The Influence of Anhui Province's Integration into the Yangtze River Delta Region on IFDI

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Abstract. In order to explore the driving effect of regional economic integration on IFDI, this paper takes Anhui Province's joining the Yangtze River Delta Economic Coordination Committee as a quasi-natural experiment, and uses the Staggered DID method to systematically evaluate the dynamic impact of policy implementation based on the panel data of 16 prefecture-level cities in Anhui Province from 2000 to 2021. The results show that: firstly, the inclusion of the Yangtze River Delta has significantly increased the scale of foreign direct investment in Anhui Province, and the conclusion is still valid after a series of robustness tests such as parallel trend test, placebo test and excluding other policy interference. secondly, the heterogeneity test shows that the policy effect is more obvious in cities adjacent to Jiangsu and Zhejiang regions, central cities, cities with higher economic development level, better infrastructure and higher degree of opening up. This study enriches the relevant literature on regional economic integration and IFDI, provides an empirical basis for IFDI attraction under the strategy of regional coordinated development, and also provides policy implications for the central and western regions to achieve high-quality foreign investment development by relying on regional cooperation.

Keywords: IFDI; Integration of the Yangtze River Delta; Difference-in-differences method; Anhui Province.

1. Introduction

Under the background of deep integration of economic globalization and regional integration, regional economic cooperation has become an important engine to promote the optimization of resource allocation and promote transnational capital flow. As one of the most economically dynamic regions in China, the Yangtze River Delta region has formed a "growth pole" effect radiating to the whole country through policy coordination, industrial linkage and factor sharing. The introduction of the Yangtze River Delta Urban Agglomeration Development Plan in 2016 has further strengthened the regional integration strategy. As a key carrier of technology spillover, industrial upgrading and economic growth, the location choice of Inward Foreign Direct Investment (IFDI) is closely related to regional policy environment. However, the existing literature mostly focuses on the IFDI agglomeration effect of core cities or developed provinces in the Yangtze River Delta, and lacks in-depth discussion on the dynamics of foreign investment attraction in the backward regions in regional integration.

Based on the panel data of 16 prefecture-level cities in Anhui Province from 2000 to 2021, this paper uses the Staggered DID method to systematically evaluate the policy effect of regional integration policy on IFDI. Compared with traditional research, the marginal contribution of this paper is reflected in the following two aspects: first, in terms of identification strategy, the progressive DID model is used to capture the dynamic effect of policy implementation, which effectively alleviates the estimation errors that may exist in the traditional two-way fixed effect model. Second, from the perspective of research, it not only verifies the overall impact of policies on FDI, but also reveals the interaction between regional synergy effect and local resource suitability from the perspective of urban endowment differences (such as location conditions, industrial base and institutional environment).

The empirical results show that the addition of Yangtze River Delta has significantly increased the scale of IFDI inflow in Anhui Province, and this effect remains robust under multiple robustness tests

(including parallel trend test, placebo simulation, variable substitution and sample reconstruction). This study not only verifies the significance of regional economic integration to economic development, but also provides policy implications for the central and western regions to integrate into the developed economic circle through institutional opening and realize the "quality and expansion" of foreign capital.

2. Policy background and mechanism analysis

2.1. Policy background

Since the beginning of the reform and opening up, the economy of Shanghai and its surrounding provinces of Jiangsu, Zhejiang and Anhui has grown rapidly, forming an economic circle with Shanghai as the core. In the 21st century, the Chinese government began to formally plan the Yangtze River Delta urban agglomeration and put forward the concept of integrated development. By the 2010s, infrastructure construction, industrial upgrading and economic transformation within the region will be strengthened, and cooperation in urban agglomerations will be deepened. In 2019, the release of the Outline of the Yangtze River Delta Regional Integrated Development Plan marked the official elevation of the Yangtze River Delta urban agglomeration to a national strategy. At present, the Yangtze River Delta urban agglomeration has become one of the most economically active and open regions in China.

