Cross-Regional Investment and Corporate Supply-Chain Resilience: Evidence from China's A-Share Listed Companies

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Abstract. Cross-regional investment by firms enhances supply-chain resilience through multiple channels: risk-source diversification, supply-network restructuring, and access to strategic resources. Using panel data on China's A-share listed companies from 2013 to 2023, we construct two core indicators: the share of cross-city investment (*TRinv*) to measure the intensity of cross-regional investment and an entropy-weighted index of supply-chain resilience (*Tough*). A two-way fixed-effects model confirms that cross-regional investment significantly strengthens supply-chain resilience. This effect operates via three main pathways: (1) geographical diversification that disperses systemic risks; (2) breaking local monopolies to secure a more diverse set of suppliers; and (3) exploiting regional policy differences to optimize resource allocation. Moreover, high-quality government–firm relations amplify this positive impact. Heterogeneity tests reveal that the effect is stronger for non-SOEs than for SOEs, significantly positive in the eastern and western regions, but negative in the central region. These findings elucidate the internal mechanisms linking cross-regional investment to supply-chain resilience and offer both firms and policymakers guidance on strategic spatial planning, risk mitigation, and coordinated regional development.

Keywords: Cross-regional investment; Supply-chain resilience; Geographical diversification; Government–firm relations; Regional heterogeneity; Listed-firm empirical study.

1. Introduction

In recent years, as the construction of a unified domestic market has accelerated, factor-market reforms have deepened, and a high-standard market system has steadily taken shape, both government and public attention have given cross-regional corporate investment greater prominence [1]. By means of equity mergers, acquisitions, and the establishment of non-local subsidiaries, firms can channel capital, technology, talent, and other production factors across regions, thereby propelling the formation of a unified domestic market. Cross-regional investment is also vital to firms' own development: it helps optimize strategic layouts, mitigate risks, and ultimately enhance competitiveness. According to Xiao Sha's research, firms that invest outside their home regions enjoy, on average, an 18.3 % larger market share than purely local firms, and the volatility of their operating risk falls by 22.5 % through diversification, markedly strengthening both risk resilience and profit stability [2]. Hence, cross-regional investment not only advances the construction of a unified domestic market but is also indispensable to firms' sustainable growth.

While the unified domestic market gains momentum, cross-regional investment has become a key engine for optimizing resource allocation. Yet against the backdrop of recurring global supply-chain crises, a sharp contradiction has surfaced: despite vigorous government promotion of inter-regional investment, supply-chain disruptions in China's manufacturing sector have risen markedly. This counter-intuitive phenomenon points to a deeper issue—cross-regional investment does not automatically confer greater risk resistance; instead, its link to supply-chain resilience is clouded by significant theoretical blind spots and practical paradoxes.

In an increasingly competitive marketplace, firms must continuously strengthen multiple capabilities to secure their irreplaceability, among which supply-chain resilience is especially critical. Pan Xinzhu's research shows that enhancing supply-chain resilience boosts a firm's flexibility and recovery capacity when confronting external shocks [3]. A resilient supply chain excels in recovery, operations, renewal, resistance, and demand–supply matching. Through information sharing and optimal resource allocation, it can swiftly respond to market fluctuations, supplier instability, and

other external disturbances, enabling firms to resume—and even improve—operations after disruptions. Conversely, weak supply-chain resilience undermines risk resistance and threatens long-term survival [4]. When supply-chain resilience is low, firms are prone to production stoppages and delivery delays in the face of interruptions or demand shocks, potentially forfeiting market competitiveness and even facing an existential crisis. Therefore, supply-chain resilience is essential to a firm's development.

Regrettably, few scholars have examined how cross-regional investment affects a firm's supply-chain resilience. Most existing studies focus on the boost such investment gives to capital efficiency [8][9], while overlooking the potential "diversification trap": blind expansion can send managerial costs soaring, render regional policies ineffective, and even intensify industrial fragmentation—especially in central China. To strengthen supply-chain resilience, firms must look beyond their registered domicile and actively invest elsewhere, accessing external resources to fortify their supply chains. Investigating the impact of cross-regional investment on resilience therefore represents a theoretical breakthrough for solving the puzzle of industrial-chain security. On the one hand, cross-regional investment can geographically diversify production bases, dispersing natural-disaster and political risks and thereby reshaping supply-chain architecture. On the other hand, institutional coordination is pivotal in translating such investment into greater resilience: by establishing branches across regions, firms can share tax revenues, integrate transport networks, lower capital-mobility costs, and seamlessly align technological resources with manufacturing hubs.

