it} = \alpha + \beta_1 Size_{it} + \beta_2 Lev_{it} + \beta_3 Growth + \beta_4 Age_{it} + \beta_5 Board_{it} + \Sigma Firm + \Sigma Year + \varepsilon_{it} \quad (2)$$

Among them, *Perform* represents the economic performance of the enterprise, which is measured by the ratio of eBIT to the number of employees. Control variables include firm Size (*Size*), asset-liability ratio (*Lev*), Growth rate of operating income (*Growth*), firm Age (*Age*) and Board size (*Board*).

Supply chain resilience refers to the ability of an enterprise to maintain its normal operation and not be disturbed by external factors when it is subjected to external shocks and threats. Based on the research of CULL et al. (2009), this paper constructs an index system for measuring the resistance capacity of the supply chain from the perspective of stabilizing the supply chain relationship. From a process perspective, the stability of supply chain relationships depends on the capital occupation of upstream suppliers by downstream customers. Under normal circumstances, in a supply chain system, when the accounts receivable pressure of upstream enterprises is relatively high, the relationship will tend to break down. Here, we take the ratio of accounts receivable to operating as the measurement indicator of capital occupation. From this perspective, the current financial situation of an enterprise has become a major indicator for measuring the resistance capacity of its supply chain. Therefore, based on previous studies, this paper further improves this measurement system, taking the natural

logarithm of the ratio of accounts receivable and advance payments to main business income as the measurement index to measure the existing capital situation of enterprises, and the measurement values are more accurate and comprehensive.

The explained variables in this paper are the resilience of the enterprise supply chain (*Recov1*) and the resilience of the supply chain (*Recov2*). In the benchmark regression experiment, in this paper, the resilience of the enterprise supply chain is taken as the explained variable and denoted as *Recov*, while the resilience of the enterprise supply chain is placed as the replaced explained variable in the subsequent robustness test.

Core Explanatory Variable. The core explanatory variable in this paper is the dummy variable of "Broadband China" pilot city construction (*DID*). In the implementation process of "Broadband China" strategy, 117 demonstration cities (groups) were selected as experimental points in three stages. According to the different time nodes when enterprises are included in the "Broadband China" demonstration cities, this study conducts multi-time point empirical analysis and processing. Specifically, in this study, if the city where the enterprise is registered is designated as the "Broadband China" demonstration city, the enterprise is classified as the experimental group. For these enterprises, if the city where they are located is a pilot city and the observation year is after the pilot year, the value of *DID* is 1, and the value is 0 in other cases.

Control Variable. The improvement of enterprise supply chain resilience requires the continuous strengthening of enterprises' own strength. This paper draws on the research of Pan and Zhang (2020), Chen et al. (2023), and selects total assets (*Size*), asset-liability ratio (*Lev*), return on assets (*ROA*), return on net assets (*ROE*), total asset turnover (*ATO*), Cashflow (*Cashflow*),

Shareholding ratio of the top five shareholders (*Top5*), years of listing (ListAge), years of company establishment (FirmAge) and whether it is a Big Four audit (Big4) are used as control variables, and time fixed effects (*Year*) and Industry fixed effects (*Industry*) are also controlled. See Table 1 for the definitions of variables.

Table 1 Variable Description Table

Types of Variables	Symbol	Implication	Measure
Explained Variable	*Recov*	Supply chain resilience measurement indicators refer to the supply chain's recovery capacity	See above
Explaining Variable	*DID*	Broadband China dummy variable	See above
Control Variable	*Size*	Total assets	Total assets of the enterprise at the end of the year
	Lev	Asset-liability ratio	Ratio of total liabilities to total assets
	ROA	Return on assets	Return on assets = net profit/total assets
	ROE	Return on equity	Return on equity = net profit/net assets
	ATO	Turnover of total capital	Total asset turnover = operating income/average total assets
	Cashflow	Cash flow	Ratio of total liabilities to total assets
	Top5	The shareholding ratios of the top five shareholders	Shareholding ratio of the top five shareholders
	ListAge	Listed years	ln(Year of the year - Year of listing +1)

