Can Regional Collaborative Development Policies Improve Local Fiscal Revenue?

An Empirical Study Based on the Yangtze River Delta Region

Qi Liu [a], Xiangqian Zhang[b*]

[a]Shanghai Institute of Technology, Shanghai, 201418, China
EMAIL:liuqiwork123@163.com
[b]Shanghai Institute of Technology, Shanghai, 201418, China
*Corresponding author.Email: xqzhang1999@163.com

Abstract. Local government fiscal revenue is the foundation and guarantee for the realization of government functions. Therefore, whether regional collaborative development policies can improve the level of local government fiscal revenue is an important basis for regions to respond to regional development policies. Based on panel data from 227 cities in China from 2006 to 2018, this study empirically examines the impact of regional development policies on government fiscal revenue and its effect on the realization of government functions. The results indicate that regional collaborative development policies promote the level of local government fiscal revenue, and this conclusion still holds after a series of robustness tests. Based on these findings, this paper proposes further strengthening the promotion of regional collaborative development policies, enhancing fiscal and taxation system reforms, and encouraging the development of synergistic industries.

Keywords: regional collaboration; fiscal revenue; PSM-DID; quasi-natural experiment

1   Introduction

With the changes in China's economic situation, economic reforms have entered a deep-water zone, and issues regarding local economic development have become increasingly prominent. Among them, the issue of local government fiscal revenue has received great attention from policy makers. As the main body of economic management, local governments rely mainly on fiscal revenue to fulfill their functions. For a long time, regional imbalances in development and fiscal revenue issues have plagued many regions in China. Therefore, at the central government level, implementing regional collaborative development policies is an important means of addressing these issues. While promoting regional collaborative development, does the implementation of this policy affect the level of regional fiscal revenue? This is an important basis for regions to actively respond to regional collaborative development policies. This study aims to

explore the impact of regional collaborative development policies on local fiscal revenue through an empirical study of the Yangtze River Delta region. The research findings of this study have significant implications for further optimizing and improving regional collaborative development policies, represented by the Yangtze River Delta region.

2   Literature Review

Rauch (2011)[1] was the first to propose the concept of "regional economic synergies" based on collaboration, which triggered a series of studies on regional synergistic development in the academic community. Based on existing research and practical achievements, the relevant research on regional synergistic development can be roughly summarized into the following categories：1. Construction of evaluation indicators for regional synergistic development: For example, Yang et al. (2014)[2]used the synergy development index model to assess regional sustainability, taking mainland China as an example. Yuan et al. (2014)[3]constructed an evaluation indicator system for the synergistic development of regional environment-tourism-economy based on regional synergy theory and system theory, and conducted an empirical analysis using the case of western Hunan. 2. Research on models of regional synergistic development: For example, Lang et al. (2021)[4]used ASEAN countries as an example to explore the regional synergistic development models of developing countries, and discussed the importance of regional synergistic development in achieving sustainable urbanization in Southeast Asian countries. 3. Research on influencing factors of regional synergistic development: For example, Tang et al. (2020) [5] discovered that the primary influencing factors for the synergistic development of county-level cities in the Beijing-Tianjin-Hebei region are primarily the GDP of the secondary and tertiary industries, population, and urbanization rate. Guo et al. (2022) [6] focused on studying the effects of the spatial functional division of urbanization (SFDU) on optimizing the industrial layout and facilitating regional coordinated development.

In the field of fiscal taxation, most studies focus on the factors influencing fiscal tax revenue changes and the areas affected by fiscal taxation. For example, Cheng et al. (2018)[7] examined whether urban land development in China is driven by economic development or fiscal revenue from the perspective of economic development and fiscal income. They concluded that the main factors influencing the intensity of urban land development are economic growth, population urbanization, and population density. Baltazar et al. (2021)[8] studied the impact of climate targets on oil production and fiscal revenues in Latin America and the Caribbean. Ashish et al. (2019) [9] proposed that complementary resources such as labor, taxation, and industrial policies play an important role in the economic development of the Bay Area. Julia et al. (2018) [10] studied the impact of trade liberalization on government tax revenues and found that since 1970, trade liberalization has led to a greater decline in tax revenues in developing countries.

