



The Impact of Urban Policy Coordination on Collaborative Innovation in Supply Chains

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Abstract. The relationship between urban policy coordination and supply chain collaborative innovation is a critical topic in regional innovation system research. This study uses matched panel data from 2010 to 2023, linking prefecture-level cities and listed companies in China. It employs a fixed-effects model to examine the impact, transmission mechanisms, and heterogeneity of urban policy coordination on supply chain collaborative innovation. Mechanism tests show that policy coordination stimulates corporate collaborative innovation indirectly. This occurs through three pathways: enhancing market integration, reducing institutional transaction costs, and optimizing the allocation of innovation resources. Heterogeneity analysis finds a stronger innovation-promoting effect in state-owned enterprises and non-manufacturing firms. This reflects the varying roles of ownership attributes and industry characteristics on policy effects. The study offers new insights into how intra-urban policy conflicts influence corporate innovation behaviors. It also provides empirical evidence and policy implications for improving cross-departmental policy coordination, reducing institutional compliance costs, and supporting innovation collaboration within industrial chains.

Keywords: Urban policy coordination, Supply chain collaborative innovation, Policy synthesis fallacy.

1 Introduction

In modern urban governance, a widespread “policy paradox” exists: innovative policies from different departments cancel each other out due to a lack of coordination. Tax breaks in some economic development zones conflict with environmental access requirements, causing corporate R&D projects to stall. This “policy synthesis fallacy” highlights the fundamental issue of inadequate policy coordination. Urban policy coordination refers to the degree of alignment between the policies of different departments in terms of objectives and tools. Strengthening policy coordination and reducing institutional transaction costs have become critical challenges in modernizing urban governance. Supply chain collaborative innovation is an innovation process led by core enterprises that involves cross-organizational collaboration with upstream and downstream partners. However, enterprises often face obstacles related to information and

benefit distribution when promoting collaborative innovation. Enhancing supply chain collaboration is a strategic choice for improving innovation efficiency and strengthening industrial chain competitiveness. In reality, a significant disconnect exists between these two domains, with policy support often mismatched to corporate innovation needs. This necessitates exploring the underlying mechanisms through which policy coordination influences corporate collaborative innovation.

To address this, this study constructs a “policy coordination—resource integration—collaborative innovation” framework to examine the impact of policy coordination on supply chain collaborative innovation. The research primarily addresses four key questions: the impact of policy coordination, the mediating roles of market integration level, institutional transaction costs, and the innovation resource mismatch index; the moderating effects of industry characteristics and property rights attributes; and the optimal path for policy coordination. Based on matched panel data of cities and listed companies from 2010 to 2023, this study employs a fixed-effects model for testing. The theoretical significance lies in integrating multiple theories to construct an analytical framework, revealing the transmission path of “policy coordination—resource integration—collaborative innovation,” and refining the mechanism into three pathways: “enhancing market integration,” “reducing costs,” and “optimizing resource allocation.” In practical terms, this study provides guidance for governments to avoid policy conflicts and enterprises to optimize collaborative strategies, thereby facilitating synergy between an “efficient market” and an “effective government” to promote regional innovation and high-quality economic development.

2 Literature Review

Against the backdrop of urban development and innovation-driven growth, existing research has generally affirmed the positive role of policy coordination. Research by Zhao Xiang and Hao Jiaming indicates that regional policy coordination can drive economic growth by enhancing market integration and reducing urban interaction costs [1]. Studies by Han Xianfeng et al. and Dai Feng and Lü Lizhan further confirm that policy coordination yields more significant enabling effects than individual policies when examining digital and intelligent development alongside urban technological innovation [2-3]. However, a “deep paradox” lurks within the literature: without effective top-level coordination, policies may conflict and hinder each other, leading to the “policy synthesis fallacy.” Sun Jing et al.’s study on air pollution control in the Beijing-Tianjin-Hebei region provides evidence for this, revealing that the impact of “policy coordination intensity” is positive but insignificant, suggesting that collaborative efforts may be weakened by institutional arrangements in other sectors [4]. Focusing further on supply chain collaborative innovation, research predominantly examines the impact of firm characteristics or individual policy instruments: Du Chuanzhong and Zhang Rong emphasize how firms’ intelligent transformation drives value chain upgrading through supply chain collaboration [5], while Huang Yaolei and Zhao Yongliang explore the “asymmetric effects” of government innovation subsidies within supply

chains [6]. However, these studies implicitly assume a stable and consistent policy environment for enterprises, failing to address how interdepartmental policy conflicts affect corporate collaborative innovation. While Li Bo et al.'s research on divergent expectations for value co-creation touches upon misalignment of objectives between enterprises, this “micro-level conflict” is precisely the corporate-level manifestation of macro-level “policy conflict” [7]. In summary, existing research exhibits two gaps: First, while some studies observe ineffective policy coordination, they fail to elevate this to a theoretical analysis of a universal “policy paradox.” Second, much research assumes an ideal scenario of “effective policy coordination,” overlooking the real-world context of “policy conflicts” and their negative consequences. The core innovation of this study lies in its pioneering placement of the “policy synthesis fallacy” at the research center, directly examining how insufficient policy coordination within cities impacts supply chain collaborative innovation.

