

## Based on the Impact of the Yangtze River Delta Expansion on its Regional Economy

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### Abstract

The expansion of the Yangtze River Delta has a significant impact on the economy, politics, culture and other aspects of the urban agglomeration, with a significant positive impact, which makes the promotion of the Yangtze River Delta expansion policy of great significance. This paper uses the research results of domestic and foreign scholars for reference to explore the impact of the expansion policy on common prosperity in the context of the Yangtze River Delta expansion. By comprehensively using the composite control method, this paper examines and compares the common trends and regional differences of the policy effects of the Yangtze River Delta expansion on the overall cities, in situ cities and new cities. Under imperceptible influence, it can effectively promote the political, economic and cultural "win-win" of the Yangtze River Delta urban agglomeration and achieve common prosperity.

### Keywords

Yangtze River Delta Expansion; Relevant Regions; Synthetic Control Method.

## 1. The Current Situation of Regional Integration and Comprehensive Development in Yangtze River Delta Cities

### 1.1. Leading Economy and Rapid Development

The strong economic strength of the Yangtze River Delta region supports the vigorous development of China's economy. As the leading city, Shanghai has led Jiangsu, Zhejiang and Anhui provinces to follow. Regional cities share resources and mutually beneficial policies to promote the integration of the Yangtze River Delta. During the epidemic, the Yangtze River Delta region played a leading role in activating the market economy, driving economic recovery and greatly reducing losses.

According to relevant data, since 2010, the total GDP of the Yangtze River Delta has accounted for about 1/4 of that of the whole country, and the total volume of imports and exports of goods has steadily accounted for 1/3 of that of the whole country. This also clearly shows that the Yangtze River Delta region has contributed a lot to China's economic development and occupies an important position.

**Table 1.** Proportion of Yangtze River Delta Regional Indicators in China from 2010 to 2018

Particular year	2010	2011	2012	2013	2014	2015	2016	2017	2018
<b>GDP</b>	23.94	23.76	23.42	23.37	23.34	23.34	23.95	23.79	23.49
<b>Goods import and export trade</b>	37.41	36.19	34.55	33.02	33.34	35.15	35.93	36.50	36.23

### 1.2. Co Innovation and Coordinated Development

Innovation is the source of development. Cities in the Yangtze River Delta also pay attention to scientific and technological innovation, activate market potential with scientific and technological innovation, and tap more development space. According to the data, in 2020, Shanghai will be the top one in the number of high-tech enterprises in the Yangtze River Delta, and it deserves to be the leading city in the Yangtze River Delta.