The Yangtze River Delta City Economic Coordination Committee was upgraded from the former Yangtze River Delta City Cooperation Office Directors' Joint Committee in 1997 by 15 cities including Shanghai, aiming to promote and strengthen the economic cooperation and cooperation in the Yangtze River Delta region. In 2008, The State Council issued the Guiding Opinions on Further Promoting reform, opening up and Economic and Social Development in the Yangtze River Delta Region, which proposed: "Adhere to integrated development, form a unified and open market system, and promote the rational flow and optimal allocation of production factors." Since then, the Yangtze River Delta City Economic Coordination Committee has expanded its capacity for many times to strengthen the economic ties between regional cities. Specifically, in the 10th meeting of the Yangtze River Delta City Economic Coordination Committee in 2010, Hefei city and Ma 'anshan City were the first to be accepted as members of the Yangtze River Delta; In 2013, the cities of Wuhu, Chuzhou and Huainan joined; In 2018, Tongling City, Anqing City, Chizhou city and Xuancheng City joined the coordination committee; In 2019, Huangshan City, Bengbu City, Lu 'an City, Huaibei City, Suzhou City, Bozhou city and Fuyang City were officially included in the Yangtze River Delta Urban Economic Coordination Committee. Although Anhui province, as a latecomer member of the Yangtze River Delta, faces a gap between Shanghai, Jiangsu and Zhejiang in development stage, its advantages such as active innovation, distinctive manufacturing characteristics, rich ecological resources and vast inland hinterland are positioned as the core of differentiated development. As an important regional oriented policy, the Yangtze River Delta City Economic Coordination Committee is committed to building a unified and open market system.

In order to deeply integrate into the integrated development of the Yangtze River Delta, Anhui Province has promulgated a series of policies and measures such as the Guiding Opinions on Deeply Integrating into the National Strategy of Integrated Development of the Yangtze River Delta to Promote High-quality Development. On the whole, the implementation of a unified market system in the Yangtze River Delta region, the establishment and improvement of cross-regional benefit sharing mechanism, the breaking of administrative barriers, the realization of market access, factor flow and other aspects of institutional integration, has played an important role in promoting the economic growth of Anhui province and the introduction of foreign capital. First, it is conducive to the rational allocation of production factors. The Yangtze River Delta Urban Economic Coordination Committee has created favorable conditions for the free circulation and effective allocation of production factors in the Yangtze River Delta region. In terms of capital factors, Anhui Province has accelerated the construction of the Anhui branch center of the Yangtze River Delta Capital Market Service base,

strengthened the division of labor and cooperation of various capital markets, promoted the integrated reform and innovation in the financial field, jointly built a unified and open capital market in the Yangtze River Delta, and promoted the orderly and free flow of capital across regions. In terms of labor factors, Anhui Province has strengthened human resource cooperation with other regions in the Yangtze River Delta, promoted the sharing of human resources and job information and the organic connection of service policies, jointly built a unified and open labor market in the Yangtze River Delta, and promoted the effective flow and optimal allocation of human resources between regions. Second, it is conducive to technological innovation. After joining the Yangtze River Delta, Anhui Province has accelerated the construction of scientific and technological innovation community in the Yangtze River Delta, promoted the "two-heart co-creation" of Shanghai Zhangjiang and Hefei Comprehensive National Science Centers, improved the open and sharing cooperation mechanism, shared scientific research resources, promoted original innovation and technological innovation in a coordinated way, and jointly improved the technological innovation chain. Third, it is conducive to the transformation and upgrading of industrial structure. After joining the Yangtze River Delta, Anhui Province has strengthened the industrial division of labor and cooperation with other regions in the Yangtze River Delta, implemented the action plan of "improving quality, expanding quantity and increasing efficiency", jointly carried out the action of strengthening the chain of the Yangtze River Delta industrial chain, focused on strengthening the cross-regional cooperation of key industries, and jointly built a world-class emerging industrial cluster. At the same time, the mechanism of Shanghai, Jiangsu and Zhejiang cities pairing to help northern Anhui (such as Nanjing helping Chuzhou and Hangzhou helping Suzhou) helps narrow the development gap within the province and promote the balanced integration of the whole region into the Yangtze River Delta. These series of policy practices not only create institutional dividends and market opportunities for foreign direct investment (IFDI) in Anhui Province, but also provide a paradigm reference for the central and western provinces to achieve "development by taking advantage of the opportunity" through regional coordination.