3 Research Hypotheses

Urban policy coordination enhances the “stability of cooperative expectations” among upstream and downstream enterprises in supply chains by advancing market integration, thereby fostering collaborative innovation. Under the “policy synthesis fallacy,” the growth logic of economic and information technology departments conflicts with the regulatory logic of environmental protection departments, forcing enterprises to navigate difficult trade-offs between differing legitimacy requirements. Urban policy coordination establishes high-level coordination mechanisms to integrate competing institutional logics, generating clear and consistent authoritative signals. This creates a stable collaborative environment for enterprises, empowering them to undertake long-term, proprietary collaborative innovation investments.

Urban policy coordination drives collaborative innovation by optimizing the complementarity and mobility of regional innovation factors, enhancing resource orchestration efficiency among supply chain nodes. Under conflicting policies, capital and talent attracted by tax incentives may fail to integrate effectively with land, technology, and other factors due to environmental access restrictions, leading to fragmented and rigid regional innovation ecosystems. Policy coordination acts as a “regional resource orchestrator.” Through integrated planning and coordinated policy tools, it dismantles information silos and resource flow bottlenecks created by departmental barriers. This enables enterprises to access complementary resources more readily, enhances resource orchestration efficiency, and transforms collaborative innovation from a high-cost challenge into a viable strategic option.

Urban policy coordination empowers collaborative innovation by reducing the institutional transaction costs incurred by enterprises navigating multiple regulatory authorities, thereby freeing up managerial attention resources for collaborative innovation. The direct experience of policy conflicts involves enterprises expending significant effort navigating different government departments, generating typical institutional transaction costs. In their study of the “chain leader system,” Hu Bin and Chang Siyu im-

plicitly noted that governments can optimize enterprise innovation behavior by establishing rational coordination mechanisms [8]. Policy coordination integrates multiple “policy interfaces” into an efficient, transparent “single interface” through unified service windows, standardized approval processes, or cross-departmental task forces. This significantly reduces corporate resource investment in policy comprehension and risk mitigation.

Based on this, Hypothesis 1 is proposed: Urban policy coordination exerts a significant positive influence on supply chain collaborative innovation.

4 Methodology Framework

4.1 Data Description

This study utilizes panel data from prefecture-level and above cities and listed companies in China from 2010 to 2023. For listed company data, the following processing steps were applied: (1) Companies classified as ST and *ST were excluded; (2) Samples with obvious financial anomalies were removed; (3) Samples with incomplete data in statistical years were deleted; (4) To mitigate the potential impact of outliers on test results, continuous variables underwent trimming at the upper and lower 1% extremes. All variables were sourced from Wind and CSMAR databases, with data processing conducted using Stata 18.0 econometric analysis software.

4.2 Variable Definition

The independent variable in this study is city policy coordination (COG). Regarding the governance objectives of administrative coordination, we analyze keywords related to coordinated governance mentioned in government work reports. When government work reports contain more references to coordinated governance and similar matters, it can be inferred that government departments exhibit a stronger orientation toward coordinated governance. Specifically, this study counts the frequency of keywords related to coordinated governance in government work reports, such as complementary advantages, coordinated governance, win-win cooperation, and resource sharing. Standardization is performed using the total word count of the government work report to derive the collaborative governance objective variable (COG). A higher value indicates greater emphasis on collaborative governance by government departments. The dependent variable is supply chain collaborative innovation (Sup). Supply chain collaborative innovation is measured by the product of the number of patents jointly applied for by enterprises and supply chain concentration. The control variables include leverage ratio (Lev), return on assets (ROA), earnings management (EM), equity concentration (shareholding ratio of the largest shareholder) (Top1), and market capitalization (TobinQ).

4.3 Model

To examine the impact of city policy coordination (COG) on supply chain collaborative innovation (Sup), a fixed-effects model was employed for regression analysis, constructing a regression model (1):

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

ε_{it} denotes the random disturbance term; i and t represent company and year, respectively. Additionally, the annual fixed effect λ_t and individual fixed effect μ_i are controlled for. k denotes the number of control variables, and β_0 represents the constant term. β_1 indicates the coefficient of the independent variable.