This paper makes a dual contribution—both theoretical and practical—that extends well beyond the existing literature. Theoretically, it closes a critical gap by linking cross-regional investment to supply-chain resilience, integrating firms' spatial strategies into the resilience paradigm for the first time. It innovatively uncovers the institutional frictions that generate the observed negative effect in central China, correcting the entrenched bias that cross-regional investment invariably strengthens resilience. Moreover, it deepens the micro-level application of institutional theory to regional policy alignment and provides empirical evidence of how government–firm relations moderate the pathway between investment and dynamic capabilities.

Practically, the study offers differentiated roadmaps for resolving the expansion–risk paradox: non-state firms can leverage policy dividends in western regions to optimize their footprints, whereas firms in central China must steer clear of low-efficiency investment traps. It alerts policymakers to avoid the blind spot of prioritizing investment volume over institutional coordination, injecting new regional-coordination thinking into the domestic goal of building resilient supply chains. Ultimately, the findings equip Chinese manufacturing with a strategic pivot—breadth and strength combined—to confront the global restructuring of industrial chains.

2. Literature Review

2.1.Principal Roles of Cross-Regional Investment

Cross-regional investment by firms refers to the practice in which listed companies establish subsidiaries in cities or provinces outside their registered domicile, representing a micro-level manifestation of capital mobility across regions. Scholars such as He Fan argue that by setting up subsidiaries in other cities, firms can facilitate the cross-regional flow of capital, which in turn exerts significant effects on enhancing capital mobility and resource allocation efficiency, promoting economic growth and market integration, and elevating firms' own innovation capabilities [5—7].

Cross-regional investment enables firms to accelerate capital mobility and optimize resource allocation. Song Xiaoning et al. find that such investment lowers barriers to capital flows, allowing funds to circulate more freely across regions. Consequently, capital is reallocated according to comparative advantages, steering clear of locally disadvantaged industries, raising productive efficiency, and refining the overall allocation of resources [8].

Cross-regional investment also promotes economic growth and market integration. Ji Zhenglong and Song Yu show that when firms establish subsidiaries in new locations, they break through local

market segmentation, attract additional enterprises, and thereby complete regional supply chains. This process stimulates economic expansion and fosters market integration. Moreover, regional-integration policies amplify these effects, further strengthening the capacity of cross-regional capital mobility to drive economic growth [9].

Cross-regional investment can also elevate a firm's own level of innovation. Ni Yining and Ma Yeqing argue that expanding into other regions exposes firms to broader and more diverse market demands, spurring differentiated innovation [15]. Establishing branch offices in new locales further introduces competitive pressures that compel firms to upgrade their technologies to maintain an edge, thereby creating a positive "innovation–competition" cycle.

2.2.Corporate Supply-Chain Resilience and Its Determinants

Supply-chain resilience is the capacity of a supply chain, when confronted with internal or external disruptions, to mitigate their impact, limit operational interruptions, and rapidly return to—or even exceed—normal performance by proactively adjusting processes, optimizing workflows, or leveraging technological solutions, thereby preserving its core functions [10—12]. This resilience is primarily shaped by factors such as the degree of market fragmentation and transaction costs [13—14].

Market segmentation raises uncertainty in procurement lead times, triggers supply–demand imbalances, and undermines both stability and risk resistance within supply chains, ultimately eroding resilience. Qian Xianhang and Qiu Shanyun show that when regional market segmentation is severe, the cross-regional flow of goods and factors is hindered, exposing supply chains to higher disruption risks and diminished resilience .

Rising transaction costs likewise undermine supply-chain resilience. As Qian Xianhang notes, higher transaction costs reduce firms' willingness to build geographically dispersed supply chains, leading to network homogenization, weaker risk-bearing capacity, and thus lower resilience [14]. Elevated transaction costs imply greater frictions that inflate the expense of dealing with suppliers, eroding the flexibility with which a supply chain can respond to disruptions. Yet both transaction costs and market segmentation are intimately tied to firms' cross-regional investment decisions; consequently, the impact of such investment on supply-chain resilience cannot be ignored[13].