FirmAge	Years of establishment of the company	ln(Year of the current year - year of establishment +1)
Big4	Is it the Big Four	The value is 1 if the company is audited by the Big Four (Price water house coopers, Deloitte, KPMG, Ernst & Young), otherwise it is 0

5. Empirical Results and Analysis

5.1. Descriptive Statistics

As shown in Table 2, Table 2 reports the descriptive statistics of the regression samples used in this paper. The contents of the report include observations, means, standard deviations, minimum values, and maximum values. The maximum value of Recov is 3.816 and the minimum value is -2.203, indicating that there are significant differences in supply chain resilience among different enterprises. The average value is -0.033, indicating that the supply chain resilience of the sample companies is generally at a relatively low level. The statistical results of other variables are within a reasonable range.

Table 2 Descriptive Statistics

Variable Name	Observed Value	mean value	Standard Deviation
Recov	19, 299	-0.033	0.749
DID	19, 299	0.596	0.491
Size	19, 299	22.200	1.204
Lev	19, 299	0.421	0.203
ROA	19, 299	0.034	0.068
ROE	19, 276	0.049	0.148
ATO	19, 299	0.629	0.422
Cashflow	19, 299	0.046	0.067
Top5	19, 299	0.510	0.149
ListAge	19, 299	2.229	0.688
FirmAge	19, 299	2.939	0.312
Big4	19, 299	0.045	0.208

5.2. Benchmark Regression Analysis

Table 3 reports the benchmark regression results, in which column (1) is the regression of enterprises' supply chain resilience on the single variable of the "Broadband China" pilot policy strategy, that is, without any control variable and the fixed effect of industry and year.

Table 3 Benchmark Regression Analysis

VARIABLES	(1) *Recov1*	(2) *Recov1*	(3) *Recov1*
DID	0.063*** (3.482)	0.043* (1.944)	0.110*** (6.646)
Size			-0.162*** (-13.385)
Lev			1.557*** (27.270)
ROA			4.638*** (14.654)
ROE			1.036*** (7.382)
ATO			-0.346*** (-10.630)
Cashflow			-0.196 (-1.507)
ListAge			0.113*** (6.298)
FirmAge			0.116*** (3.960)
Big4			0.045 (0.689)
Top5			0.209*** (2.908)
Constant	-0.071*** (-4.946)	-0.362*** (-4.852)	2.150*** (8.190)
Observations	19, 299	19, 299	19, 276
R-squared	0.002	0.137	0.302
IndustryFE	NO	YES	NO
Year FE	NO	YES	NO

Note: The robust heteroskedastic t values adjusted by corporate cluster analysis are reported in parentheses, and ***, ** and * represent significance at the levels of 1%, 5% and 10%, respectively

The regression results show that column (2) is significant at the level of 10%, and the regression results of the remaining columns are significant at the level of 1%. Moreover, compared with the model without control variables, the DID coefficient decreases after two-way fixed effects and control variables are added, but it is still significant, indicating that the policy effect is not driven by other factors, but the positive impact brought by the policy itself. This shows that the "Broadband China" pilot policy strategy has a significant role in promoting the supply chain resilience of manufacturing enterprises. This conclusion shows that the development of digital economy and the wide application of digital technology can promote the digital transformation of supply chain of manufacturing enterprises, and then improve the resistance and recovery ability of supply chain of manufacturing enterprises, and significantly improve the resilience of supply chain of listed companies.

5.3. Parallel trend test

The key premise hypothesis of the multi-period DID model is the parallel trend hypothesis, which requires that the supply chain resilience levels of enterprises in the treatment group and the control group have the same development trend before the implementation of the "Broadband China" model city policy. Since the "Broadband China" pilot policy is promulgated in three batches, this paper

adopts the multi-period DID parallel trend test to dynamically analyze the impact of the "Broadband China" pilot policy on enterprises' supply chain resilience through the event study method.

