



Low-altitude Economy and Cross-regional Investment

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Abstract. The low-altitude economy represents a new form of productive forces, and its impact on enterprises' cross-regional investment warrants further examination. Drawing on data from Chinese A-share listed companies between 2001 and 2024, this study employs a fixed-effects model to analyze how low-altitude economy pilot policies influence enterprises' cross-regional investment. Results indicate that such pilot policies inhibit cross-regional investment, with this conclusion remaining robust after stability tests. Further analysis reveals that the low-altitude economy exerts its effects through multiple channels: enhancing industrial agglomeration to strengthen firms' local roots, reducing redundant resources to limit cross-regional expansion capacity, and diminishing supply chain stability to increase operational risks in distant locations. Heterogeneity analysis indicates that the suppression effect is most pronounced among state-owned enterprises, firms with weaker CEO backgrounds, and non-technology-intensive, non-capital-intensive businesses. This study reveals that the nascent low-altitude economy exerts a certain degree of restraint on interregional capital flows, thereby potentially guiding rational capital allocation.

Keywords: low-altitude economy; cross-regional investment; industrial agglomeration; sunk redundant resources; supply chain stability

1 Introduction

In early 2026, the new “Law of the People's Republic of China on Administrative Penalties for Public Security Management”—dubbed the “strictest drone regulation”—took effect. For the first time, it classified unauthorized drone flights as crimes endangering public safety. Concurrently, two national mandatory standards for drones were introduced. While strengthened oversight aimed to regulate the market and ensure safety, it instead triggered market turbulence. This presents a conundrum: the low-altitude economy has garnered significant national attention, being included in the national economic and social development plan in 2021, designated as a strategic emerging industry in 2023, and supported by joint guidelines from ten ministries in 2026. Yet despite these escalating policy measures, why do micro-entities face “difficult takeoff”? Is the disconnect between policy intensification and insufficient market demand a temporary phenomenon or rooted in deeper causes?

Reviewing relevant literature reveals that research on low-altitude economic development has established its positive role in promoting consumption, improving the environment, and driving industrial upgrading. On the other hand, while extensive studies exist on corporate foreign investment, none have yet addressed the low-altitude economy sector. These two areas of research remain separate. In reality, the low-altitude economy can both facilitate information flow to support cross-regional investment and, conversely, cause crowding-out effects due to insufficient legal frameworks and overly stringent technical requirements. Existing research fails to address this critical question: How do enterprises alter their cross-regional investment behavior when governments simultaneously introduce supportive policies and tighten regulations?

This paper utilizes a sample of A-share listed companies in China from 2001 to 2024 to analyze the impact of low-altitude economy pilot programs on firms' cross-regional investment behavior under a fixed-effects model. This study represents the first examination of how the low-altitude economy influences corporate cross-regional investment. It proposes a novel perspective: such an economy may inhibit firms' investment behavior in the short term. These findings enrich the understanding of how emerging economic forces shape corporate decision-making and provide empirical evidence for refining policies to promote rational capital flows.

2 Literature Review

Research on the low-altitude economy has encompassed discussions on stimulating consumption, improving environmental performance, and achieving industrial upgrading. Zhang Mingming, building on Marx's theory of social reproduction, analyzes how the low-altitude economy stimulates consumption by optimizing industries and enhancing circulation, while also highlighting challenges arising from inadequate infrastructure^[1]. Ren Xinhui focuses on development policies for the low-altitude economy, arguing that airspace management, infrastructure construction, and advancements in key technologies are crucial for fostering cross-sector collaboration^[2].

As research progresses, increasing attention is directed toward the practical challenges confronting the low-altitude economy. Tang Kai concludes from a quasi-natural experiment that while low-altitude economic policies can enhance urban productive capacity, their full impact is constrained by rigid airspace management and nascent industrial chains^[3]. Cui Lili et al. identified shortcomings in key technology compatibility and infrastructure development^[4].