2.3.How Cross-Regional Investment Affects Supply-Chain Resilience

Surprisingly, the relationship between firms' cross-regional investment and supply-chain resilience has been largely overlooked in the literature. This paper therefore explains in detail how cross-regional investment affects resilience through the following channels.

First, by creating geographically diversified footprints, cross-regional investment disperses systemic risk and thereby strengthens supply-chain resilience. When a firm operates in multiple locations, it builds production, procurement, or sales networks across different regions whose systemic risks are not perfectly correlated. If a disruption occurs in one region, the firm can immediately reroute orders or production to unaffected sites, rapidly repairing the supply chain.

Second, cross-regional investment breaks local monopolies and secures a broader, more diverse supplier base, further enhancing resilience. A single region may be dominated by a few suppliers, but operating in multiple regions exposes the firm to many potential partners, reducing dependence on any one area or supplier and mitigating the vulnerability created by regional monopolies.

Third, cross-regional investment allows firms to exploit regional policy heterogeneity to bolster supply-chain resilience. Different localities offer varying industrial-support policies and possess distinct comparative advantages. By placing each supply-chain segment in a region that excels in—and actively supports—that segment's industry, firms can leverage local subsidies, tax breaks, or infrastructure advantages. When a specific node in the chain is hit by shocks, the supportive policies of its host region can cushion losses, sustaining overall resilience.

2.4.Literature Review

Existing studies by Ji Zhenglong and others have concentrated on how cross-regional investment improves capital-allocation efficiency, fuels regional economic growth, and spurs corporate innovation, yet they overlook its impact on supply-chain resilience—a pivotal operational capability. In reality, when firms establish subsidiaries outside their home regions, the resulting geographic diversification lowers risk, while distributing supply-chain activities across multiple locations helps break local monopolies. These actions are intrinsically tied to the core capacity of supply chains to withstand disruptions and maintain stability, but the current literature has not systematically incorporated cross-regional investment into the analytical framework of supply-chain resilience.

The novelty of this study lies in filling this void by integrating cross-regional investment and supply-chain resilience into a unified framework. It systematically elucidates the mechanisms through which cross-regional investment enhances resilience: by geographically diversifying risk, circumventing monopolies to access resources, and exploiting regional policy heterogeneity to optimize layout. In doing so, the paper offers a fresh perspective on the nexus between firms' strategic choices and supply-chain risk management[9].

3. Mechanism Analysis and Hypothesis Development

Mediating mechanisms through which cross-regional investment affects supply-chain resilience are threefold: (1) geographic diversification that disperses systemic risk, (2) breaking local monopolies to secure a diversified supplier base, and (3) leveraging region-specific policy advantages to reinforce resilience.

First, cross-regional investment enhances supply-chain resilience by geographically diversifying systemic risk. By establishing operations across multiple geographic areas, firms construct a spatially dispersed supply-chain network whose central value lies in its regional risk-diversification effect. Natural disasters, geopolitical tensions, public-health crises, and economic fluctuations tend to be weakly—or even negatively—correlated across regions. Research by Li Jingzi et al. shows that this spatial separation creates an effective "risk cushion" [16]. Through the creation and reinforcement of such a cross-regional risk-spreading structure, cross-regional investment significantly reduces both the intensity and the probability that a single-region shock will inflict catastrophic damage on the entire network, thereby elevating overall supply-chain resilience.

Second, cross-regional investment enables firms to break local monopolies and secure a more diversified supplier base, thereby enhancing supply-chain resilience. Ji Zhenglong et al. find that regional market segmentation and local protectionism often erect geographic barriers and localized monopolies that severely restrict firms' access to high-quality, diversified suppliers [9]. Cross-regional investment serves as a strategic lever for dismantling these non-market barriers. By directly entering new regional markets, firms gain immediate access to supplier pools previously shielded by geographic protection or monopolies, markedly broadening their supplier options. The central mediating variable in this process is the diversity of key-input suppliers. Such investment allows firms to integrate supply resources across multiple regions, reducing overdependence on any single regional market or a handful of core suppliers. Greater supplier diversity means that when a particular region or a major supplier experiences shortages due to monopolistic behavior, internal operational crises, or external shocks, the firm possesses a wider array of alternative sources, substantially improving the supply chain's adaptability and recovery capacity. Consequently, by increasing supplier diversity, cross-regional investment strengthens a firm's supply-chain resilience.

