The impact of regional integration on inter-governmental tax competition- An empirical analysis based on the expansion of the Yangtze River Delta

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Abstract. Based on the panel data of cities in East China from 2005 to 2021 and from the perspective of gradual expansion of the Yangtze River Delta urban agglomerations, this paper constructs a differentially differential model to empiricly study the impact of regional integration on tax competition among local governments. The results show that the expansion of the Yangtze River Delta has no significant effect on the tax competition of the original cities, but with the advancement of the integration process, its easing trend gradually appears, and the central cities are more obvious. However, the expansion of regional integration significantly intensifies the tax competition among local governments in new cities.

Keywords: Regional integration, Expansion of the Yangtze River Delta, Tax competition.

1 Introduction

At present, urban agglomeration has become the main form of regional economic integration, and the expansion of urban agglomeration, as the forerunner and key policy of regional integration, is a necessary means to break through the administrative division between regions and weaken the resistance to integration. In 2014, the Pearl River Delta expanded from nine cities to 14. Since 2010, the Yangtze River Delta has experienced four expansions covering the current "one province and three cities" area, and it can be predicted that there will still be more and more urban agglomerations or metropolitan areas to absorb new cities to develop and grow. Does the regional integration strategy based on urban agglomerations accelerate or alleviate the tax competition among local governments? Are there differences in the characteristics of local governments? As the process of regional integration continues to advance, does the degree of intensification or mitigation evolve? This article will try to answer these questions.

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2 Theoretical analysis and literature review

Does regional integration increase tax competition or reduce tax competition? First, the standard tax competition theory. Zodrow and Mieszkowski's research shows that in order to attract scarce liquidity capital, local governments will compete to choose a lower tax rate or implement greater tax incentives, resulting in an ineffective equilibrium of "race to the bottom"[1]. Under this theoretical mechanism, the improvement of regional integration will intensify the inter-governmental tax competition. The tax competition theory of new economic geography holds that the expansion of the market scale of a certain region can bring increasingly prominent positive externality benefits to the enterprises in the region, and the enterprises settled in the region will have a higher return on capital. The agglomeration force will promote the discontinuous agglomeration of mobility factors to some areas, resulting in "agglomeration rent". The local government can levy taxes on the "agglomeration rent" without causing capital flight, thus blocking the "race to the bottom" in the standard tax competition theory. Based on this theory, The study of Baldwin and Krugman finds that the urban center with significant agglomeration effect forms agglomeration rent due to economic agglomeration. As long as the agglomeration rent obtained by enterprises is greater than the tax burden gap, the government in the central area can tax agglomeration rent without worrying about the relocation of enterprises.[2]. Due to the final result of regional integration is to promote economic agglomeration. Therefore, based on the theoretical mechanism of new economic geography, the agglomeration effect brought by the promotion of regional integration will ease the intensity of tax competition among local governments.

Pu Yanping and Cheng Xiao show that agglomeration effect can alleviate the intensity of inter-regional enterprise income tax competition [3]. Based on the quasi-natural experiment of establishing urban agglomerations in China, Huang Yaru and Ren Yanqin verified that China's urban agglomerations policy can reduce the intensity of tax competition among urban agglomerations [4]. However, some scholars hold the opposite view. Pu Long et al. found through the opening of high-speed rail that infrastructure promoted the integration of the domestic market, enhanced the inter-regional flow of factors, and further intensified the competition of local governments in attracting factors [5]. In terms of the evolution of the degree of tax competition, Forslid found that in the process of economic integration, the tax rate difference between the two regions is bell-shaped.[6].

To sum up, the two theories lead to two opposite mechanisms for the tax competition between local governments. This paper takes the Yangtze River Delta city cluster as the research object, based on its gradual expansion background, to explore the impact of regional integration on the tax competition among local governments.

3 Research design

3.1 Model design

This paper adopted Staggered DID to estimate the impact of regional integration in the Yangtze River Delta on tax competition among local governments. The model is as follows:

$$Tax_{it} = \beta_0 + \beta_1 DID_{it} + \beta_2 control_{it} + \lambda_i + \eta_t + \varepsilon_{it} \quad (1)$$

Where, Tax_{it} is the explained variable, measures the tax competition degree of city i in year t and is represented by the macro tax burden. β_0 is a constant term. $DID_{it} = treat_{it} \times post_{it}$ is a virtual variable of the expansion policy. The regression coefficient β_1 reflects the effect of expansion on tax competition. $control_{it}$ represents a set of control variables. λ_i represents ity fixed effect, η_t represents time fixed effect, ε_{it} represents random error term.