Concurrently, research on interregional corporate investment has made progress in institutional reform and technological empowerment. Pang Jialan proposed that data assets alleviate financing constraints and reduce transaction costs, thereby stimulating interregional investment^[5]. Gao Sifan noted that expanding service sector openness lowers institutional transaction costs, triggering cross-regional capital flows^[6].

Existing research reveals that the low-altitude economy and cross-regional investment have coexisted as distinct strands, yet a clear disconnect persists between them. On one hand, the low-altitude economy improves circulation conditions, fosters tech-

nological progress, and enhances resource efficiency—all crucial drivers of cross-regional investment. On the other hand, during the nascent stage of the low-altitude economy, the lack of essential hardware infrastructure, coupled with stringent airspace management and limited technological capabilities, may transform corporate cross-regional expansion into a source of high institutional transaction costs or uncertainty, thereby hindering cross-regional investment. Tang Kai and Sun Zhihua suggest that the policy's efficacy remains underutilized, indicating that during the entry phase of the low-altitude economy, its impact on capital flows may not be exclusively positive but could carry negative implications. Regrettably, existing literature has yet to test this hypothesis directly.

This paper innovates by addressing these gaps: First, it pioneers the combined analysis of the low-altitude economy and inter-regional investment, bridging the existing literature divide. Second, it employs the exogenous variable of low-altitude economic development pilot zones as a quasi-natural experiment to examine its impact on inter-regional investment. Third, it conducts empirical research from the perspectives of industrial agglomeration, sunk redundant resources, and supply chain stability to explain why certain inhibitory effects emerge during the early stages of low-altitude economic development.

3 Research Hypothesis

The low-altitude economy exerts a negative effect on out-of-region investment through three observable channels. Considering practical circumstances, we select municipal industrial agglomeration levels, sedimentation of redundant resources, and supply chain stability as mediating variables to explore their underlying mechanisms.

First, the low-altitude economy may enhance industrial agglomeration while reducing out-of-region investment. Pilot policies signal favorable conditions for enterprises, attracting resources to flow toward pilot regions and significantly increasing local industrial agglomeration. Industrial agglomeration facilitates easier access to upstream and downstream support systems and economies of scale locally, strengthening firms' local roots. New economic geography posits that local market effects make firms more inclined to develop within the region rather than expand elsewhere. This manifests as increased capital investment in local low-altitude industries, reduced attention to subsidiaries in other regions, and diminished out-of-region investment. Thus, we propose Hypothesis H2a: The low-altitude economy constrains firms' out-of-region investment through agglomeration effects.

Second, the low-altitude economy may constrain out-of-region investment by reducing embedded redundant resources. These resources serve as buffers embedded in daily operations, providing management expertise and sales channel support for cross-regional expansion. However, the early stages of low-altitude economic development require substantial capital. When funds are scarce, investments made in response to government initiatives erode resources needed to maintain sales networks, thereby reducing embedded redundancy levels. Resource-based theory posits that diminished buffers impair firms' ability to withstand risks and seize new market opportunities, making them

more cautious about cross-regional investment. This leads to Hypothesis H2b: The low-altitude economy suppresses cross-regional investment by depleting embedded buffers.

Second, the low-altitude economy may hinder off-site investment by weakening supply chain stability. Supply chain stability is critical for off-site operations. Policy implementation may cause enterprises to focus more attention on local low-altitude industry development, thereby affecting upstream-downstream relationships. On the other hand, new models and markets may alter competitive dynamics, disrupting existing supply chain equilibrium. Reduced supply chain stability increases coordination challenges and supply issues for cross-regional operations, heightening uncertainty for enterprises. Under such conditions, guided by real options theory, firms are more inclined to defer irreversible investments, leading to a reduction in the number of cross-regional subsidiaries. Thus, Hypothesis H2c is proposed: The low-altitude economy inhibits cross-regional investment by reducing supply chain stability.