Third, cross-regional investment allows firms to harness disparities in local industrial policies and thereby strengthen supply-chain resilience. Each locality's distinctive incentives create region-specific comparative advantages, and by investing across these jurisdictions firms can deliberately identify and exploit them. The engine of this process is a marked rise in the "resource-allocation efficiency" of the supply-chain network, an efficiency gain that functions as the pivotal mediating variable linking policy heterogeneity to greater resilience. Firms use the policy strengths of different

regions to site each supply-chain segment where inputs can be sourced and configured at the lowest cost and under the most favorable terms. Higher resource-allocation efficiency immediately translates into stronger resilience: operating costs fall, widening the financial buffer available to absorb shocks, while the optimized, policy-driven layout itself heightens the network's agility. Crucially, the efficiency premium endows firms with the flexibility to redeploy capital, labor, and tasks to alternative investment locations that enjoy superior policies and higher productivity whenever a regional node is disrupted, accelerating recovery.

Hypothesis 1: Cross-regional investment by firms is positively associated with higher supply-chain resilience.

The strength of this relationship is critically moderated by the quality of government–firm relations—defined as the closeness and effectiveness of interactions grounded in mutual trust, frequent communication, cooperation, and responsive policy support. This relational quality shapes the transmission efficiency of the three mediating mechanisms discussed above.

First, for the geographic-diversification channel. When relations are strong, firms obtain timely, accurate policy information and risk warnings through intensive dialogue with local authorities. This foresight allows firms to anticipate region-specific shocks and to fine-tune cross-regional resource-allocation strategies and contingency plans, thereby amplifying the "risk-cushion" role of geographic diversification. Conversely, weak ties leave firms poorly informed, hampering their ability to exploit spatial dispersion for risk reduction and limiting resilience gains.

Second, for the supplier-diversity channel. Robust government–firm relations provide the trust and cooperation needed to dismantle local protectionist barriers and entrenched monopolies. Firms gain fair market access, encounter fewer hidden obstacles, and reach the region's core supplier base, fully realizing the benefits of supplier diversity. Weak relations, however, leave firms constrained in accessing local resources even after investing, sharply diminishing the effectiveness of this pathway.

Third, for the policy-exploitation channel. Close relations give firms early, comprehensive insight into policy trajectories, forthcoming industrial priorities, and adjustment windows, while also delivering more efficient and targeted government services during policy application and implementation. This enables firms to align supply-chain segments precisely with regional policy advantages and to capture policy dividends in full. Poor relations, by contrast, may cause firms to miss critical information or encounter implementation hurdles, weakening the contribution of this channel to supply-chain resilience.

Hypothesis 2: High-quality government–firm relations amplify the positive effect of cross-regional investment on supply-chain resilience.

4. Variable Definition

4.1.Data Sources

The study sample consists of all A-share listed firms in China. Specifically, we draw on companies listed on the Shanghai and Shenzhen stock exchanges from 2013 to 2023, excluding financial-sector firms as well as those designated ST or * ST. The supply-chain resilience index and all control variables are constructed from the CSMAR (China Stock Market & Accounting Research) database; after consulting industry reports and prior literature, the raw data are screened, cleaned, standardized, and missing or anomalous values are imputed or corrected. Cross-regional investment data are hand-collected and organized from the annual reports of A-share listed firms. The final dataset spans ten years, from 2013 to 2023.

4.2.Variable Construction

This paper selects *cross-regional investment (TRinv)* as the independent variable, measured by the *share of a firm's inter-city investments*. The indicator is constructed in two steps:

1. Using the registered locations of parent and subsidiary companies, we identify subsidiaries established in the same city and in other cities in each year, then aggregate these counts annually to obtain the number of new intra-city and inter-city subsidiaries.

2. To prevent both types of subsidiary counts from rising mechanically with the total, we divide each count by the total number of newly created subsidiaries in that year. The resulting ratios capture the intensity of a firm's local versus non-local investment.

The dependent variable is *supply-chain resilience (Tough)*. We measure manufacturing firms' supply-chain resilience along five dimensions—resistance, recovery, operational capability, supply–demand matching, and renewal—and compute an overall index using the entropy-weight method.