This paper takes the current policy implementation period as the base period, and the results shown in Figure 1 show that before the policy intervention, the confidence intervals of regression coefficients in each period cover zero value, implying that there is no significant difference in the level of enterprise supply chain resilience before the policy implementation. However, with the implementation of the "Broadband China" pilot policy, the confidence interval of the regression coefficient no longer contains zero value three years after the policy, which clearly indicates that the policy has a positive promoting effect on the resilience of enterprises' supply chain. Further analysis reveals that in the fourth year after the implementation of the policy, the confidence interval of the estimated coefficient is re-incorporated into the zero value, indicating that the policy effect may have weakened or changed to some extent during this period, indicating that the policy may become ineffective over time. This result implies the attenuation of the policy influence, which may come from a variety of factors. For example, the lack of continuity of policy implementation, the change of market environment, the improvement of enterprise adaptability or the interference of other external factors may lead to the gradual loss of the effect of the initial policy intervention.

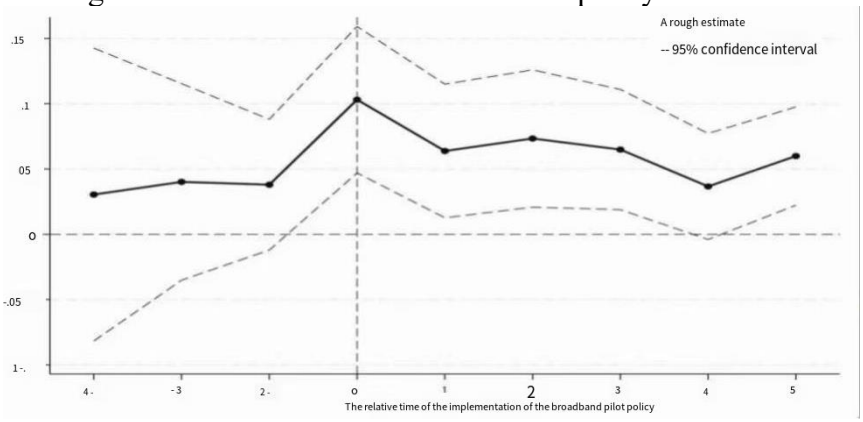

Fig. 1 Parallel Trend Test

5.4. Placebo Test

The placebo test is a statistical method used to assess the robustness of the results of empirical studies, and is particularly suitable for judging whether there are other factors not taken into account that have an impact on the benchmark regression results. The core idea is to simulate a "fake treatment" environment by introducing a placebo variable unrelated to the actual treatment variable, and then observe whether this "fake treatment" will also produce similar results to the actual treatment. In this paper, the individual placebo test is carried out, and the pseudo-policy variable is constructed by randomly selecting the pilot time and treatment group for regression analysis, and the operation is repeated 1000 times. We then observe whether the estimated coefficient is near 0. If the mean of the coefficients of the randomly sampled pilot policies is around 0, it indicates that the experimental results are not affected by omitted variables and random factors.

It can be seen from Figure 2 that the estimated coefficients of the dummy variables are mostly concentrated around 0, and the estimated coefficients of the real policy dummy variables are significantly different from the results of the placebo test, which to some extent confirms that other factors not considered have no impact on the benchmark regression results, thus confirming the validity of the benchmark regression in this paper.