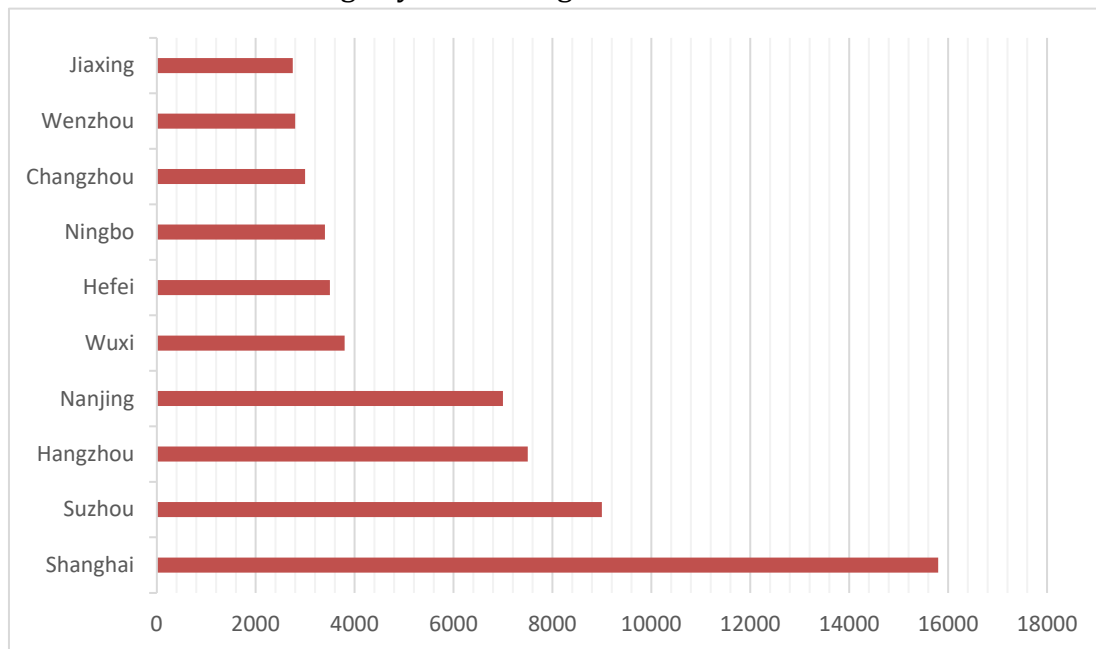


Figure 1. Number of high-tech enterprises in the Yangtze River Delta in 2020

It is easy to see from Figure 1 that since 2018, the growth rate has been increasing. In 2020, the number of high-tech enterprises in the Yangtze River Delta has reached 73615, nearly 20 times that of 2013. This year, the state has vigorously pursued the Yangtze River Delta development policy, promoted the integration of the Yangtze River Delta region, and activated the city's innovation ability.

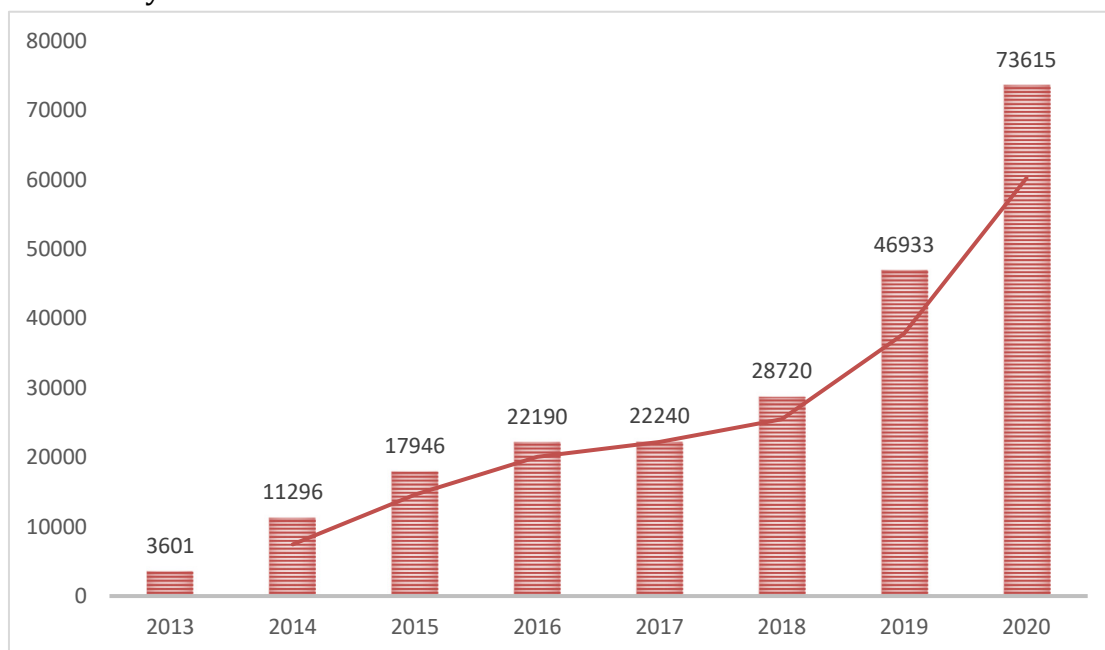


Figure 2. Number of high-tech enterprises in the Yangtze River Delta from 2013 to 2020

### 1.3. Close Connection and Reasonable Division of Labor

The cities in the Yangtze River Delta enjoy coordinated development, resource sharing, close ties and sound development momentum. Good industrial layout planning, industrial distribution pattern and industrial quantity matching can greatly promote the economic development of the city and build a circular pattern of industrial development. It can be seen from the figure below that the distribution of different industries of high-tech enterprises in the three provinces and one city of the Yangtze River Delta is relatively balanced, and the productive service industry in Shanghai has developed well, leading the manufacturing industry and other industries. Jiangsu Province, Zhejiang Province and Anhui Province are relatively leading in manufacturing industry. Comparatively speaking, the manufacturing industry and producer services in Jiangsu Province are higher than those in other regions of the Yangtze River Delta. Anhui's manufacturing, producer services and other industries need further development space.