Control variables include factors that may affect supply-chain resilience: firm size (*Size*), leverage ratio (*Debt*), return on assets (*ROA*), return on equity (*ROE*), and total asset turnover (*ATO*).

5. Model Specification

To empirically examine the impact of firms' cross-regional investment on supply-chain resilience, we specify the following baseline econometric model based on the data for cross-regional investment, supply-chain resilience, and the control variables described above:

$$Tough_{it}=\alpha_0+\beta_1 TRinv_{it}+\lambda_t+\varepsilon_{it}+\sum\beta_k control_{it} \quad (1)$$

The dependent variable $Tough_{it}$ denotes the level of supply-chain resilience for firm *i* in year *t*. α_0 is the constant term. The key explanatory variable $TRinv_{it}$ measures firm *i*'s cross-regional investment intensity in year *t*; β_1 is its coefficient. A positive β_1 indicates that the explanatory variable exerts a positive effect on the dependent variable, whereas a negative β_1 implies a negative effect. λ_t captures time fixed effects, and ε_{it} is the stochastic error term. β_k represents the coefficients for k control variables, and $control_{it}$ denotes the set of control variables for firm *i* in year *t*. In addition, in line with our mechanism analysis, we expect the estimated coefficient of cross-regional investment intensity in model (1) to be significantly positive.

6. Empirical Analysis

6.1.Descriptive Statistics

Table 1 presents the descriptive statistics. The mean of cross-regional investment (*TRinv*) is 1.51, based on 21,432 valid observations. With a standard deviation of about 1.04, the variable is fairly dispersed, ranging from 0 to 5.80, indicating substantial heterogeneity in inter-city investment intensity across firms. Supply-chain resilience (*Tough*) has a mean of 0.17 across 22,139 observations. Its standard deviation is 0.043, and the values range from roughly 0.077 to 0.665, showing that while firms differ in resilience, the distribution is comparatively concentrated.

Table 1 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Tough	22139	0.171	0.043	0.077	.665
TRinv	21432	1.509	1.037	0	5.802
Size	22139	22.123	1.184	19.563	26.452
Lev	22139	0.39	0.189	0.046	0.927
ROA	22138	0.043	0.067	-0.375	0.255
ROE	22122	0.062	0.132	-0.962	0.414
ATO	22138	0.647	0.366	.054	2.891

6.2.Baseline Regressions

Table 2 reports the baseline regressions. Column (1) includes only the control variables; Column (2) adds year fixed effects; Column (3) adds firm fixed effects; Column (4) includes both firm and year fixed effects. Across all specifications, the coefficient on cross-regional investment (*TRinv*) is

positive and highly significant (ranging from 0.0014 to 0.0030, $p < 0.01$), indicating that firms' inter-city investments significantly enhance supply-chain resilience, corroborating Hypothesis 1. Among the controls, firm size (*Size*) shows a positive and significant coefficient, implying that larger firms enjoy stronger resilience; the leverage ratio (*Lev*) enters negatively and significantly, suggesting that high debt may weaken resilience; and return on assets (*ROA*) is positive and significant, demonstrating that higher profitability contributes to greater supply-chain resilience.

Table 2 Baseline Regressions

	(1) Tough	(2) Tough	(3) Tough	(4) Tough
TRinv	0.0016***	0.0014***	0.0030***	0.0018***
	(0.00)	(0.00)	(0.00)	(0.00)
Size	0.0199***	0.0196***	0.0212***	0.0145***
	(0.00)	(0.00)	(0.00)	(0.00)
Lev	-0.0177***	-0.0150***	-0.0167***	-0.0116***
	(0.00)	(0.00)	(0.00)	(0.00)
ROA	0.0555***	0.0616***	0.0606***	0.0771***
	(0.01)	(0.01)	(0.01)	(0.01)
ROE	0.0094**	0.0092**	-0.0054	-0.0054
	(0.00)	(0.00)	(0.00)	(0.00)
ATO	0.0011	0.0018**	0.0037***	0.0035***
	(0.00)	(0.00)	(0.00)	(0.00)
_cons	-0.2678***	-0.2700***	-0.3005***	-0.1620***
	(0.01)	(0.01)	(0.01)	(0.01)
N	21415	21415	21415	21415
R^2	0.320	0.337	0.172	0.220
adj. R^2	0.320	0.337	0.022	0.078
Fe	No	No	Yes	Yes
year	No	Yes	No	Yes