3.2 Variable selection

3.2.1 The explained variable. This paper uses a medium-calibre macro TAX burden to measure the tax competition intensity of local governments, that is, TAX= local fiscal revenue /GDP. The lower the actual tax burden level of the i city in the t year, the higher the tax competition intensity of the city.

3.2.2 Core explanatory variable. Yangtze River Delta expansion policy dummy variable $DID_{it} = treat_{it} \times post_{it}$.$Treat_{it}$ indicates whether it is a processing group. Yes =1, no =0. Indicates the policy implementation time. Yes =1, no =0. In order to further explore the different impacts of regional integration policies on cities with different roles, this paper sets up two major processing groups, 16 original city groups and 25 new city groups. If the coefficient β_1 is significantly greater than zero, it indicates that the expansion of the Yangtze River Delta urban agglomeration has alleviated the degree of tax competition among local governments. If the coefficient is less than zero, it will be aggravated. No significant effect indicates no significant effect.

3.2.3 Control variables. The variables controlled in this paper are as follows: (1) Government size(govern), measured by the proportion of local fiscal expenditure in GDP of each city; (2) Industrial structure (indstru), measured by the proportion of the sum of the output value of the secondary and tertiary industries in the GDP of each region; (3) Financial development level (finance), expressed by the proportion of deposits and loans of financial institutions in GDP at the end of the year; (4) Human capital level (highedu), measured by the proportion of higher education students in the total population of each city in the current year; (5) Economic development level (pgdp), expressed by the per capita GDP of each city in the current year; (6) Infrastructure level (lnroad), represented by the actual road area of each city at the end of the year, and logarithmic processing.

All the data in this paper are from the "China City Statistical Yearbook", provincial and municipal statistical yearbooks and related government websites. The descriptive statistics of each data variable are shown in Table 1.

Table 1. Descriptive statistics of primary variables

variable	Sample size	Mean	variance	Minimum	median	Maxi-mum
tax	1327	0.809	0.304	0.216	0.762	3.449
govern	1327	0.143	0.075	0.022	0.126	1.200
indstru	1327	0.903	0.067	0.595	0.915	1.000
finance	1327	2.287	0.967	0.842	2.024	8.729
highedu	1327	0.020	0.023	0.000	0.012	0.128
pgdp	1327	5.565	3.727	0.376	4.806	19.902
lnroad	1327	7.411	0.917	4.920	7.424	10.393

4 Empirical analysis

4.1 Reference model regression

Table 2 reports the baseline regression results. Columns (1) - (4) report the results of original cities and new cities respectively. It can be found that the virtual variable coefficients of original cities fail to pass the significance test, indicating that the integrated expansion of the Yangtze River Delta has no significant impact on the tax competition of original cities. The main reason is that the cities in situ joined the Yangtze River Delta earlier, and after years of integration, a few central cities have shown agglomeration advantages, weakening the motivation of local governments to participate in strategic tax reduction. However, the Yangtze River Delta is a typical "one core and multi-center" urban agglomeration structure, and most of the cities in situ are still in the development stage of rapid expansion, and still need to attract the inflow of factor resources to achieve economic agglomeration. Due to the cancellation of factor competition and agglomeration effect, regional integration expansion has no significant impact on the in-situ cities.On the contrary, the virtual variable coefficients of new cities are significantly negative at the level of 1%, indicating that integrated expansion has intensified the tax competition intensity of new cities in the Yangtze River Delta.

Table 2. Baseline regression result

variable	(1)	(2)	(3)	(4)	(5)	(6)
did	-0.0314	0.0132	-0.0791***	-0.0594***		
	(0.0200)	(0.0227)	(0.0223)	(0.0182)		
before					0.0090	
					(0.0412)	
year1-4					-0.0588	-0.0167

					(0.0422)	(0.0192)
year5-8					-0.0311	-0.1245***
					(0.0428)	(0.0236)
year9-11					0.0601	-0.1502***
					(0.0454)	(0.0383)
Constant	0.3137	-0.2375	0.8181***	-0.2460	-0.3747**	-0.3433**
	(0.1960)	(0.1839)	(0.0055)	(0.1818)	(0.1750)	(0.1722)
Control variable	Yes	Yes	Yes	Yes	Yes	Yes
Time-fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Individual fixation effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,327	1,327	1,327	1,327	1,327	1,327
$\text{Adj} - R^2$	0.663	0.785	0.663	0.787	0.806	0.809

Note: * means significant at 10% significance level, * * means significant at 5% significance level, * * * means significant at 1% significance level. Values in brackets are cluster robust standard errors. The same below