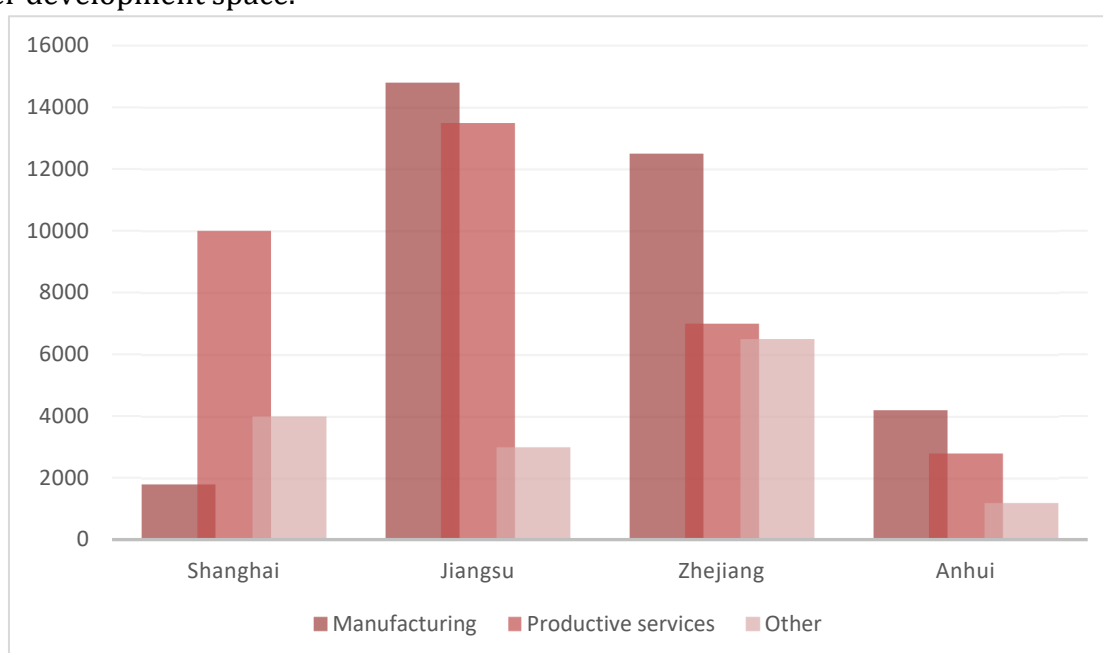


Figure 3. Distribution of different industries of high-tech enterprises in the Yangtze River Delta

### 1.4. Perfect Facilities and Win-Win Communication

Cities in the Yangtze River Delta have stepped up infrastructure construction to ensure high-quality economic development. The infrastructure construction in the Yangtze River Delta region is conducive to resource sharing among cities to achieve interoperability and win-win results. The Yangtze River Delta region actively responded to the call of national policies. We have made great achievements in implementing the national strategy. Among them, Anhui Province has made great contributions to the Yangtze River Delta transportation interconnection.

In promoting the construction of existing infrastructure, we will adjust the structure, complement the weaknesses, and optimize and upgrade. It also focuses on the construction of new information and intelligent infrastructure to provide a solid foundation for the integrated development of the Yangtze River Delta.

### 1.5. Attach Importance to Resources and Environmental Protection

Economic development needs to develop together with the environment. The short-term benefits brought by economic development should not be ignored while the long-term benefits brought by environmental resources. In order to realize the green development of economy,

the Yangtze River Delta region vigorously renovates the environment, reduces pollution and improves the environment. Many cities also actively promote environmental protection related knowledge, green travel concept, etc., aiming to improve the environmental protection awareness of the whole people and rectify environmental pollution from the source.

In recent years, the environmental governance in the Yangtze River Delta has achieved good results. According to data, the average concentration of PM2.5 in the Yangtze River Delta in 2021 will be 31 micrograms/m<sup>3</sup>, a decrease compared with 2020. The proportion of excellent days in the Yangtze River Delta is 86.7% on average, 1.6 percentage points higher than that in 2020.