2.2. Mechanism analysis

By breaking administrative barriers and geographical segmentation, the integration of the Yangtze River Delta has reconstructed the regional market boundary and significantly expanded the market radiation scope of Anhui Province. High-speed rail networks (such as the "3-hour Economic Circle") have reduced logistics costs and information asymmetry, transforming Anhui from an inland hinterland into an important node for the extension of the industrial chain in the Yangtze River Delta. For example, the "linkage receiving and unloading" mode of Wuhu Port and Shanghai Haiyangshan Port reduces logistics costs by 30%, attracting foreign enterprises to locate Anhui based on supply chain efficiency. At the same time, the unified factor market (such as labor, capital and technology) has accelerated the cross-regional allocation of resources, and Anhui has become the preferred place for the gradient transfer of foreign manufacturing industry relying on the advantages of land cost and labor dividend.

The high-level institutional opening of the Yangtze River Delta has provided Anhui with institutional dividends. The experience replication of pilot free trade zones (such as the mixed mode of "bonded + export" and the "no meeting" approval of maritime government affairs) has reduced the institutional transaction costs of foreign enterprises. Regional collaborative governance mechanisms (such as inter-provincial cooperation and joint rewards and punishments for environmental credit) have improved policy transparency and implementation efficiency. For example, Hefei Customs has piloted the integrated inspection operation mode for special goods in the Yangtze River Delta, and implemented rapid customs clearance of precision equipment imported by integrated circuit enterprises by "first release and then inspection", shortening the customs clearance time by 75%. Based on this, this paper proposes the following hypothesis:

Hypothesis 1: The addition of Anhui province to the Yangtze River Delta significantly promotes IFDI growth.

Cities bordering Jiangsu, Zhejiang and Shanghai (such as Wuhu, Ma 'anshan and Chuzhou) and central cities (such as Hefei and Bengbu) benefit from geographical proximity and are easier to integrate into the core industrial chain of the Yangtze River Delta. For example, Maanshan Zhengpu Port is positioned as an "enclave port" in Hefei, which reduces cross-border logistics costs through land-water combined transportation and attracts foreign enterprises to locate nearby. In addition, the border areas took the lead in enjoying 173 items covered by the "One Network" of government services in the Yangtze River Delta, and the connectivity in cross-border payment, medical care and other livelihood areas accelerated the flow of foreign talents. The neighboring cities form rapid response capacity through the mode of "production and supply chain." For example, by integrating into Hefei's new energy vehicle industry chain, Changfeng County realized the "3-hour supply circle" of batteries, motors and body parts, which attracted BYD to complete the contract within 42 days. Central cities such as Hefei, relying on comprehensive national science centers, gather foreign R&D institutions (such as Dazhong Science and Technology) to form technology spillover effects and promote the concentration of IFDI in high-tech industries. Border areas and central cities will give priority to the pilot policies of the Yangtze River Delta. For example, Hefei and Wuhu have been included in the pilot program of "Science and Technology Huitong" to facilitate cross-border capital remittance of foreign non-enterprise scientific research institutions and promote the development of science and technology innovation finance. In addition, the pairing assistance mechanism between Shanghai, Jiangsu and Zhejiang cities (such as Nanjing's assistance to Chuzhou) provides industrial transfer funds and technical support for the border areas, narrowing the institutional gap with the core areas of the Yangtze River Delta. Based on this, this paper proposes the following hypothesis:

Hypothesis 2: The promotion effect of IFDI in cities bordering Jiangsu, Zhejiang and Shanghai and central cities in the province is more significant.

3. Study design and data description

3.1. Methods of research

By studying the impact of the policy system on IFDI, we can observe the changes of IFDI before and after the implementation of the policy to see whether there is a significant increase. But such a comparison cannot eliminate the impact of other factors on IFDI. Therefore, in order to reasonably estimate the policy effect and effectively eliminate the interference of other factors, DID is usually used for research. The specific idea of DID is to regard the policy implementation as a "quasi-natural experiment." First, the policy implementation areas are taken as the experimental group, and the policy non-implementation areas are taken as the control group. Then, the impact of the policy shock is estimated by calculating the difference generated by the trend of changes in the data indicators of the two samples after the implementation of the policy. DID has been widely used in the analysis of policy effects. For example, in the study on the impact of the 1986 tax reform in the United States on the labor participation rate of single women with children, and in the study on the impact of the minimum wage increase in New Jersey and Pennsylvania on the employment rate of the fast food industry, all samples entered the policy experiment at the same time. However, the policy of Anhui Province joining the Yangtze River Delta is based on the municipal administrative region and joined in batches, so it is not applicable to the DID model setting of the same period. Therefore, the Staggered DID method is adopted for research.