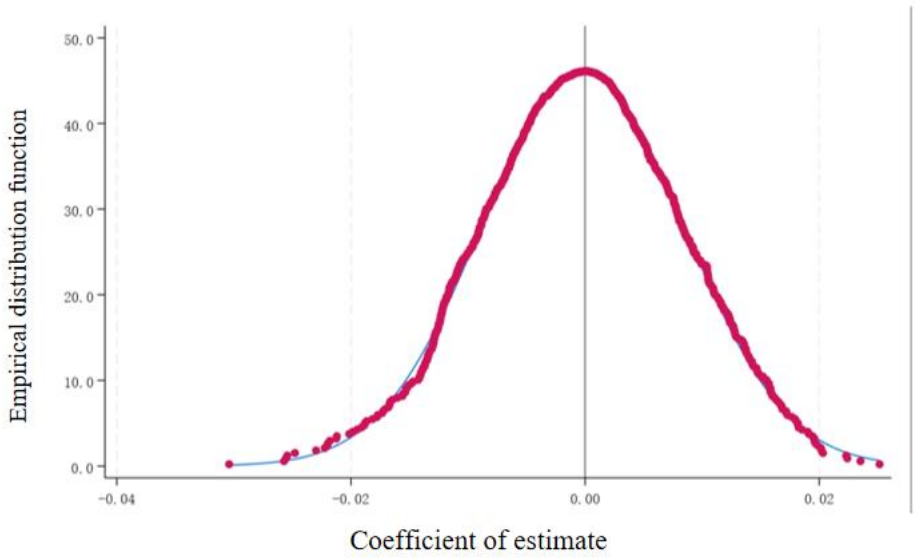

Fig. 2 Placebo Test

5.5. Robustness Test

Change the Measurement Method of Explained Variable. Table 4 reports the regression results of the robustness test for changing the measurement method of the explained variable. Referring to the literature of CULL et al. (2009), in this part, the natural logarithm of the ratio of accounts receivable and advance payments to main business income is reused as the proxy variable of the enterprise's supply chain resistance, namely Recov2. The smaller its value, the stronger the enterprise's supply chain resistance. Column (2) of Table 4 reports the regression results after changing the explained variables. The regression coefficient of enterprise supply chain resilience is 0.105 and is significant at the 1% level. The results indicate that the results still hold after changing the explained variables.

Table 4 Replace the Explained Variable

VARIABLES	(1) *Recov1*	(2) *Recov2*
DID	0.055*** (2.871)	0.105*** (3.415)
Size	-0.181*** (-15.878)	-0.058*** (-3.676)
Lev	1.363*** (26.001)	0.512*** (6.024)
ROA	4.866*** (15.647)	-0.442 (-1.190)
ROE	0.886*** (6.747)	0.467*** (3.095)
ATO	-0.256*** (-9.048)	-0.757*** (-15.785)
Cashflow	-0.159 (-1.450)	-3.316*** (-20.779)
ListAge	0.054*** (3.338)	-0.179*** (-6.648)
FirmAge	-0.053* (-1.772)	-0.016 (-0.330)
Big4	0.048	-0.058

	(0.848)	(-0.827)
Top5	0.001	-0.597***
	(0.013)	(-6.039)
Constant	3.077***	0.092
	(12.401)	(0.247)
Observations	19, 276	19, 264
R-squared	0.403	0.370
IndustryFE	YES	YES
YearFE	YES	YES

PSM-DID. In order to alleviate the selection bias of samples, this paper uses PSM-DID method to conduct robustness test. Specifically, this paper takes control variables such as enterprise size and asset-liability ratio as covariates, and adopts 1:1 nearest neighbor matching with replenishment for sample matching. The PSM-DID regression results are shown in columns (1) - (4) in Table 5, and the regression coefficients are all positively significant at the level of 1%, which further confirms the robustness of the model.

Table 5 PSM-DID

VARIABLES	(1) *Recov1*	(2) *Recov1*	(3) *Recov1*	(4) *Recov1*
DID	0.070***	0.065***	0.102***	0.057***
	(3.473)	(2.847)	(5.753)	(2.860)
Size			-0.162***	-0.180***
			(-12.379)	(-14.977)
Lev			1.579***	1.369***
			(25.414)	(24.453)
ROA			4.806***	5.039***
			(14.507)	(15.492)
ROE			1.039***	0.887***
			(6.930)	(6.375)
ATO			-0.358***	-0.268***
			(-10.357)	(-9.377)
Cashflow			-0.115	-0.061
			(-0.814)	(-0.522)
ListAge			0.131***	0.065***
			(6.854)	(3.805)
FirmAge			0.107***	-0.061*
			(3.296)	(-1.860)
Big4			0.037	0.032
			(0.570)	(0.562)
Top5			0.236***	0.015
			(3.053)	(0.221)
Constant	-0.077***	-0.396***	2.124***	3.049***
	(-4.486)	(-4.798)	(7.446)	(11.652)
Observations	16, 309	16, 309	16, 309	16, 309
R-squared	0.002	0.141	0.310	0.414
IndustryFE	NO	YES	NO	YES
YearFE	NO	YES	NO	YES

Change the Observation Interval of the Sample. Considering that the impact of the financial crisis in 2008 and the stock market crash in 2015 May affect the normal conduct of this study, making

the regression results unreliable, as shown in Table 6, this paper makes a regression after excluding the data of the financial crisis in 2008 and the stock market crash in 2015. The regression results are shown in columns (1) - (4) in Table 6, and the regression coefficients are all positively significant at the level of 1%, which further confirms the robustness of the model.