### 1.6. Focus on People's Livelihood and Improve Service

The people's happiness is the goal of national development. The country is tirelessly implementing corresponding strategic policies for this goal. Since 2022, China has entered an aging society from an aging society, and the number of elderly people has increased dramatically, which undoubtedly brings pressure to the development of the region. In this regard, the Yangtze River Delta region actively responds to the national pension welfare policy, adapts measures to local conditions, implements a new pension service model, improves medical infrastructure, and builds a good pension service system.

It can be seen from the table below that the medical level of central cities in different regions is different. In the process of building a new elderly care model integration, it is necessary to take into account the infrastructure level of different cities, achieve common development and seek benefits for the people's livelihood according to the local elderly care and medical needs.

**Table 2.** Indicators of medical system in Hefei, Hangzhou and Nanjing

City	Index	2018	2019	2020	2021
Hefei	Number of hospitals	470	462	172	171
	Number of licensed (assistant) physicians/10000	1.77	1.93	2.1	2.23
Nanjing	Number of hospitals	333	365	302	316
	Number of licensed (assistant) physicians/10000	3.48	3.82	4.18	4.49
Hefei	Number of hospitals	213	225	220	222
	Number of licensed (assistant) physicians/10000	2.23	2.53	2.81	3.16

## 2. Literature Review

Liu Naiquan et al. (2017) found that the expansion of the Yangtze River Delta in 2010 will promote the economic growth of the entire urban agglomeration; Zhao Lingdi (2019) pointed out that the integration of the Yangtze River Delta should aim at the two-way integration of economic environment, and the formulation and implementation of expansion policies should fully consider the coordinated development of economic environment. It can be seen from the above scholars' research on the expansion of the Yangtze River Delta that most of them take the expansion of the Yangtze River Delta as a quasi natural experiment and use qualitative or quantitative analysis methods to study the economic development and environmental effects of the expansion of the Yangtze River Delta. This topic is based on the research results of various scholars, combined with the expansion policy of the Yangtze River Delta under the new era background, and explores the path of common prosperity from political, economic and cultural perspectives, and draws scientific conclusions.

As the guide and key policy of regional integration, the expansion policy is a necessary means to break through the barriers of regional and municipal segmentation, and also a key means to achieve common prosperity. The domestic and foreign academic research on the regional integration of the Yangtze River Delta mainly focuses on the environmental effects and

economic development. Few scholars pay attention to the research on the impact of the expansion of the Yangtze River Delta on common prosperity, ignoring the significant impact of the expansion policy of the Yangtze River Delta on common prosperity under the international situation of high-quality economic development driven by innovation.

### 3. Analysis of the Impact of the Yangtze River Delta Expansion Policy

#### 3.1. Theoretical Analysis

The expansion of the Yangtze River Delta has broken the regional barriers and promoted the flow of talents between regions. Human capital optimizes the production process and improves the personal productivity of workers by improving the education level of workers. Human capital absorbs foreign advanced technology, promotes the upgrading of the economy and industrial structure, and indirectly drives economic growth. Technological progress is the internal power of sustainable economic growth. The expansion of the Yangtze River Delta has increased investment in urban R&D and innovation, which is conducive to technological progress. Technological progress is the source and power of economic growth. The expansion of the Yangtze River Delta has strengthened scientific and technological exchanges in the Yangtze River Delta region, not only has more scientific and technological talents circulated to each other, providing a source of vitality for regional scientific and technological development, but also makes up for the irrational distribution of regional enterprise echelons, insufficient scientific and research support and other defects. Moreover, the expansion of the Yangtze River Delta has optimized the scientific and technological ecology in the Yangtze River Delta region, and strengthened technical communication and integration, The scientific and technological level of the city has been improved. The impact of trade opening on the quality of economic growth is mainly reflected in the externalities of technology, economies of scale and ecological exchange effects. Knowledge spillover is an important driving force for innovation growth. The impact of trade opening on the quality of economic growth is mainly reflected in the externalities of technology, economies of scale and ecological exchange effects. The expansion of the Yangtze River Delta has strengthened the externality of technology, formed economies of scale, expanded the market scale, created a good ecology for the technological innovation of enterprises, and made the technology of enterprises move to the forefront of the world, forming a guiding role. Focusing on the research on the impact of the expansion of the Yangtze River Delta on common prosperity, this paper proposes a hypothesis from the economic, cultural and political levels: the expansion of the Yangtze River Delta promotes common prosperity.