3.2. Variable setting

3.2.1 Explained variable and core explanatory variable

IFDI is the explained variable, and CSJit, the core explanatory variable of Anhui joining the Yangtze River Delta, is in the form of dummy variable. If city i joins the Yangtze River Delta in year t, the value is 1; otherwise, the value is 0.

3.2.2 Control variables

In order to control other factors that may affect IFDI in Anhui cities, this paper adds a series of control variables. Since geographical characteristics will affect IFDI attraction, this paper measures the distance (dis) from each city to the boundary of the Yangtze River Delta, and cross-multiplizes it with the time fixed effect to control the influence of time-invariant geographical factors on the estimation results. In order to control the influence of other factors on the regression results, this paper further controls a series of city-level control variables, including: regional gross product (gdp); Industrial structure (str), measured by the ratio of the added value of the tertiary industry to GDP; Population density (pop) is measured by the ratio of the total population to the land area of the administrative region at the end of the year; Propensity to consume (apc), measured by total retail sales of consumer goods/GDP; Labor cost (wage) is calculated by the average wage of employees on the job; The level of opening to the outside world (open) is measured by the proportion of export in GDP, in which the export is converted by the exchange rate of RMB against US dollar; Government expenditure (gov) is measured by the proportion of general budget expenditure of local finance in GDP.

3.3. Strategy of identification

This paper takes Anhui's joining the Yangtze River Delta as a quasi-natural experiment to evaluate its impact on the IFDI of Anhui cities. Given that Anhui has gradually joined the Yangtze River Delta in four batches, this paper draws on the practice of Beck et al. (2010) to construct the following Staggered Difference-in-Differences (Staggered DID) model:

$$FDI_{it} = \beta_0 + \beta_1 CSJ_{it} + \beta_2 X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

Where i and t represent city and year respectively. FDI_{it} is the amount of foreign direct investment of city i in year t; Is the core explanatory variable; X_{it} is a series of control variables at the city level; μ_i and λ_t represent city fixed effect and year fixed effect respectively; ε_{it} is the random error term. The estimated coefficient β_1 measures the net effect of Anhui joining the Yangtze River Delta on the growth of IFDI utilization scale of Anhui cities.

3.4. Data sources and descriptive statistics

The relevant data in this paper come from Anhui Provincial Bureau of Statistics, Anhui Statistical Yearbook and China City Statistical Yearbook. The descriptive statistics of specific variables are shown in Table 1.

Table 1. descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
IFDI	352	5.098	7.29	.01	37.48
CSJ	352	.25	.434	0	1
city distance	352	97.394	67.869	9.189	216.887
city gdp	352	15.637	1.006	13.273	18.553
city gov	352	.163	.066	.062	.355
city open	352	.057	.052	.003	.34
city pop area	254	1061.205	729.673	174	3651.17
city str	351	.42	.088	.051	.65
city wage	352	10.303	.823	8.609	11.623
city apc	352	.375	.097	.163	.726

4. Empirical analysis

4.1. Benchmark regression results

Table 2 reports the regression results of the impact of Anhui's joining the Yangtze River Delta on its IFDI. Column (1) is the case when no control variables are added. Given that geographical characteristics will affect the location choice of IFDI, Column (2) further controls the interaction term of geographical characteristics at the city level and year fixed effects. In (3), the control variables at the city level and the interaction term of geographical characteristics and year fixed effects are added. The results show that when IFDI is the explained variable, the estimated coefficients of CSJ are significantly positive in all kinds of model Settings, indicating that the addition of Anhui to the Yangtze River Delta significantly promotes the growth of IFDI, and Hypothesis 1 is verified.