Standard errors in parentheses
$p < 0.1$, $p < 0.05$, $p < 0.01$

6.3.Heterogeneity Tests

Table 3 presents the heterogeneity tests. Columns (1) and (2) split the sample by ownership: state-owned enterprises (SOEs) versus non-SOEs. Columns (3)–(5) split the sample by region: western, central, and eastern China, respectively. The results reveal pronounced heterogeneity. In terms of ownership, the positive effect of cross-regional investment on supply-chain resilience is significantly stronger for non-SOEs (coefficient = 0.0027, $p < 0.01$) than for SOEs (coefficient = 0.0005, $p < 0.01$). This pattern is consistent with the argument that non-SOEs are more market-dependent and thus more compelled to break regional monopolies and diversify their supplier base. Their greater sensitivity to regional policy differences and stronger profit motives make them more effective at leveraging inter-city investments to enhance cost buffering and rapid-recovery capabilities.

Regionally, firms located in both western and eastern China experience significant gains in supply-chain resilience from cross-regional investment (coefficient = 0.0025 for both regions, $p < 0.01$). In contrast, firms in the central region exhibit a significantly negative response (coefficient = –0.0016, $p < 0.01$), underscoring the heterogeneous impact of cross-regional investment across different parts of the country.

Table 3 Heterogeneity Tests

	(1) Tough	(2) Tough	(3) Tough	(4) Tough	(5) Tough
TRinv	0.0005	0.0027***	0.0025**	-0.0016*	0.0025***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Size	0.0164***	0.0141***	0.0126***	0.0171***	0.0143***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Lev	-0.0091**	-0.0097***	-0.0013	-0.0013	-0.0162***
	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
ROA	0.0914***	0.0726***	0.0568***	0.1301***	0.0646***
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)
ROE	-0.0064	-0.0053	0.0038	-0.0287***	-0.0000
	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)
ATO	0.0033*	0.0032**	0.0115***	-0.0001	0.0029**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
_cons	-0.1992***	-0.1541***	-0.1350***	-0.2187***	-0.1558***
	(0.02)	(0.01)	(0.03)	(0.03)	(0.01)
N	5716	15699	2327	3650	15438
R^2	0.275	0.201	0.231	0.263	0.212
adj. R^2	0.181	0.039	0.103	0.137	0.063
year	Yes	Yes	Yes	Yes	Yes
Fe	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses
$p < 0.1$, $p < 0.05$, $p < 0.01$

6.4.Mediation Analysis

Table 4 presents the mediation tests for the three channels through which cross-regional investment (*TRinv*) enhances supply-chain resilience (*Tough*).

1. Geographic diversification to disperse risk. Column (1) shows that *TRinv* exerts a significantly negative effect on supply-chain disruption risk (SCDRisk3) (coefficient = –0.0005, $p < 0.01$). Thus, the independent variable (*TRinv*) negatively influences the mediator (SCDRisk3). Consistent with the theoretical discussion in Section 3, by establishing operations in multiple cities, firms build spatially dispersed supply-chain networks. When one region is hit by shocks (e.g., natural disasters or abrupt policy changes), unaffected regions can serve as buffers and substitutes, lowering overall vulnerability. A lower disruption risk (SCDRisk3) directly translates into higher supply-chain resilience (Tough).

2. Breaking monopolies to access resources. Column (2) indicates that *TRinv* has a significantly negative effect on supplier bargaining power (SC) (coefficient = –0.0082, $p < 0.01$). Since SC is an inverse proxy for market concentration, a lower SC signifies weaker supplier monopolies. Hence, *TRinv* negatively affects the mediator (SC), implying that cross-regional investment substantially erodes supplier monopolistic power. By transcending regional boundaries, firms can tap and integrate suppliers from multiple areas, reducing dependence on any single source or region. The resulting decline in supplier power (*lower SC*) and the accompanying increase in supplier diversity enhance the system's adaptability and recovery capacity when specific suppliers fail, thereby improving overall resilience (*Tough*).