#### 3.2. Synthetic Control Method

##### 3.2.1. Model Setting

Suppose that the per capita GDP data  $Y_{i,t}$  of  $P+1$  cities in the  $T$  period can be observed, where the first city is the target city for the implementation of the Yangtze River Delta expansion strategy, the remaining  $P$  regions are the control cities that have not implemented the Yangtze River Delta expansion strategy, and the first city is in the  $T_0$  period\_ Implementation of Yangtze River Delta expansion strategy in the period of  $T_0$  meets  $1 \leq T_0 < T$  other regions as the control group without implementing the Yangtze River Delta expansion strategy, define  $Y_{i,t}^1$  is the potential result of city  $i$ 's implementation of the Yangtze River Delta expansion strategy in the period  $Y_{i,t}^0$  is the potential result of the city  $i$ 's failure to implement the Yangtze River Delta expansion strategy in the period  $t$ , thus obtaining the public.

$$\tau_{i,t} = Y_{i,t}^1 - Y_{i,t}^0, \quad i = 1, \dots, P + 1, \quad t = 1, \dots, T$$

The causal effect of the first city's implementation strategy is  $((\tau_{1,T_0+1}, \dots, \tau_{1,T}))$  for  $t > T_0$  has:

$$\tau_{1,t} = Y_{1,t}^1 - Y_{1,t}^0 = Y_{1,t} - Y_{1,t}^0$$

In order to estimate the counterfactual results of City 1, the benchmark model is introduced:

$$Y_{i,t}^0 = \delta_t + \theta_t Z_i + \lambda_t \mu_i + \varepsilon_{i,t}, \quad i = 1, \dots, P + 1, \quad t = 1, \dots, T$$

In equation (3),  $\delta_t$  is the unobservable fixed effect of a specific city,  $Z_i$  is an observable variable that is not affected by policies or changes over time,  $\theta_t$  is the unknown coefficient vector,  $\varepsilon_{i,t}$  are all instantaneous impacts that cannot be observed in the sample cities.

Use the above formula to compare  $Y_{i,t}^1$  is estimated, and the weight vector  $W = (w_2, \dots, w_{P+1})$  is constructed, satisfying  $w_i > 0, \quad i = 2, \dots, P + 1$  and  $w_2 + \dots + w_{P+1} = 1$ , each specific weight vector  $W$  represents the composite control combination, and the resulting composite control model is as follows:

$$\sum_{i=2}^{P+1} w_i Y_{i,t} = \delta_t + \theta_t \sum_{i=2}^{P+1} w_i Z_i + \lambda_t \sum_{i=2}^{P+1} w_i \mu_i + \sum_{i=2}^{P+1} \varepsilon_{i,t}$$

Suppose there is a vector  $W^* = (w_2^*, \dots, w_{P+1}^*)$ , so that

$$\sum_{i=2}^{P+1} w_i^* Z_i = Z_1$$

For any  $t \in [T_0, T]$ :

$$\sum_{i=2}^{P+1} w_i^* Y_{i,t} = Y_{1,t}$$

If  $\sum_{t=1}^{T_0} \lambda_t' \lambda_t$  is non singular, there are:

$$Y_{1,t}^0 - \sum_{i=2}^{P+1} w_i^* Y_{i,t} = \sum_{i=2}^{P+1} w_i^* \sum_{s=1}^{T_0} \lambda_t \left( \sum_{n=1}^{T_0} \lambda_n' \lambda_n \right)^{-1} \lambda_s' (\varepsilon_{i,s} - s_{1,s}) - \sum_{i=2}^{P+1} w_i^* (\varepsilon_{i,t} - \varepsilon_{1,t})$$

Abadie et al. proved that the left side of the above equation tends to be 0, so use  $\sum_{i=2}^{P+1} w_i^* Y_{i,t}$  can be replaced to obtain the policy intervention effect of intervention group city 1.