Table 2. Benchmark regression results

Variable	(1) IFDI	(2) IFDI	(3) IFDI
CSJ	10.702***	3.525*	4.292**
	(2.707)	(1.934)	(1.573)
_cons	2.423***	4.217***	-13.413***
	(0.362)	(0.483)	(58.343)
Geographical characteristics x year fixed effects	no	yes	yes
City control variable	no	no	yes
Year fixed effect	no	yes	yes
City fixed effect	no	yes	yes
Level of clustering	city	city	city
Sample size	352	352	254
Adjust R2	0.4036	0.7408	0.8837

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

4.2. Parallel trend test

The parallel trend assumption is a prerequisite for the credibility of the asymptotic DID estimation. Because the cities in Anhui province have different time to accept the policy impact of the Yangtze River Delta Urban Economic Coordination Committee, it is necessary to set the relative time dummy variable for each pilot city according to the critical point of the policy occurrence. Referring to the event study method of Li et al. (2016) and Song et al. (2019), this paper analyzes the dynamic effect of Anhui's joining the Yangtze River Delta on the growth of IFDI scale of cities in Anhui Province. The regression model is shown as follows:

$$FDI_{it} = \alpha_0 + \sum_{k=-8,k\neq-1}^{k=5} \alpha_k \times D_{i,t_0+k} + \chi X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (2)$$

D_{i,t_0+k} is a series of dummy variables indicating the KTH year when city i joined the Yangtze River Delta. α_k is the coefficient that this paper focuses on, indicating the difference in IFDI growth between cities that have joined the Yangtze River Delta Urban Economic Coordination Committee and those that have not in the KTH year of the policy implementation. This paper takes the year before the implementation of the policy (k=−1) as the base period. The other variables have the same meaning as Equation (1). Figure 1 presents the results of the parallel trend estimation with 95% confidence intervals. Before the policy, the regression coefficient of the relative time dummy variable of Anhui joining the Yangtze River Delta is not significant, indicating that the IFDI growth of cities in Anhui Province shows a similar trend of change, indicating that the parallel trend test passes. In terms of the dynamic effect of the policy, the IFDI growth effect of Anhui joining the Yangtze River Delta has been significantly positive except for the first year after the implementation of the policy,

indicating that the IFDI growth effect of Anhui cities joining the Yangtze River Delta is significantly higher than that of cities not joining the Yangtze River Delta.

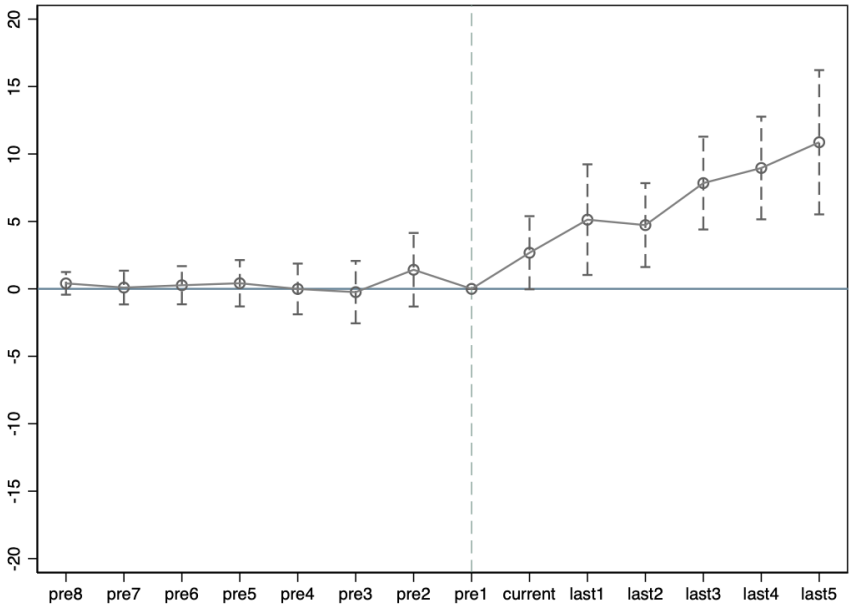

Fig. 1 Parallel trend test

4.3. Robustness test

4.3.1 Spillover effect test

Provinces bordering Anhui Province other than Jiangsu, Zhejiang and Shanghai may have spillover effects on the cities in the control group. In order to alleviate such interference, this paper excludes the cities in Anhui that border on non-Jiangsu, Zhejiang and Shanghai to exclude the impact of policy spillover effect on the benchmark estimation results. From the regression results in Column (1) of Table 3, it can be seen that the direction and significance of the regression coefficients are consistent with the benchmark regression results, which proves the robustness of the benchmark estimation.