Table 6 Change the sample interval

VARIABLES	(1) *Recov1*	(2) *Recov1*	(3) *Recov1*	(4) *Recov1*
DID	0.060***	0.040*	0.113***	0.054***
	(3.268)	(1.737)	(6.695)	(2.721)
Size			-0.161***	-0.180***
			(-13.259)	(-15.755)
Lev			1.557***	1.363***
			(27.301)	(26.108)
ROA			4.739***	4.965***
			(14.836)	(15.789)
ROE			1.037***	0.892***
			(7.334)	(6.702)
ATO			-0.347***	-0.258***
			(-10.612)	(-9.128)
Cashflow			-0.238*	-0.183
			(-1.800)	(-1.623)
ListAge			0.115***	0.055***
			(6.428)	(3.453)
FirmAge			0.109***	-0.059*
			(3.588)	(-1.906)
Big4			0.043	0.041
			(0.678)	(0.731)
Top5			0.231***	0.017
			(3.143)	(0.276)
Constant	-0.063***	-0.371***	2.143***	3.037***
	(-4.342)	(-4.956)	(8.141)	(12.225)
Observations	17, 876	17, 876	17, 856	17, 856
R-squared	0.002	0.134	0.307	0.408
IndustryFE	NO	YES	NO	YES
YearFE	NO	YES	NO	YES

6. Heterogeneity Analysis

To verify whether each enterprise will show heterogeneous impact effects on supply chain resilience due to different urban locations, forms of ownership, and leadership Settings, this paper will conduct heterogeneity analysis from the above three entry perspectives respectively.

6.1. Regional Heterogeneity Analysis

From a geographical perspective, to explore whether the policy effects of the "Broadband China" pilot policy on cities in different regions are different, this paper divides the whole country into three regions: the eastern, central and western regions, and respectively investigates the impact of the "Broadband China" pilot policy on the supply chain resilience of enterprises in different regions. The regression results are shown in columns (1) - (3) of Table 7. It is found that only the estimated coefficients of the eastern cities are significantly positive, indicating that compared with the central and western cities, the "Broadband China" pilot policy can better promote the improvement of the supply chain resilience level of eastern enterprises. The possible reason lies in that eastern cities have

a higher degree of openness compared to those in the central and western regions, and the digital infrastructure construction in the developed eastern areas is more mature (Jiang Bo et al., 2024). They can accept and implement the corresponding national policies more quickly, have more active innovation and entrepreneurship activities, and develop digital technologies at a faster level. Therefore, compared with the "Broadband China" pilot policy in central and western cities, it has further promoted the improvement of the supply chain resilience level of enterprises in this region.

6.2. Heterogeneity of Ownership

The nature of ownership is a key dimension of a company's characteristics, and it may have a significant and even decisive impact on core areas such as an enterprise's R&D investment and innovation capabilities. Therefore, this paper classifies enterprises into two categories: state-owned enterprises and non-state-owned enterprises, and conducts tests respectively. According to the data in columns (4) and (5) of Table 7, it can be known that compared with non-state-owned enterprises, the pilot policy of "Broadband China" only has a positive and significant impact on state-owned enterprises. Perhaps because state-owned enterprises are affiliated with the state and have the advantage of resource inclination (Xiao Renqiao et al., 2024), they should maintain a more positive attitude towards relevant national policies. Under the influence of the "Broadband China" pilot policy, state-owned enterprises, under the guidance and leadership of the state, are more inclined to utilize the Internet and big data for digital transformation or the application of digital technologies, and transform new production methods. Promote the enhancement of the resilience of enterprise supply chains.

6.3. Heterogeneity in leadership Settings

Leadership setting is a key link in enterprise operation, which plays a very important role in enterprise innovation performance. Based on this criterion, this paper divides enterprises into integrated structure and separation structure. The results are shown in columns (6) and (7) of Table 7: Compared with enterprises with two roles integrated, the "Broadband China" pilot policy only has a positive and significant impact on enterprises with the separation of the roles of chairman and general manager. As shown in the research of Qian and Zhang (2021) in 2021, the separation of the roles of chief executive and general manager is conducive to improving the innovation performance of traditional enterprises in the field of mobile Internet. In the context of the implementation of the "Broadband China" pilot policy, the problems of information transmission and unreasonable intervention caused by the separation of the two positions are not serious, but it can achieve the effect of inhibiting the opportunistic behavior of managers, which is conducive to the stable development of the enterprise supply chain.