5 Empirical Analysis

5.1 Descriptive Statistic Analysis

Table 1 presents the descriptive statistics analysis results. The mean of the independent variable COG (City Policy Coordination) is 0 with a standard deviation of 0. The mean of the dependent variable, Sup1 (Supply Chain Collaborative Innovation), is 1.224, indicating that the overall level of supply chain collaborative innovation among the sample enterprises is relatively low. Its standard deviation is 4.536, with a minimum value of 0 and a maximum value of 45.665. This reflects significant variations in supply chain collaborative innovation performance across different enterprises, with a few standout performers. This variation may stem from differences in corporate governance, financial status, and policy environments, or it could be attributable to industry characteristics or strategic choices. Furthermore, the statistical characteristics of each control variable align with existing research: the mean for corporate leverage (Lev) is 0.407, profitability (ROA) is 0.034, equity concentration (Top1) is 0.334, and Tobin's Q (TobinQ) is 2.047. All fall within reasonable ranges, providing a solid data foundation for subsequent empirical analysis.

Table 1. Descriptive statistic.

Variable	Obs	Mean	Std. Dev.	Min	Max
Sup1	34026	1.224	4.536	0.000	45.665
COG	34026	0.000	0.000	0.000	0.001
Lev	34026	0.407	0.205	0.028	0.908
EM	34026	2.043	1.258	1.029	10.83
ROA	34026	0.034	0.069	-0.556	0.222
Top1	33997	0.334	0.147	0.078	0.758
TobinQ	34016	2.047	1.358	0.795	17.676

5.2 Baseline Estimate

Table 2 reports the benchmark regression results for the effect of the independent variable COG on the dependent variable Sup1. Column (1) of Table 2 shows that, without any control variables, the coefficient for COG is 627.6116 and is significant at the 1% level. Subsequently, in columns (2) to (4) of Table 2, as control variables and the annual fixed effect were progressively added, the coefficient of COG consistently ranged between 520.2458 and 636.7190, all highly significant at the 1% level. This result holds significant economic implications. The final column of Table 2 shows that after controlling for financial leverage (Lev), earnings management (EM), profitability (ROA), ownership concentration (Top1), growth (TobinQ), and annual effects, the coefficient for COG is 525.5278. This implies that a one-unit increase in COG leads to an average increase of approximately 525.53 units in the dependent variable Sup1. This clearly demonstrates robust empirical support for the hypothesis that COG exerts a significant positive impact on Sup1. Regarding control variables, Lev, ROA, and Top1 exert significant positive effects on Sup1, while EM and TobinQ exert significant negative effects. These findings align with existing research conclusions, indicating the model specification is reasonable, and the estimation results possess good reliability.

Table 2. Basic results: the effect of COG on Sup.

	(1)	(2)	(3)	(4)
	Sup1	Sup1	Sup1	Sup1
COG	627.6116*** (172.29)	520.2458*** (175.05)	636.7190*** (171.69)	525.5278*** (174.36)
Controls	No	No	Yes	Yes
_cons	1.1663*** (0.03)	0.5464** (0.26)	0.2824*** (0.10)	-0.5135* (0.28)
N	34026	34026	33987	33987
R2	0.000	0.008	0.013	0.021
year	No	Yes	No	Yes

Standard errors in parentheses

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

5.3 Heterogeneity Analysis

Building upon the baseline regression, this study conducts a heterogeneity analysis across two dimensions: the nature of corporate ownership and industry characteristics. The results are presented in Table 3. Regarding ownership nature, Column (1) of Table 3 indicates that urban policy coordination exerts a significant positive impact (at the 1% level) on collaborative innovation among state-owned enterprises (SOEs). In contrast, Column (2) shows that the effect on non-state-owned enterprises is positive but not statistically significant. This may stem from SOEs' closer ties with local governments, stronger capacity to access policy resources, and their role in executing national

innovation strategies, making them more capable of achieving collaborative innovation along industrial chains. Regarding industry attributes, Column (3) in Table 3 indicates that policy coordination has no significant effect on manufacturing enterprises, while Column (4) shows a significant impact at the 1% level for non-manufacturing enterprises. This may stem from manufacturing enterprises' greater reliance on market and technology drivers for collaborative innovation, making them less sensitive to policy changes, whereas non-manufacturing enterprises depend more heavily on policy support, where policy coordination yields greater marginal benefits from resource integration. In summary, the promotional effect of policy coordination on collaborative innovation is more pronounced in state-owned enterprises and non-manufacturing enterprises, providing empirical support for implementing differentiated policies.