$$\hat{\tau}_{1,t} = Y_{1,t} - \sum_{i=2}^{P+1} w_i^* Y_{i,t}$$

### 3.2.2. Model Analysis

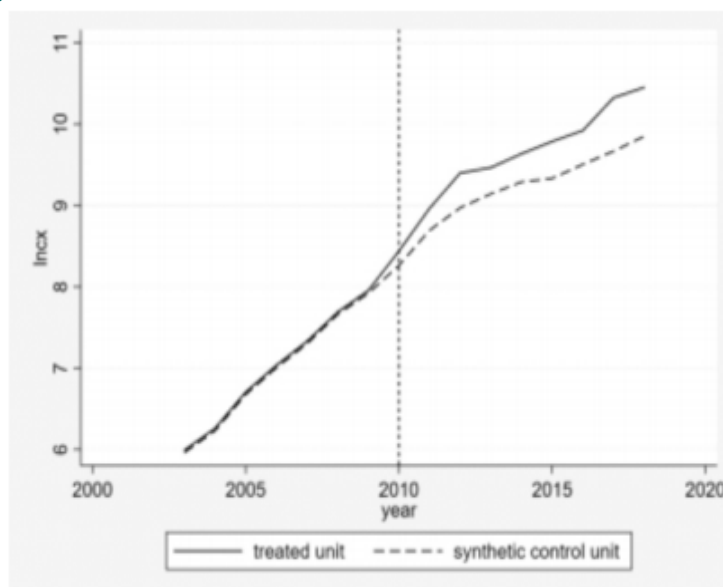


Figure 4. Overall City

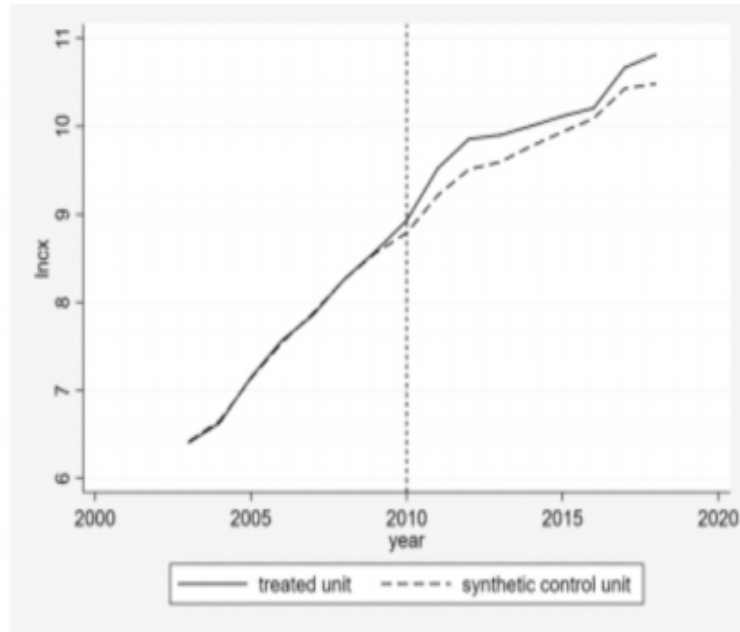


Figure 5. Original City

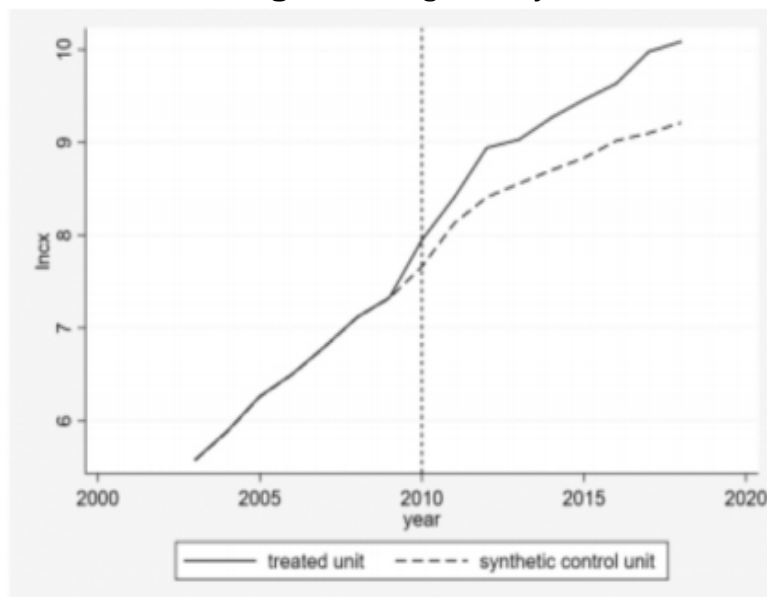


Figure 6. New Cities

According to the operation of Stata16, Figure 4 shows the change of GDP per capita between the target cities of the Yangtze River Delta expansion and the corresponding composite control cities from 2000 to 2020. The dotted line represents the composite GDP per capita, the solid line represents the actual GDP per capita, and the vertical dotted line represents the policy intervention time, which is set as 2010. It can be seen from Figure 4 that on the left side of the policy intervention time, the growth path of real GDP per capita almost coincides with that of synthetic GDP per capita, which indicates that synthetic control cities better fit the economic growth path of target cities before the implementation of the Yangtze River Delta expansion policy. On the right side of the policy intervention time, the two gradually deviated. The actual per capita GDP was significantly higher than the composite per capita GDP, which means that compared with the target cities that did not implement the expansion policy, the implementation of the expansion policy has greatly improved the per capita GDP of the target cities. It can be seen from Figures 5 and 6 that the per capita GDP growth rate of new cities is greater than that of the original cities, indicating that the Yangtze River Delta expansion strategy can improve the economic development level of cities.

## 4. Urban Development and Revitalization Path in Other Regions of the Yangtze River Delta

Anhui Province has made outstanding contributions and made outstanding achievements in promoting the development of the Yangtze River Delta region. Although there is still a big gap between the economic development of Anhui Province and other cities, we believe that with the continuous efforts of the people of Anhui Province, the total economic volume of the province will continue to improve. Therefore, according to the research of Anhui Province in the process of regional integration development in the Yangtze River Delta, we propose the following revitalization paths for the urban development in other regions of the Yangtze River Delta based on the positioning of Jiangsu, Zhejiang and Shanghai in the regional development of the Yangtze River Delta.

### 4.1. Work Hard to Support the Development of the Yangtze River Delta Region

As the backbone of the development of the Yangtze River Delta region, Jiangsu's economic development has always been in the forefront of the country. Its economic level has been stable, and it has continued to grow. Its industrial structure has been constantly optimized, and it has also made outstanding contributions to high-tech industries. In the future, in the integrated development of the Yangtze River Delta, Jiangsu should