The above three mechanisms elucidate the micro-level transmission channels through which the nascent low-altitude economy curtails corporate cross-regional investment. This does not negate its positive effects but rather reflects investment behaviors shaped by lagging infrastructure development, limited technological capabilities, and insufficient institutional frameworks. It also provides strong support for Tang Kai and Sun Zhihua's "policy efficacy constraint theory." Consequently, we propose the following hypothesis: H1: Low-altitude economy pilot policies exert a significant inhibitory effect on corporate cross-regional investment.

4 Empirical Framework

This paper selects Chinese A-share listed companies from 2001 to 2024 as its initial sample. Information on companies' cross-regional investments is sourced from the related-party transactions module of the Guotai-An CSMAR database, which details all subsidiaries of listed companies along with their control relationships and locations relative to the parent company. Following the methodology of Chen Junhua et al. and He Fan et al., the following adjustments were made: only subsidiaries were retained as related-party observations, excluding the parent company itself, branch offices, joint ventures, and overseas subsidiaries; cross-regional subsidiaries were identified based on whether the subsidiary's city of registration differed from the parent company's city, retaining only samples of subsidiaries registered within China whose parent company was not located in the same city; Based on the aggregated number of non-locally registered subsidiaries per company-year, we further excluded listed companies in the financial sector, ST or *ST companies, and insolvent samples with a debt-to-asset ratio exceeding 1, after removing those with no disclosed subsidiary information or fewer than one subsidiary observation for the year. To minimise outlier interference, all continuous variables were truncated at the 1% and 99% percentiles. The final dataset comprises unbalanced panel data covering 286 prefecture-level and above cities, with 38,742 company-year observations. Low-altitude economy-related data originates from

the China Urban Statistical Yearbook, policy approval documents for low-altitude economic development demonstration projects issued by the Ministry of Industry and Information Technology, and manually compiled city-level policy dummy variables.

4.1 Variable Specification

Dependent Variable: Inter-regional Investment Activity of Prefecture-level Cities (Remotriv)

This study employs a well-established methodology from existing research to measure corporate inter-regional investment behaviour. First, information on all subsidiaries controlled by each company annually is obtained from the CSMAR related-party transaction database, then mapped to prefecture-level city boundaries based on subsidiary locations. Second, the registered city of listed companies and their subsidiaries is determined. To avoid misclassification due to variations in registered location descriptions, all subsidiary locations undergo standardised processing and fuzzy matching against the list of administrative divisions at or above the county level published by the Ministry of Civil Affairs of the People's Republic of China. Finally, the number of non-local subsidiaries is calculated on a company-year basis. Where a company established no non-local subsidiaries in a given year, resulting in a right-skewed variable equal to zero, we add one and take the natural logarithm to derive the firm's non-local investment (Remoteinv). Higher values indicate greater cross-regional capital allocation.

Core explanatory variable: Policy implementation and treatment group interaction term (DID) across prefecture-level cities

This study employs a multi-period difference-in-differences approach to estimate the effects of low-altitude economic development policies. Following the methodology of Han et al., the policy implementation year is set as the base year (2021). Regarding the selection criteria for the experimental and control groups, the experimental group comprises 15 provinces and their subordinate prefecture-level cities designated as pilot regions for low-altitude airspace management reform after 2010. These include Hunan, Jiangxi, Hubei, Shandong, Yunnan, Guizhou, Sichuan, Shaanxi, Zhejiang, Guangdong, Hainan, Inner Mongolia, Guangxi, Fujian, and Hebei. The control group consists of the remaining 15 provinces, excluding Tibet, Hong Kong, Macao, and Taiwan. Building upon the preceding step, we define the province grouping dummy variable *Treat* and the policy implementation year dummy variable *Post*. The core explanatory variable DID is the interaction term of *Treat* and *Post*, whose coefficient indicates the impact of the low-altitude economic development pilot on enterprises' inter-regional investment.