4.3.2 Eliminate other policy interference

When identifying the impact of Anhui joining the Yangtze River Delta on the IFDI growth of Anhui cities, Anhui cities may be affected by other policies at the same time, thus interfering with the authenticity of the estimation results. To this end, this paper summarizes other policies implemented during the sample period, including smart cities, state-level high-tech industrial development zones, opening of high-speed trains, construction of Nanjing metropolitan area and Hefei metropolitan area, and successively controls their potential impacts on the economic growth of towns in Anhui. Columns (2) - (6) of Table 3 show that after excluding the impact of the six types of interference policies, the coefficients of the core explanatory variables are still significantly positive.

4.3.3 The control variables are lagged by one period

The control variables are lagged by one period, and all the control variables are regressed by one period.

Table 3. Robustness test

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variable	Spillover effect test	Eliminate other policy interference	Eliminate other policy interference	Eliminate other policy interference	Eliminate other policy interference	Eliminate other policy interference	Control variables are lagged by one period
	IFDI	*IFDI*	*IFDI*	*IFDI*	*IFDI*	*IFDI*	*IFDI*
CSJ	3.758*	4.248**	4.139**	4.226***	4.259**	4.323***	4.113**
	(1.879)	(1.558)	(1.570)	(1.258)	(1.558)	(1.322)	(1.872)
Smart_city		0.302					
		(1.558)					
Railway			0.551				
			(0.924)				
cnht				4.467***			
				(0.771)			
njdsq					1.245		
					(0.874)		
hfdsq						-0.072	
						(0.989)	
_cons	63.179	-11.750	-16.459	-31.739	-9.267	-14.011	-6.615
	(84.861)	(59.550)	(58.245)	(45.543)	(56.502)	(57.752)	(64.776)
Geographical characteristics x year fixed effects	yes	yes	yes	yes	yes	yes	yes
City control variable	yes	yes	yes	yes	yes	yes	yes
Year fixed effect	yes	yes	yes	yes	yes	yes	yes
City fixed effect	yes	yes	yes	yes	yes	yes	yes
Level of clustering	city	city	city	city	city	city	city
Sample size	159	254	254	254	254	254	254
Adjust R2	0.891	0.883	0.884	0.911	0.885	0.883	0.885

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

4.4. Goodman-Bacon decomposition

There are heterogeneous treatment effects in the two-way fixed effect estimator of DID, which may affect the credibility of the estimation results (Goodman-Bacon, 2021). Generally speaking, the treatment effects of different time points and different groups are often inconsistent, which may lead to the situation of "bad treatment group" and negative weight, so it is difficult to explain the treatment effect of two-way fixed effect model. It can be seen from Figure 2 that the time of joining the Yangtze River Delta in Anhui is different, and it is mainly concentrated in the second half of the sample period, which may lead to a relatively serious negative weight problem. In view of this, this paper refers to the coefficient decomposition method of Goodman-Bacon (2021) to examine the bias of the asymptotic DID estimation. It can be seen from Figure 3 that the weight of the appropriate treatment effect is 77.0%, which accounts for a large proportion. The weight of the unsuitable treatment effect is 23%, which is relatively small. The above results confirm that there is no serious bias in the benchmark regression estimates.