Table 7 Analysis of Heterogeneity

VARIABLES	(2) Heterogeneity of urban locations eastern	western	Central	(5) Ownership heterogeneity State-owned enterprises	Non-state-owned enterprises	(6) Leadership heterogeneity CEO/Chairman duality	(7) Non-CEO/Chairman duality
DID	0.079***	0.025	0.031	0.144***	0.009	0.032	0.062***
	(4.125)	(0.612)	(0.514)	(3.937)	(0.412)	(1.118)	(2.735)
Control variables	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Industry fixed effects	YES	YES	YES	YES	YES	YES	YES
N	13, 620	3, 323	2, 333	5, 665	13, 611	5, 631	13, 645
R^2	0.424	0.436	0.435	0.410	0.426	0.444	0.396

7. Analysis of Mechanism

The implementation of the "Broadband China" pilot policy has brought about the construction of digital infrastructure, such as broadband network, data center, etc. The improvement of digital capability has brought about the improvement of enterprise supply chain resilience from three aspects of internal, external and organizational structure respectively. From the internal perspective, the implementation of the pilot policy promoted the full flow of information and resources, injected inexhaustible power into enterprise innovation, firmly seized the initiative of development, and constantly improved the adaptability of enterprises to the market, thus improving the resilience of enterprise supply chain; From the external perspective, the implementation of the pilot policy makes the information regionalization feature remarkable, helps enterprises in the region to establish a network, enhance cooperation to cope with the changing market environment, and help enterprises quickly mobilize resources in case of crisis, so as to enhance the resilience of enterprise supply chain. From the aspect of organizational structure, the implementation of pilot policies has made various high-end technologies continue to emerge. Using advanced technologies such as real-time data analysis, Internet of Things technology and cloud computing, enterprises can realize real-time monitoring and dynamic adjustment of supply chain. Such efficient and flexible organizational structure and coordination mechanism help to further enhance the adaptability of supply chain. Based on this, this part will test the above mechanism, and the model is as follows:

$$M_{it} = \partial_0 + \partial_1 Treated_{it} + \partial_2 DID_{it} + \alpha Controls_{it} + \delta_{it} + \eta_{it} + \varepsilon_{it} \tag{3}$$

$$\mathrm{Re\,cov}_{it} = \theta_0 + \theta_1 Treated_{it} + \theta_2 DID_{it} + \theta_3 M_{it} + \alpha Controls_{it} + \delta_{it} + \eta_{it} + \varepsilon_{it} \tag{4}$$

Where M is the mechanism variable, including three variables: enterprise innovation capability, partnership and supply chain layout, and the remaining variables are consistent with Model (1). Specifically, if β_2, ∂_2 and θ_3 are all significant, and θ_2 is significantly smaller or insignificant compared with β_2, it indicates that there is a mediating effect.

7.1. Promote Enterprise Innovation

In terms of quantitative indicators to evaluate the innovation capability of enterprises, this study adopts a specific and practical method, that is, by considering the number of utility model patent applications independently submitted by enterprises in a specific year as the key indicator to measure

their innovation capability. According to the data in Column (1) of Table 8, the "Broadband China" pilot policy strategy significantly promotes the improvement of enterprises' innovation capability (Chen and Zhang, 2024; Tong Yu, 2023; Meng Qingwei and Xu Sijie, 2022). The reason may be that the rapid development of broadband networks has promoted the application of emerging technologies such as cloud computing, big data, and the Internet of Things, which provide new business models and ways for enterprises to innovate. In addition, the introduction of a large number of excellent talents provides a talent foundation for enterprise innovation.