4.2 Model

To examine the effect of *X* on *Y*, regression analysis using a fixed-effects model yields regression model (1):

$$y_{it}\beta_0 + \beta_1 *x_{it} + \sum \alpha_k \text{controls}_{it} + \varepsilon_{it} + \lambda_t + \mu_i \quad (1)$$

is the random disturbance term; i and t denote company and year, respectively. Additionally, it controls for annual fixed effects and individual fixed effects, where k represents the number of control variables and is the constant term. β_k is the parameter corresponding to the independent variable.

5 Empirical Analysis

5.1 Descriptive Statistic Analysis

Table 1 presents the basic characteristics of all relevant variables. The dependent variable, Remoteinv (enterprise cross-regional investment), has a mean of 1.466, a standard deviation of 1.134, a minimum value of 0, and a maximum value of 6.686. This indicates significant variation in the scale of cross-regional investment among the sample enterprises. Some firms possess no cross-regional subsidiaries, while the most active enterprises exhibit a logarithmically scaled number of cross-regional subsidiaries reaching 6.686. The core explanatory variable, the low-altitude economy pilot policy DID, exhibits a mean of 0.162 and a standard deviation of 0.368, indicating that approximately 16.2% of the sample data is influenced by this factor. Including control variables, all indicator values fall within normal ranges and align closely with findings from other literature. Consequently, these data are generally considered reliable and suitable for subsequent regression analysis.

Table 1. Descriptive Statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Remoteinv	48039	1.466	1.134	0	6.686
DID	48039	0.162	0.368	0	1
TobinQ	48037	1.915	1.253	0.789	16.647
Size	48039	22.109	1.341	19.171	26.452
Lev	48039	0.437	0.206	0.027	0.99
ROA	48033	0.036	0.066	-0.375	0.255
FirmAge	48020	2.83	0.448	1.099	3.664

5.2 Baseline Estimate

Table 2 presents the benchmark regression results for the impact of low-altitude economy pilot policies on firms' cross-regional investment. All regressions incorporate year fixed effects and individual firm fixed effects, with standard errors clustered by firm. The first column of Table 2 includes only the core explanatory variable DID, yielding an estimated DID value of -0.0589, significant at the 1% level. This indicates that low-altitude economy pilot policies exert a negative influence on firms' cross-regional investment. In the second column, after incorporating Tobin's Q, the DID estimate becomes -0.0576 and remains statistically significant at the 1% level, showing no change in magnitude or significance compared to the previous column. The third column fur-

ther includes firm size and debt-to-asset ratio, yet the DID coefficient remains statistically significant at the 1% level, with no alteration in value or significance compared to the preceding columns. The fourth column presents the full model incorporating all control variables. The DID coefficient stands at -0.0556, highly significant at the 1% level and statistically robust, thereby supporting the paper's principal conclusion.

From an economic perspective, analysis of Table 2's fourth column reveals that, controlling for other factors, the introduction of the low-altitude economy pilot policy reduces the extent of cross-regional investment by companies in pilot regions by approximately 5.56 percentage points. As the dependent variable 'enterprise out-of-region investment' is calculated by taking the natural logarithm of the sum of out-of-region subsidiaries plus one, this coefficient indicates that, due to the policy's impact, companies in pilot regions reduced their number of out-of-region subsidiaries by approximately 5.56 percentage points compared to companies unaffected by the policy. Given that the average number of out-of-region subsidiaries during this period was 1.466, this reduction represents 3.79% of the average level, signifying substantial economic implications. This confirms that during the introductory phase, the low-altitude economy policy does indeed exert a certain degree of impediment on enterprises' cross-regional capital flows.