Overall, research in the field of regional synergistic development and local fiscal taxation is abundant. However, there is still a lack of research that combines regional

synergistic development policies with local fiscal taxation. This provides rich data and research space for the issues addressed in this study.

3   Model Construction and Data Sources

3.1   Model Construction

The focus of this study is to examine how the regional collaborative development policies in the Yangtze River Delta region affect local fiscal revenue. Therefore, the year 2016, when the central government issued the "Development Plan for the Yangtze River Delta City Cluster," is selected as the starting year. A total of 16 key cities in the Yangtze River Delta region are chosen as the experimental group, and panel data covering the period from 2006 to 2018, spanning 13 years before and after the policy implementation, are analyzed.

To ensure consistent experimental standards in terms of the changing trends of variables other than the policy implementation variable, this study selects 227 cities from across the country as the control group. The double-difference (DID) empirical analysis is conducted using a two-way fixed-effects model. The double-difference model is set as follows:

$$tax_{it} = \alpha_0 + \beta_1 DID_{it} + \gamma X_{it} + \lambda_t + \mu_i + \varepsilon_{it} \tag{1}$$

$$income_{it} = \alpha_0 + \beta_2 DID_{it} + \gamma X_{it} + \lambda_t + \mu_i + \varepsilon_{it} \tag{2}$$

In equation, the dependent variable tax_{it} represents the natural logarithm of the current-year value-added tax payable for city i in year t, $income_{it}$ represents the natural logarithm of the local general budgetary revenue for city i in year t. DID_{it} represents the policy of "Development Plan for the Yangtze River Delta City Cluster" issued by the central government. X_{it} represents the control variables, λ_t represents city fixed effects, μ_i represents year fixed effects, and ε_{it} represents the random disturbance term.

3.2   Variable and Data Description

(1) Dependent variable: In order to mitigate the impact of differences in data magnitudes, this study takes the logarithm of the proportions of the added value of the primary, secondary, and tertiary industries to GDP as the dependent variables.

(2) Independent variable: The regional collaborative development policy is the independent variable in this study. The "Development Plan for the Yangtze River Delta City Cluster" policy is treated as a quasi-natural experiment, and the interaction term between city type dummy variables and the policy implementation time dummy variable (treat × post) represents the treatment effect of the regional collaborative development policy (DID).

(3) Control variables: This study controls for the following variables based on existing literature: the level of economic development represented by the logarithm of per capita GDP (lnpcgrp), the total economic output represented by the logarithm of re-

gional GDP (lngdp), the size of the city represented by the logarithm of the total population at the end of the year (lnpop), the level of financial development represented by the ratio of the total loans at the end of each year to regional GDP (finc), and the degree of foreign investment openness represented by the ratio of the number of foreign-funded enterprises and Hong Kong, Macao, and Taiwan-funded enterprises to the total number of enterprises (foreign-funded enterprises + Hong Kong, Macao, and Taiwan-funded enterprises + domestic-funded enterprises) (open).

(4) Data sources: The data for this study mainly come from databases such as the "China Urban Statistical Yearbook" and the "China Science and Technology Statistical Yearbook." Data processing was conducted using STATA 15. Descriptive statistics of the relevant variables are presented in Table 1.