Promote Partnership Building. In the current business ecological environment, enterprises are encountering unprecedented competitive pressure. It is worth noting that competition is not limited to the confrontation between individual enterprises, but extends to the supply chain level. The competitive influence between supply chains is expanding day by day, and its role and importance in the competitive pattern of enterprises are becoming more prominent (Zhao et al., 2021). This situation requires different organizations to establish an effective collaboration mechanism to promote the formation of a stable and sound buyer-supplier interaction model (Y.-L.Cheung et al., 2020). A healthy buyer-supplier relationship enables both parties to coordinate with each other to improve operational efficiency, share information and risks, and pursue their common interests, so as to improve the company's financial performance and further improve the enterprise's supply chain resilience (A. Jaaskelainen, 2021). Here, based on the research of Gu et al. (2022), this paper uses the sum of the minimum transaction shares of major customers that have existed continuously in the past two years to measure the stability of supply chain, which is used as the proxy variable of "promoting the establishment of partnership," and as the measurement method of the action mechanism of the "Broadband China" pilot policy to promote the improvement of enterprise supply chain resilience. According to the data in Column (2) of Table 8, the results show that the "Broadband China" pilot policy strategy has a significant impact on promoting the establishment of the cooperative partnership mechanism.

Promote Supply Chain Synergy. Referring to the practice of Liu et al. (2024), the deviation degree of enterprises' production fluctuations and demand fluctuations is used to measure the level of supply chain coordination. On the contrary, if the value of this indicator decreases, it indicates that the coordination level of enterprise supply chain is relatively low. The measurement of supply chain risk level is quantified in the following way: the ratio of quarterly standard deviation of Production and quarterly standard deviation of Demand is used as the indicator of risk level. Production volume and demand respectively represent the total production and sales volume of enterprises in a particular quarter. Before the standard deviation calculation, the quarterly production and quarterly sales data must be log-transformed and the first-order difference processing, so as to ensure the stationarity and consistency of the data, so as to facilitate effective statistical analysis.

According to the data in Column (3) of Table 8, the "Broadband China" pilot policy strategy significantly promotes the optimization of supply chain layout. The reason may be that the supply chain collaboration platform supported by broadband network can realize real-time data sharing and process collaboration, improve the operation efficiency of the whole supply chain, and thus help optimize the layout of the enterprise supply chain.

Table 8 Analysis of Mechanism

VARIABLES	(1) *Innovation*	(2) *Partnership*	(3) *Layout*
DID	10.313***	0.041***	-0.017**

	(3.657)	(3.897)	(-2.493)
Size	35.241***	-0.001	0.011***
	(26.629)	(-0.162)	(3.018)
Lev	-6.198	-0.035	-0.060***
	(-0.799)	(-1.244)	(-3.149)
ROA	-152.635***	0.014	0.031
	(-3.551)	(0.120)	(0.383)
ROE	97.684***	-0.015	-0.102***
	(5.301)	(-0.303)	(-3.062)
ATO	13.895***	0.020	0.193***
	(4.350)	(1.412)	(23.831)
Cashflow	0.806	-0.028	0.275***
	(0.041)	(-0.571)	(7.714)
ListAge	26.047***	0.074***	0.000
	(11.065)	(7.545)	(0.046)
FirmAge	3.196	0.045***	0.003
	(0.666)	(2.692)	(0.298)
Big4	58.124***	0.026	0.008
	(9.967)	(0.962)	(0.490)
Top5	54.463***	0.162***	0.024
	(6.265)	(4.462)	(1.070)
Constant	-874.559***	-0.149	0.162*
	(-27.861)	(-1.139)	(1.916)
Observations	19, 276	19, 276	19, 276
R-squared	0.140	0.124	0.303
IndustryFE	YES	YES	YES
YearFE	YES	YES	YES

8. Conclusions and Policy Recommendations

Using the panel data of A-share listed companies from 2012 to 2023 as the research sample, this paper explores the impact of the "Broadband China" pilot policy on the level of enterprise supply chain resilience. The main conclusions of this paper are as follows: (1) The "Broadband China" pilot policy is conducive to the improvement of enterprises' supply chain resilience, which is still established after the parallel trend, placebo test and a series of other robustness tests. (2) Based on the empirical analysis of heterogeneity at the enterprise level, it is found that in state-owned enterprises and non-job integration enterprises, the implementation of the "Broadband China" pilot policy has significantly promoted the resilience of the industrial chain and supply chain; The regional heterogeneity test finds that compared with the central and western regions, the "Broadband China" pilot policy has a more significant role in promoting the supply chain resilience of enterprises in the eastern developed regions. (3) The results of the mechanism show that the "Broadband China" pilot policy mainly promotes the resilience of enterprises' supply chain by improving the innovation ability of enterprises, promoting the establishment of cooperative partnership and promoting the optimization of supply chain layout.