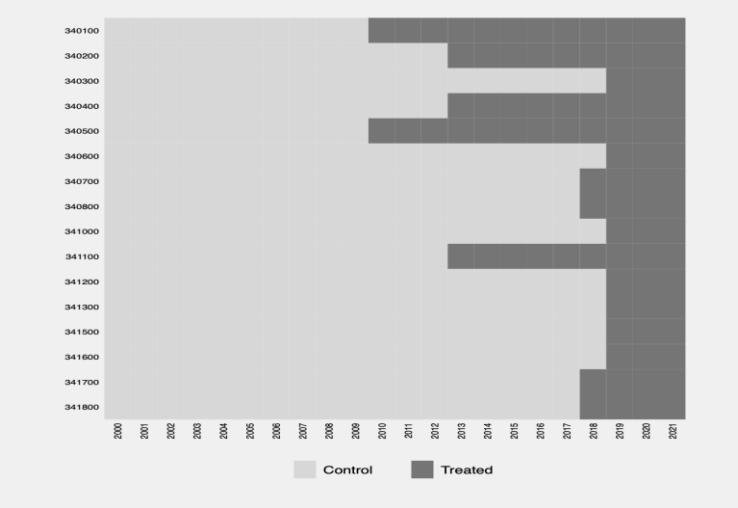

Fig. 2 Treatment group and control group treatment status

Diff-in-diff estimate: **4.308**

DD Comparison	Weight	Avg DD Est
Earlier T vs. Later C	**0.770**	**7.444**
Later T vs. Earlier C	**0.230**	**-6.162**

T = Treatment; C = Comparison

Fig. 3 Goodman-Bacon decomposition weight table

4.5. Placebo test

Because the implementation of the Yangtze River Delta Urban Economic Coordination Committee will be affected by a variety of unobservable factors that change over time, and these effects cannot be directly controlled. Therefore, this paper adopts an indirect placebo test method widely used by scholars (Liu and Lu, 2015; Song et al., 2019). According to Equation (1), the following coefficient expression can be obtained:

$$\widehat{\beta_1} = \beta_1 + \phi \times \frac{cov(CSJ_{it}, \varepsilon_{it}|z)}{var(CSJ_{it}|z)} \tag{3}$$

Where ϕ is the impact of unobservable factors on the growth of IFDI in Anhui cities; if ϕ=0, it indicates that unobservable factors have no impact on the estimation results, that is, $\widehat{\beta_1}$ is unbiased. z includes all control variables and fixed effects. The logic of the indirect placebo test is to replace the core explanatory variable CSJ_{it} with an error variable that theoretically has no impact on the explained variable, in which case β_1=0. Under this premise, if $\widehat{\beta_1}$=0 is estimated, ϕ=0 can be inverted. If this error variable actually has an impact on the explained variable, that is, $\widehat{\beta_1}$≠0, then it can be inferred that ϕ≠0, indicating that the estimation results of this paper are biased, that is, other characteristic factors will affect the IFDI growth of Anhui. To this end, this paper makes the impact of Anhui joining the Yangtze River Delta on a specific region become a random event, and repeats this process 500 times. Figure 4 shows the distribution of these 500 $\widehat{\beta_1}$s, and it is found that the estimated coefficients are mainly distributed around 0 and follow the normal distribution, which can be reversed to obtain ϕ=0. This shows that unobservable factors almost have no impact on the estimation results, further indicating that the benchmark estimation results are robust.

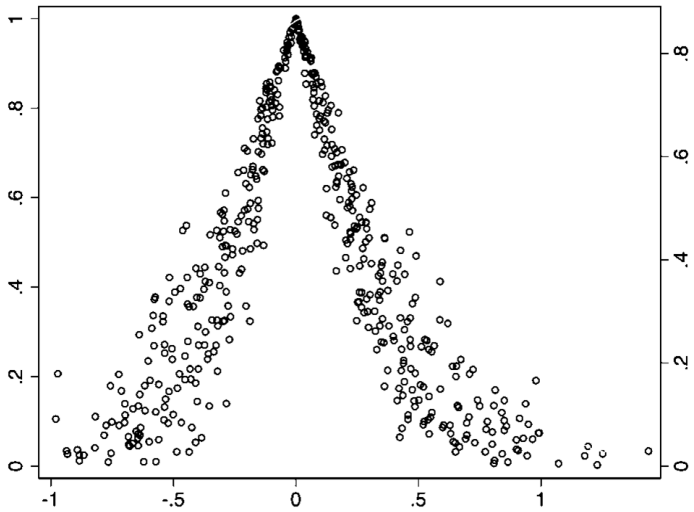

Fig. 4 Placebo test

4.6. Analysis of heterogeneity

Generally speaking, central cities and cities bordering each other have economic agglomeration effect and high efficiency of resource allocation and utilization. Other cities are not far behind. Based on this, this paper divides the cities of Anhui province into two types: central cities, border cities and other cities. It is used to explore whether the impact of Anhui province's joining the Yangtze River Delta on the scale of FDI utilization will be different due to the different types of cities. The results in columns (1) and (2) of Table 4 show that the regression coefficients of central and border cities are significantly positive at the level of 5%, while those of other cities are not significant. Hypothesis 2 is verified.