Table 1. Descriptive Statistics of Variables

Var-Name	Obs	Mean	SD	Min	Median	Max
tax	3671	12.895	1.247	7.713	12.944	16.179
income	3770	13.505	1.202	9.722	13.475	18.079
did	3900	0.012	0.110	0.000	0.000	1.000
lnpcgrp	3686	10.359	0.719	4.595	10.362	13.056
lngdp	3725	16.215	1.005	13.160	16.178	19.605
lnpop	3779	5.846	0.741	-3.219	5.913	8.133
finc	3725	2.194	1.134	0.560	1.858	13.530
open	3444	0.097	0.107	0.005	0.054	0.741
tec	3769	0.014	0.014	0.000	0.010	0.207

4   Empirical Analysis

4.1   Propensity Score Matching (PSM) Results

The double-difference method may suffer from "selection bias" due to the dissimilar city characteristics between the experimental group and the control group before the implementation of the policy. Since the city sample selected in this study covers a wide range and exhibits significant differences in development levels, we utilize the Propensity Score Matching (PSM) method to match the experimental group and the control group on a yearly basis. Subsequently, we re-estimate the double-difference using the matched sample. Specifically, this study employs kernel matching to estimate the propensity scores, taking the logarithm of the proportion of the added value of the primary industry to GDP in 2016, during the implementation period of the regional collaborative development policy, as an example for matching.

To verify the reliability of the matching results, we first conduct a parallel trend test, and the results are shown in Table 2. From the table, it can be observed that the standardized deviations between the matched experimental group and the control group have significantly decreased. Moreover, the p-values for the sample differences in both groups exceed 0.5, indicating that there are no significant differences between the

matched experimental group and the control group. This suggests that the matching effect is satisfactory.

Table 2. Comparison of PSM Before and After

Variable	Un-matched Matched	Mean Treated Con-trol		bias	%reduct |bias|	t p>t	t-test V(T)/V(C)
lnpcgrp	U	11.173	10.617	116.3		14.66 0.000	0.78
	M	11.173	11.202	-5.9	94.9	-0.60 0.548	0.9
lngdp	U	17.414	16.541	105.2		14.50 0.000	1.2
	M	17.414	17.41	0.5	99.5	0.05 0.963	0.88
lnpop	U	6.1256	5.9301	30.9		3.87 0.000	0.75
	M	6.1256	6.0799	7.2	76.6	0.67 0.506	0.62
finc	U	2.9145	2.2419	59.7		7.51 0.000	0.77
	M	2.9145	2.8873	2.4	95.9	0.21 0.833	0.53
open	U	.20859	.10062	100.7		12.58 0.000	0.74
	M	.20859	.21076	-2	98	-0.16 0.876	0.37

4.2 Balance Test

To examine whether there are significant differences in the values of covariates between the two groups after matching, a balance test is conducted. If the differences are not significant, it indicates a good matching effect, and the matched sample is appropriate for conducting the DID regression analysis. Figure 1 shows the results of the logistic regression before and after matching. The results indicate that the standardized deviations in the regression results after matching have significantly decreased. This suggests that there is little variation in the values of all covariates between the two groups after matching, indicating a clear matching effect.
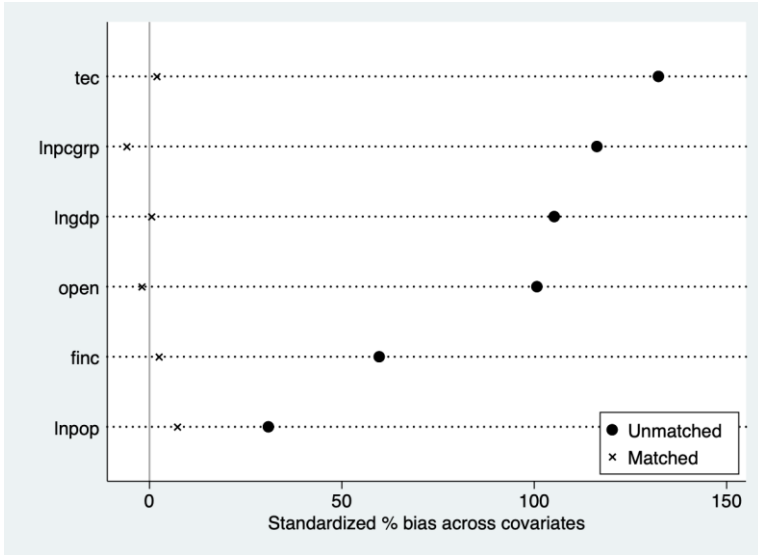
Fig. 1. Logit Regression Results Before and After Matching