Based on the above research conclusions, the following policy recommendations are put forward.

First, we will continue to deepen the pilot policy of "Broadband China" and maximize the enabling effect of digital technology. Non-pilot cities should actively learn from the successful experience of pilot cities, combine with the actual development of the region, actively promote the construction of digital infrastructure, and empower the development of enterprises. On the one hand, the country should strengthen the construction of digital infrastructure and narrow the regional development gap. In view of the current situation of relatively weak digital infrastructure in the central and western

regions, government departments should increase financial investment and policy preference, expand the coverage of broadband network in underdeveloped regions, improve the quality of network and constantly narrow the "digital divide" between regions by increasing tax incentives, improving investment and financing, strengthening talent support and other policies. On the other hand, regions should actively strengthen ties and constantly promote the diffusion of demonstration effects. Encourage the mature experience of the developed eastern regions to be promoted to the central and western regions, promote the spillover of digital technology through cross-regional technological cooperation and talent exchange, promote the resilience of the supply chain of enterprises in the central and western regions, empower the development of the central and western regions, and constantly narrow the gap between the eastern and western regions.

Secondly, we should attach importance to the construction of digital infrastructure and improve the basic pattern of national data infrastructure with horizontal and vertical connectivity. The National Development and Reform Commission, the National Data Administration and the Ministry of Industry and Information Technology recently issued the National Data Infrastructure Construction Guidelines, marking the start of a new round of data-centered digital infrastructure layout in China. On the one hand, we should constantly promote data fusion and intelligent development. Through the construction of a unified data sharing platform, led by the government, combined with industry associations and leading enterprises, build a cross-industry and cross-region supply chain data sharing platform, formulate unified data standards and interface specifications, promote the interconnection of production, inventory, logistics and other data between enterprises, break the "information island", constantly reduce the cost of information exchange, improve the performance of data exchange; Through the application of Internet of Things (IoT), artificial intelligence (AI) and other technologies, we will continue to consolidate the foundation of intelligence. On the other hand, we will promote the optimization and upgrading of traditional network facilities and comprehensively promote the research and development and innovation of 6G network technology. By strengthening network support, building high-speed data transmission network, realizing efficient and flexible data transmission and deep interconnection between multi-terminals, multi-platforms and private networks, so as to solve key technical problems such as data transmission capacity bottleneck, high cost and interconnection barriers, orderly promote the evolution of 5G network to 5G-A, and comprehensively promote the research and development and innovation of 6G network technology.

Finally, we should strengthen the demonstration and leading role of state-owned enterprises and optimize the governance efficiency of enterprises with separation of employment and employment. The results show that the impact of the "Broadband China" pilot policy on enterprises' supply chain resilience is heterogeneous due to the differences in the nature of enterprises. In this regard, for state-owned enterprises, priority should be given to providing financial subsidies or low-interest loans to support them in building intelligent supply chain management platforms and deploying Internet of Things devices, so as to form replicable digital upgrading models and promote them to the industry. Through the establishment of a "state-owned enterprise-private enterprise" assistance mechanism, state-owned enterprises are encouraged to drive upstream and downstream non-state-owned enterprises to enhance their supply chain resilience through data sharing and information exchange. For enterprises with separation of roles and roles, the chairman of the board focuses on strategic planning and resource integration, while the general manager is responsible for operation and execution. To this end, the government can amplify the demonstration effect of enterprises with separation of roles and responsibilities, encourage enterprises with non-compulsory separation of roles and responsibilities (especially small and medium-sized private enterprises) to optimize their governance structure, give tax incentives or financing convenience to enterprises that take the initiative to implement separation of roles and responsibilities, and constantly strengthen the capacity building of managers, incorporate digital technology application ability into the assessment standards of professional managers, and promote the specialization of management.

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