Table 4. Analysis of heterogeneity

Variable	Center and bordering cities (1) IFDI	Other Cities (2) FDI
CSJ	2.252**	-1.219
	(1.659)	(0.844)
_cons	8.178***	60.022
	(95.146)	(41.937)
Geographical characteristics x year fixed effects	yes	yes
City control variable	yes	yes
Year fixed effect	yes	yes
City fixed effect	yes	yes
Level of clustering	city	city
Sample size	79	175
Adjust R2	0.9727	0.7187

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

5. Conclusions and policy recommendations

Based on the panel data of 16 prefecture-level cities in Anhui Province from 2000 to 2021, this study systematically evaluates the policy effect of Anhui province's joining the Yangtze River Delta Economic Coordination Committee on IFDI through the Staggered DID method. The empirical results show that regional integration strategy significantly improves the level of foreign direct

investment in Anhui Province, and this effect remains significant in a series of robustness tests such as parallel trend test and placebo simulation.

The marginal contribution of this paper is mainly reflected in two aspects: first, it breaks through the static assumption of the traditional two-way fixed effect model in terms of method, and adopts progressive DID to capture the dynamic effect of policy implementation, which alleviates the estimation errors caused by the phased implementation of policies. Secondly, from the perspective of research, this paper constructs a theoretical mechanism from multiple dimensions such as market integration, industrial coordination and institutional spillover, and reveals the driving path of regional integration for foreign investment attraction in the backward regions. The research conclusion not only provides empirical evidence from emerging economies for the resource allocation effect of regional economic integration, but also provides theoretical support for the central and western regions to achieve "development by taking advantage of the opportunity" through cross-regional cooperation.

Based on the research conclusions, this paper puts forward the following policy recommendations.

1. Deepen the regional coordination mechanism, strengthen institutional opening, promote the coverage of the convenient policies in the Yangtze River Delta to Anhui Province, and reduce the institutional transaction costs of foreign enterprises. We will replicate and promote the innovative experience of pilot free trade zones to create a business environment in line with international standards.

2. Optimize the industrial division of labor and cultivate differentiated competitive advantages

For bordering cities (such as Chuzhou and Ma 'anshan), cross-provincial industrial cooperation parks will be built based on geographical proximity, focusing on high-end manufacturing and service industry spillover from Shanghai, Jiangsu and Zhejiang. We will support Hefei, Wuhu and other central cities in giving full play to their advantages in scientific and technological innovation resources, setting up foreign-funded R&D centers and regional headquarters, and forming a virtuous cycle of "innovation-industry-investment".

3. Improve the infrastructure network and improve the efficiency of factor flow

We will accelerate inter-provincial high-speed rail, port combined transport and other transportation infrastructure, shorten the time and space distance from the core area of the Yangtze River Delta, and reduce logistics costs for foreign enterprises. We will build a unified data factor market in the Yangtze River Delta, promote cross-regional sharing of talent, technology and capital, and enhance the supporting capacity of foreign investment.

4. Implement gradient investment introduction strategy to stimulate the potential of local endowment

For northern Anhui and other underdeveloped regions, we should guide foreign investment in green energy, modern agriculture and other characteristic fields through preferential tax policies and preferential land use indicators. For industrial agglomeration areas such as Wanjiang Urban Belt, strengthen industrial chain investment, attract foreign capital to participate in the construction of new energy vehicles, integrated circuits and other strategic industrial clusters.

This study provides a practical paradigm for the latecomer regions to integrate into the developed economic circle, which can be further extended to other provinces in central and western China in the future to explore the optimal path of regional coordination and local resource adaptation.

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