4.3   Baseline Regression Results

This study empirically examines the impact of the implementation of regional collaborative development policies on urban industrial structure based on Model (1). To ensure the accuracy of the results, the same fixed effects model is used to estimate Model (1). The specific regression results are shown in Table 3:

Table 3. Regression Results of the Baseline Model

	(1)	(2)	(3)	(4)
	tax	income	tax	income
did	0.199***	0.0762***	0.178***	0.0725**
	(5.61)	(3.64)	(4.72)	(2.93)
lnpcgrp			0.948***	0.754***
			(15.29)	(20.36)
lnpop			0.615***	0.404***
			(5.55)	(6.52)
finc			-0.0280	0.00257
			(-1.82)	(0.30)
open			-1.715***	-0.512***

	(1)	(2)	(3)	(4)
			(-5.70)	(-4.20)
tec			2.139***	1.456**
			(3.37)	(3.03)
_cons	13.37***	13.98***	-0.172	3.567***
	(2091.83)	(4077.80)	(-0.16)	(5.91)
N	2498	2498	2498	2498
	(1)	(2)	(3)	(4)
	tax	income	tax	income

Note: ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, and the same convention applies throughout.

In Table 3, the first (1) and third (3) columns represent the results of the impact of regional collaborative development policies on current-year VAT payment by companies without and with the inclusion of control variables, respectively. The second (2) and fourth (4) columns represent the results of the impact of regional collaborative development policies on general budgetary revenue without and with the inclusion of control variables, respectively. The results indicate that, when considering various control variables and fixed effects, the coefficients of the interaction terms in the first, second, and third columns are significantly positive at the 1% level, while the coefficients in the fourth column are significantly positive at the 5% level. This suggests that regional collaborative development policies can significantly increase current-year VAT payment by companies and general budgetary revenue. Further examination of other control variables reveals that economic development level, urban size, technological investment, and degree of openness have significant effects on current-year VAT payment by companies. This indicates that regional collaborative development policies have a significant promoting effect on local fiscal revenue.

5   Conclusion

This study aimed to investigate the impact of regional coordinated development policies on local fiscal revenue, focusing on the Yangtze River Delta region as the empirical research object. Through data analysis and research, the following conclusions have been drawn:

Firstly, regional coordinated development policies have a significant positive impact on local fiscal revenue. The implementation of these policies promotes cooperation and coordination among local governments within the region, enhancing resource sharing and optimal allocation, thereby increasing local fiscal revenue. Additionally, the implementation of regional coordinated development policies has shown significant effects in the Yangtze River Delta region. As an important engine of China's economic development, these policies have facilitated complementary development among cities in the region, accelerating economic growth and consequently boosting local fiscal revenue.

Based on these findings, the following policy recommendations are proposed:

1. Further strengthen the promotion of regional coordinated development policies. To continuously improve local fiscal revenue, the government should increase support for regional coordinated development policies. This includes providing more policy support and funding to encourage stronger cooperation and coordination among local governments in terms of resource flow and sharing.

2. Enhance fiscal and tax system reforms. In the process of advancing regional coordinated development, it is necessary to further improve the fiscal and tax system to ensure fair and reasonable distribution of fiscal revenue.

3. Encourage industry coordination and development. In addition to intergovernmental cooperation and coordination, it is also important to encourage collaboration and development among enterprises and industries in different regions. The government can formulate supportive policies to encourage the formation of industrial chain synergy through cross-regional cooperation among enterprises.

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