Regarding control variables: - The Tobin's Q coefficient is significantly negative at the 1% level, indicating that high-growth companies exhibit weaker enthusiasm for cross-regional investment, likely preferring to allocate capital towards core domestic operations. - The debt-to-equity ratio coefficient is significantly negative at the 5% level, suggesting that highly leveraged firms face stronger financing constraints, thereby reducing their cross-regional investment activities. The coefficient for the firm's listing duration is significantly negative at the 1% level, indicating that older firms exhibit less interest in cross-regional investment than newly established ones. Although the coefficients for firm size and return on total assets are negative, neither rejects the null hypothesis, suggesting that scale and profitability exert a relatively minor influence on whether firms undertake cross-regional investment. Overall, the statistical results for the control variables align with existing research findings, thereby validating the constructed model and the conclusions drawn herein.

Table 2. Benchmark Regression.

	(1)	(2)	(3)	(4)
	Remoteinv	Remoteinv	Remoteinv	Remoteinv
DID	-0.0589*** (0.02)	-0.0576*** (0.02)	-0.0553*** (0.02)	-0.0556*** (0.02)
TobinQ		-0.0210*** (0.00)	-0.0231*** (0.00)	-0.0219*** (0.00)
Size			-0.0089 (0.01)	-0.0070 (0.01)
Lev			-0.0957*** (0.04)	-0.0819** (0.04)
ROA				-0.0114 (0.08)

FirmAge				-0.1321*** (0.04)
_cons	1.4859*** (0.03)	1.5235*** (0.03)	1.7430*** (0.18)	1.9247*** (0.19)
<i>N</i>	48039	48037	48037	48014
<i>R</i> ²	0.000	0.001	0.001	0.001
Adjusted <i>R</i> ²	-0.082	-0.082	-0.082	-0.081
year	YES	YES	YES	YES

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

5.3 Heterogeneity Analysis (Ownership, Time, Regional Heterogeneity, etc.)

Table 3 presents the results of the heterogeneity analysis. In terms of ownership structure, the inhibitory effect is more pronounced in state-owned enterprises. Regarding the CEO background, the effect is stronger among CEOs with financial experience, suggesting that CEOs possessing financial or academic backgrounds can mitigate this effect to some extent. From the perspective of industry factor intensity, the inhibitory effect is more evident in non-technology-intensive and non-capital-intensive enterprises. Consequently, the impact of the low-altitude economy on cross-regional investment primarily affects state-owned enterprises, firms with CEOs of weaker background, and non-technology-intensive, non-capital-intensive enterprises.

Table 3. Heterogeneity Analysis.[illegible]

5.4 Mediation Analysis

This paper further examines the pathways through which low-altitude economy pilot policies influence firms' cross-regional investment decisions. As discussed above, during the introductory phase, the low-altitude economy may dampen firms' willingness to invest across regions due to competitive squeeze, perceived policy uncertainty, and shifts in managerial focus. To test this hypothesis, we employ municipal industrial agglomeration level (*cityagg*), sedimented redundant resources (*RY2*), and supply chain stability (*scstab*) as mediating variables. An empirical examination of the mediating effect is conducted using a two-step approach, first analysing the relationship between the core dependent variable (*DID*) and each mediating variable. As shown in Table 4.

From the industrial agglomeration pathway, *DID* exerts a positive and statistically significant (at the 1% level) influence on city-level industrial agglomeration (*cityagg*). This indicates that the low-altitude economic development pilot policy enhances agglomeration effects within pilot regions. Strengthened agglomeration enables local firms to concentrate greater resources within their dominant industries, thereby reducing both the motivation and capacity for relocation. This confirms the existence of a resource crowding-out effect, wherein low-altitude economic development curtails firm relocation by intensifying local industrial concentration.

Analysing from the perspective of sedimented redundant resources, Table 4 shows that *DID*'s estimated impact on sedimented redundant resources *RY2* is -2.6387, rejecting the null hypothesis at the 10% significance level. The reduction in firms' sedimented redundancy levels due to low-altitude economic policies indicates diminished operational resources available for cross-regional expansion, thereby discouraging such investments. This aligns with the Resource-Based View, where policy interference reduces firms' surplus resources, constraining their cross-regional resource allocation.