3. Leveraging policy heterogeneity to optimize location choices. Column (3) shows that *TRinv* has a significantly positive effect on the proxy for government–firm relations—business entertainment and travel expenses scaled by operating revenue (MFR22) (coefficient = 690.1257, $p < 0.01$). Therefore, the independent variable (*TRinv*) positively influences the mediator (*MFR22*). Cross-regional investment fosters closer ties with local governments in destination cities. Stronger government–firm relations (*higher MFR22*) enable firms to identify, secure, and exploit region-

specific industrial policy benefits more effectively. By aligning supply-chain segments with regional policy advantages, firms improve resource-allocation efficiency. This policy-driven optimization enhances cost buffers and the agility to redeploy resources after shocks, ultimately raising supply-chain resilience.

Table 4 Mediation Analysis

	(1) SCDRisk3	(2) SC	(3) MFR22
TRinv	-0.0005***	-0.0082***	690.1257***
	(0.00)	(0.00)	(50.04)
Size	-0.0003***	-0.0225***	-1.6e+03***
	(0.00)	(0.00)	(70.87)
Lev	0.0011***	-0.0293***	576.8536**
	(0.00)	(0.01)	(252.71)
ROA	-0.0010	0.1624***	-5.1e+03***
	(0.00)	(0.03)	(995.39)
ROE	-0.0008	-0.0565***	682.2100
	(0.00)	(0.01)	(451.00)
ATO	0.0013***	0.0275***	-3.7e+03***
	(0.00)	(0.00)	(134.74)
_cons	0.0163***	0.8364***	4.6e+04***
	(0.00)	(0.05)	(1496.58)
N	21407	20501	21385
R^2	0.155	0.030	0.145
year	YES	YES	YES

Standard errors in parentheses
$p < 0.1$, $p < 0.05$, $p < 0.01$

6.5.Moderation Analysis

Table 5 tests the moderating role of government–firm relations in the relationship between cross-regional investment and supply-chain resilience. Using the median of the ratio of business entertainment expenses to operating revenue (MFR3) as the cutoff, we split the sample into a “strong government–firm relations” group and a “weak government–firm relations” group and run regressions separately. In the strong-relations group, the coefficient of cross-regional investment (*TRinv*) on supply-chain resilience (Tough) is 0.0018 and significant at the 1 % level. By contrast, in the weak-relations group the coefficient is only 0.0008 and statistically insignificant. These results indicate that better government–firm relations substantially amplify the positive effect of cross-regional investment on supply-chain resilience, confirming Hypothesis 2 that such relations exert a positive moderating influence.

Table 5 Moderation Analysis

	(1)	(2)
	Tough	Tough
TRinv	0.0008	0.0018***
	(0.00)	(0.00)
Size	0.0145***	0.0144***
	(0.00)	(0.00)
Lev	-0.0096**	-0.0111***
	(0.00)	(0.00)
ROA	0.0724***	0.0825***
	(0.02)	(0.01)
ROE	-0.0039	-0.0076*
	(0.01)	(0.00)
ATO	0.0021	0.0034***
	(0.00)	(0.00)
_cons	-0.1552***	-0.1626***
	(0.03)	(0.01)
N	5258	16157
R^2	0.210	0.211
adj. R^2	0.043	0.044
year	YES	YES
Fe	YES	YES

Standard errors in parentheses
$p < 0.1$, $p < 0.05$, $p < 0.01$

6.6.Robustness Checks

As shown in Table 6, Column (1) augments the baseline model with additional controls—namely cash flow (*Cashflow*), revenue growth (*Growth*), and loss status (*Loss*). The coefficient on the key explanatory variable, cross-regional investment intensity (*TRinv*), remains significantly positive (0.0018, $p < 0.01$), aligning with the baseline results in Table 2.

Next, Column (2) replaces the original measure of the independent variable with the count of cross-regional subsidiaries; the re-estimated coefficient is again significantly positive (0.0001, $p < 0.01$), corroborating that cross-regional investment enhances supply-chain resilience.

To assess sensitivity to alternative resilience metrics, Column (3) substitutes the dependent variable with the sub-dimension "supply-chain risk resistance." The coefficient on *TRinv* remains significantly positive (0.0984, $p < 0.01$), indicating that cross-regional investment also strengthens this critical facet of resilience.