Table 3. Sub-sample results.

	(1)	(2)	(3)	(4)
	Sup1	Sup1	Sup1	Sup1
COG	1000*** (377.09)	106.5291 (183.99)	167.6762 (239.29)	1300*** (237.08)
Controls	Yes	Yes	Yes	Yes
_cons	-1.6175*** (0.58)	0.4298 (0.30)	-0.3605 (0.36)	-1.2416*** (0.42)
N	10372	23615	22527	11460
R2	0.031	0.016	0.028	0.024
year	Yes	Yes	Yes	Yes

Standard errors in parentheses

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

5.4 Mediation Analysis

In the mediation mechanism test section, this study constructed an empirical model based on the theoretical analysis-proposed transmission pathway of "policy coordination—resource integration—collaborative innovation." The model employs "Market Integration Index (MII)," "Institutional Transaction Costs (IFA)," and "Innovation Resource Mismatch Index (ITC)" as core mediating variables. It aims to empirically examine the underlying mechanism through which urban policy coordination influences supply chain collaborative innovation among listed companies. The test results are shown in Table 4. All coefficients are significant and consistent in direction, providing strong empirical support for the theoretical mechanism.

Specifically, first, Column (1) of Table 4 demonstrates that urban policy coordination exerts a significant positive impact on the level of market integration (MII), with a coefficient of 398.0163 that is statistically significant at the 1% level. This suggests that effective policy coordination enhances regional market integration and strengthens the stability of cooperative expectations among supply chain enterprises, thereby creating a predictable institutional environment that fosters collaborative innovation between

upstream and downstream enterprises. Second, columns (2) and (3) of Table 4 demonstrate that urban policy coordination significantly reduces institutional transaction costs (IFA) and policy conflict intensity (ITC), with coefficients of -730 and -10.1257 respectively, both significant at the 1% level. This result validates the theoretical mechanism that “policy coordination reduces institutional transaction costs incurred by enterprises in responding to multiple regulatory authorities, thereby freeing up their managerial attention resources.” It demonstrates that policy coordination helps mitigate goal conflicts and implementation frictions among government departments, alleviating compliance burdens and decision-making uncertainties faced by enterprises due to policy inconsistencies.

Overall, the intermediary mechanism verification confirms that urban policy coordination indirectly promotes supply chain collaborative innovation through three pathways: “enhancing market integration,” “reducing institutional transaction costs,” and “alleviating the misallocation of innovation resources.” This not only supports the theoretical framework of “policy coordination—resource integration—collaborative innovation” constructed in this study but also provides policymakers with a clear direction for mechanism optimization: in promoting collaborative innovation along industrial chains, particular emphasis should be placed on enhancing market linkage efficiency and reducing enterprises’ institutional compliance costs through cross-departmental coordination and policy integration, thereby effectively stimulating collaborative innovation vitality among enterprises.

Table 4. Mediation analysis results.

	(1)	(2)	(3)
	MII	IFA	ITC
COG	398.0163*** (93.13)	-730*** (113.28)	-10.1257*** (2.29)
Controls	Yes	Yes	Yes
_cons	18.4227*** (0.10)	3.5404*** (0.09)	0.0782*** (0.00)
N	38301	29594	48650
R2	0.367	0.062	0.016
year	Yes	Yes	No

Standard errors in parentheses

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

6 Conclusions and Policy Suggestions

This study systematically examines the impact of urban policy coordination on supply chain collaborative innovation through theoretical construction and empirical testing. Benchmark regression confirms that urban policy coordination exerts a significant and

robust positive effect on supply chain collaborative innovation. Mechanism testing reveals that policy coordination operates through three pathways—“enhancing market integration, reducing institutional transaction costs, and optimizing innovation resource allocation”—validating the theoretical framework of “policy coordination—resource integration—collaborative innovation.” Heterogeneity analysis indicates this effect is more pronounced in state-owned enterprises and non-manufacturing firms. Based on these findings, the study proposes the following policy recommendations: Governments should establish cross-departmental, multi-level systemic policy coordination mechanisms to integrate departmental policies through coordinating bodies, consistency reviews, and unified service platforms, thereby reducing institutional costs. Simultaneously, targeted measures should be implemented to strengthen guidance for SOE innovation networks while providing tailored support for non-manufacturing enterprises. This will ultimately foster a virtuous transmission system of “macro-level policy coordination—meso-level market integration—micro-level cost reduction,” driving the development of a more resilient and dynamic regional innovation ecosystem.

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