Columns (5) and (6) further analyze the dynamic trend of the effect of tax competition on central and new cities over time in the process of regional integration. In particular, we introduced the cross-multiplication term before expansion for the in-situ city. Before expansion, the coefficient of the in-situ city was positive, but after expansion, the coefficient became negative, indicating that the expansion impacted the tax policy of the original city to a certain extent. This is because the "gravity" and "grip" of the in-situ city on the mobile elements were not stable when the integration was not perfect. The addition of peripheral cities will more or less reduce their tax collection efforts, but with the continuous advancement of the integration process, the positive externalities brought by the scale effect of in-situ cities gradually appear. In the latest year9-11, the coefficient of in-situ cities has changed from negative to positive. On the contrary, we observe that with the increase of the time for new cities to join the association in column (4), the dummy variable changes from negative to insignificant at the beginning to negative to significant, and the intensity of tax competition gradually intensifies. The results obtained in this paper are consistent with the studies of foreign scholars Hansson and Olofsdotter. Through studying the impact of integration on the capital tax of OECD countries, they found that the integration process had a negative impact on the tax rate, while the influence of agglomeration on the tax rate was positive [7]. The regression results show that the tax rate between the existing cities and the new cities in the Yangtze River Delta region is increasing. Foreign scholar Devereux et al studied the integration process of the European Union from 1965 to 2000 and found that the average income tax rate in the central area of the European Union increased from 7% to 10%. On the other hand, from 1965 to 1984, the peripheral jurisdictions continuously declined, and then gradually increased. The taxes of the central and peripheral jurisdictions first expanded and then decreased, showing an inverted U-shaped trend [8]. It can be predicted that new cities in the Yangtze River Delta will maintain a relatively high level of tax competition for a certain period of time.

4.2 Parallel trend test

The event study method is adopted and the time dummy variable before expansion is introduced. For the period far away from the policy implementation point, the samples that are more than or equal to three years before the policy implementation are regarded as the third year of policy implementation in this paper, and the cross-multiplication term between the dummy variable and the corresponding processing group is obtained, as shown in the Table 3. It can be seen that before the implementation of the expansion policy, the coefficients of both the original city and the new city are not significant, indicating that there is no significant gap between the tax competition between the treatment group and the control group before the implementation of the policy, and the premise of the use of the differential method is satisfied on the whole.

Table 3. Parallel trend test

Parallel trend test	Original city	New city
Before3×Treat	0.0451	0.0548
	(0.0534)	(0.0396)
Before2×Treat	0.0293	0.0216
	(0.0534)	(0.0402)
Before1×Treat	0.0020	0.0109
	(0.0533)	(0.0398)
Constant	-0.3333*	-0.3761**
	(0.1762)	(0.1749)
Control variable	Yes	Yes
Time-fixed effect	Yes	Yes
Individual fixation effect	Yes	Yes
Observations	1,327	1,327
$\mathrm{Adj}-\mathrm{R}^2$	0.804	0.806

5 Conclusions

Based on the background of the gradual expansion of the Yangtze River Delta, this paper uses the difference-difference method to test the effect of regional integration on tax competition among local governments. The results show that the orignal city gradually tends to "top to top" competition. This result verifies the inference of new economic geography on tax competition, that is, regional integration leads to economic agglomeration, and the enhancement of agglomeration advantage will ease the intensity of tax competition in central cities. On the contrary, the expansion process of regional integration will intensify the intensity of tax competition in new cities, which verifies the inference of the classical tax competition theory: regional integration will reduce the factor barriers between cities, increase the inter-regional mobility of factors, and intensify the inter-governmental tax competition.

Based on the above conclusions, this paper puts forward the following suggestions:

First, we need to improve the top-level system design for regional integrated development. On the one hand, it is necessary to continue to expand the advantages of economic agglomeration development and deepen the cooperation and coordination mechanism with innovative cities; On the other hand, in the process of promoting regional integration, it is also necessary to regulate the competition behavior among local governments, weaken the dependence of local governments on attracting production factors through disorderly tax competition, coordinate balanced development within the region through macro-policies such as fiscal policies, and reduce the difference between central cities and peripheral cities.

Second, the central government should gradually and orderly promote regional integration and pay more attention to the negative effects of regional integration on tax competition of new cities. China's current regional integration strategy mainly relies on the construction of urban agglomerations for development, and urban agglomerations are composed of different urban individuals, so when expanding the development of urban agglomerations, on the one hand, it is necessary to arrange capacity expansion based on geographical location, on the other hand, it is also necessary to avoid too many homogeneous cities flooding into urban agglomerations at the same stage. Cities with different characteristics need to combine their own economic development level, industrial structure and financial status, and recognize their own position in the "overall" of urban agglomerations, and make good use of the "double-edged sword" of tax competition according to local conditions.

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