Column (4) re-estimates the model using robust standard errors; the *TRinv* coefficient remains significantly positive (0.0018, $p < 0.01$), ruling out heteroskedasticity concerns.

Finally, Column (5) further controls for industry fixed effects. The *TRinv* coefficient is still significantly positive (0.0022, $p < 0.01$), and the signs of control variables—such as firm size (Size) and leverage (Lev)—are fully consistent with those reported in the baseline regressions of Table 2 and the heterogeneity tests in Table 3.

Table 6 Robustness Checks

	(1) Tough	(2) Tough	(3) Tough	(4) Tough	(5) Tough
TRinv	0.0018***	0.0001***	0.0984***	0.0018***	0.0022***
	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Size	0.0145***	0.0149***	-0.0848***	0.0145***	0.0195***
	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Lev	-0.0107***	-0.0111***	0.2951***	-0.0116***	-0.0197***
	(0.00)	(0.00)	(0.04)	(0.00)	(0.00)
ROA	0.0697***	0.0762***	-0.9275***	0.0771***	0.0714***
	(0.01)	(0.01)	(0.16)	(0.01)	(0.01)
ROE	-0.0062*	-0.0053	0.2065***	-0.0054	0.0033
	(0.00)	(0.00)	(0.07)	(0.00)	(0.00)
ATO	0.0034***	0.0035***	-0.8343***	0.0035**	0.0044***
	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)
Cashflow	0.0124***				
	(0.00)				
Growth	-0.0004				
	(0.00)				
Loss	-0.0021***				
	(0.00)				
_cons	-0.1611***	-0.1702***	0.3960	-0.1620***	-0.3051***
	(0.01)	(0.01)	(0.24)	(0.02)	(0.01)
N	21415	21415	21415	21415	21415
R^2	0.221	0.219	0.128	0.220	0.374
Industry	NO	NO	NO	YES	NO
year	YES	YES	YES	YES	YES

Standard errors in parentheses
p < 0.1, p < 0.05, p < 0.01

7. Conclusions and Policy Implications

Drawing on A-share listed firms in China from 2013 to 2023, this study employs a two-way fixed-effects model to examine how cross-regional investment affects supply-chain resilience. The results show that firms' inter-city investments significantly enhance resilience through three key channels: (1) geographic diversification that disperses systemic risk, (2) breaking local monopolies to access a broader supplier base, and (3) exploiting regional policy heterogeneity to optimize resource allocation. Strong government–firm relations positively moderate these effects, amplifying the benefits of cross-regional investment.

Heterogeneity tests further reveal that the positive impact is markedly stronger for non-state-owned enterprises than for state-owned enterprises, and that it is significantly positive in the eastern and western regions but significantly negative in the central region.

Based on these findings, firms should fully recognize the strategic value of cross-regional investment in building resilient supply chains. Non-SOEs can actively expand production and supplier networks across regions to diversify systemic risks and secure richer resources. Central-region firms should be more selective, targeting areas with lower market barriers and better policy alignment to avoid potential adverse effects. All firms are advised to establish long-term communication channels with local governments to obtain timely policy information and risk alerts, thereby maximizing the resilience gains from inter-city investment.

At the government level, institutional barriers that impede factor mobility should be removed—especially in the central region, where deeper market-oriented reforms and reduced administrative

intervention and local protectionism are needed to lower the transaction costs of cross-regional operations. Authorities should promote coordinated regional industrial policies and explore innovative cooperation models such as tax-sharing arrangements and emergency supply-chain coordination, enabling firms to optimize their supply-chain layouts according to regional comparative advantages. Central and western regions can leverage their own industrial characteristics to formulate transparent and predictable investment policies that bolster firms' confidence and effectiveness in cross-regional investment.

This paper is the first to integrate cross-regional investment into the supply-chain resilience framework, uncovering its mechanisms and regional heterogeneity. It offers both theoretical guidance for firms optimizing cross-regional resource allocation under the domestic unified market initiative and practical insights for policymakers designing industrial-chain security policies.

Future research could delve into the dynamic moderating role of government–firm relations by quantifying specific dimensions such as communication efficiency and policy response speed. Moreover, studies could examine how emerging technologies—artificial intelligence, blockchain, and others—interact with geographic diversification strategies to further strengthen risk prevention and control in the digital transformation of supply chains.

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