From the perspective of supply chain stability, in the first column, *DID* indicates an impact of -1.3838 on supply chain stability (*scstab*), statistically significant at the 1% confidence level. Supply chain stability is a prerequisite for ensuring smooth operations in distant locations. Low-altitude economic policies diminish supply chain stability, potentially due to firms favouring local low-altitude industries under policy influence, thereby altering upstream-downstream business relationships. Reduced supply chain stability increases the costs and supply risks of cross-regional operations, thereby inhibiting inter-regional investment. This aligns with the physical option theory's assertion that uncertainty reduces investment.

The above findings validate three transmission channels: enhanced industrial agglomeration, reduced sedimentation of redundant resources, and diminished supply chain stability. This confirms that low-altitude economic development exerts a restraining effect on enterprises' cross-regional investment, manifested through firm-level investment activities. This provides empirical evidence for studying the impact of low-altitude economic development at the corporate level.

Table 4. Testing of Mediating Mechanisms.

	(1) cityagg	(2) RY2	(3) scstab
DID	0.0000*** (0.00)	-2.6387* (1.49)	-1.3838*** (0.37)
Control Variables	YES	YES	YES
_cons	0.1241*** (0.00)	-21.5683 (14.53)	23.5672*** (8.57)
<i>N</i>	45193	46521	130
<i>R</i> ²	.	0.001	0.461
adj. <i>R</i> ²	.	-0.085	0.261
year	YES	YES	YES

Standard errors in parentheses

p<0.1, **p<0.05, ***p<0.01

6 Conclusions and Policy Suggestions

6.1 Key Findings

Firstly, the low-altitude economy pilot policy exerts a pronounced deterrent effect on cross-regional investment by enterprises. The DID estimate stands at approximately -0.0556 and is statistically significant at the 1% level, indicating that this policy reduces the number of cross-regional subsidiaries established by parent companies in pilot regions by around 5.56%. This finding carries significant practical implications. Second, mechanistically, the low-altitude economy curbs cross-regional investment by: enhancing industrial agglomeration to increase firms' local stickiness; reducing the accumulation of redundant resources to diminish firms' capacity for cross-regional expansion; and amplifying operational risks in distant locations due to supply chain instability. Thirdly, heterogeneity analysis reveals that negative impacts predominantly manifest in state-owned enterprises, firms led by CEOs lacking financial or academic backgrounds, and non-technology-intensive, non-capital-intensive businesses. The presence of CEOs with financial or academic expertise effectively mitigates these adverse effects.

6.2 Policy Recommendations

First, addressing stage-specific constraints during the introduction phase. The dampening effect of low-altitude economy on cross-regional investment stems from inadequate infrastructure and insufficient institutional provision. Consequently, the government must demonstrate a resolute commitment to accelerating relevant infrastructure development and refining airspace management regulations to maximise future promotional potential. Secondly, implement differentiated policy support measures. For significantly affected state-owned enterprises, firms with substandard CEO capabilities, and non-technology/non-capital-intensive businesses, preferential policies such as tax relief

and financial loans can alleviate resource-constraint challenges, enhancing their capacity for cross-regional investment.

Thirdly, optimise industrial layout to foster coordinated regional development. Fourthly, improve the business environment and reduce policy uncertainty. Accelerate the formulation and refinement of laws and regulations governing low-altitude economic development, clarify airspace classification and allocation methods, streamline aircraft flight approval procedures, and enhance regulatory transparency. Additionally, strengthen monitoring of enterprise supply chain stability to prevent losses arising from adverse impacts of policy changes.

6.3 Research Limitations and Future Prospects

This thesis has the following shortcomings: firstly, the sample size for supply chain stability indicators is insufficient; secondly, it only analyzes the inhibiting effects during the early stages of low-altitude economic development; thirdly, it examines investment decision-making solely from the enterprise perspective. Future work could broaden the scope to encompass the entire industry or even a region to investigate the changes brought about by the low-altitude economy.

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