give full play to its own advantages, show its role in the in-depth development of the Yangtze River Delta, and further optimize the industrial structure and resource allocation of the Yangtze River Delta. We will improve relevant laws and regulations, relax the system of market access conditions, make Jiangsu contributions to the market integration of the Yangtze River Delta region, achieve policy interoperability among the three provinces and one city, eliminate institutional barriers between resource elements, and achieve resource interoperability and mutual benefit.

### 4.2. As a Demonstration Area for Common Prosperity to Support the Development of the Yangtze River Delta Region

Since Zhejiang Province is a demonstration area for high-quality development and construction of common prosperity in China, it is sufficient to show that the prosperity of Zhejiang is the common prosperity of the people of the whole province. Therefore, Zhejiang should give full play to the comparative advantages of each region in the province, and accelerate the formation of the overall pattern of regional coordinated development of "one bay leading, two wings improving, four poles radiating, and the whole region beautiful". Through exchanges and cooperation, Zhejiang contributes to the coordinated development of the Yangtze River Delta region. For example, Zhejiang Province can make full use of the markets and resources in Shanghai, Jiangsu and Anhui, encourage enterprises in the province to develop good competition and cooperation with industries in surrounding areas, promote mutual growth, give play to the advantages of light manufacturing in the province, and actively explore a development path that is more conducive to the characteristics of industrial development in the province.

### 4.3. To Lead the Development of the Yangtze River Delta as a Leader

Shanghai has always been a leader in the integrated development of the Yangtze River Delta, playing a very important role as a model and leader. Since the reform and opening up, Shanghai has constantly seized the opportunity to develop itself, reflecting Shanghai's spirit of daring to try. At present, Shanghai has become an international metropolis, so starting from a new starting point, Shanghai needs to further improve its ability to open up and cooperate with the outside world. We will improve the financial service enterprise system and attract foreign capital. At the same time, Shanghai has assumed greater responsibility and mission in the integrated development of the Yangtze River Delta region, played its leading role as a central



city, promoted the continuous improvement of the scientific and technological innovation capacity of surrounding provinces and cities, improved the development of relevant industrial chains, and actively built a world oriented industrial cluster in the Yangtze River Delta region to promote the realization of the goal of common prosperity in China.

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