

Analysis on the Intergovernmental Dynamics during the Formation of China's Mega-region using Social Preference Theory

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ABSTRACT

This paper introduces social preference theory into the research of horizontal intergovernmental relationship in Mega-region in order to better reveal the micro motivations of local governments in forming the intergovernmental relationship during regional integration process. Through model construction, we argue that local government not only stand on their local interests, but also have specific social preferences (“sense of ownership” and “political reputation”) when choosing their interactive game strategy to compete or cooperate during the regional integration process within Mega-region, and there exists some social factors influencing the strength of social preferences. We also make a case study on the regional integration process of Yangtze River Delta to prove our hypothesis.

Keywords: horizontal intergovernmental relationship, social preference theory, economic integration, regional cooperation, Mega-region, Yangtze River Delta.

1. INTRODUCTION

1.1. Background

With the development of China's economy and society and its increasing participation in globalization process, it is more and more important to break the limit of administrative boundary and promote the regional economic integration process in order to build up urban agglomeration economy and enhance the overall competitiveness of all regions in China. And regional coordinated development strategy has become one of the most important development strategies in the new era. To achieve this goal, good cooperation among local governments is indispensable. Currently, many scholars have studied the essential connotation and mechanism about horizontal intergovernmental relationship, such as micro motivations, institutional structure and the economic space evolution for intergovernmental coordination among local governments. But most of those researches focus on government interests or macro institutions.

This paper attempts to introduce social preference theory to explain the micro motivation during the evolution of intergovernmental relationship among local

governments in the regional coordinated development process in Mega-region, such as government thinking, social network and cultural identity, hence to deepen the research on horizontal intergovernmental relationship. In addition, since China is on a fast lane to develop its own Mega-region, a case study about the regional coordinated development process in the Yangtze River Delta can provide more enlightenment for establishing a good government cooperation network during the formation process of China's Mega-region and lead to more policy suggestions.

1.2. Literature Review

1.2.1. The Social Preference Theory

For a very long time, the mainstream economic model presupposes that people are selfish and rational and pursues for the maximization of their own interests. However, the development of behavioural economics and experimental economics recent years points out prosocial behaviour are widely existed, and challenges the Economic Man hypothesis. For example, in the ultimatum game, the responder may reject a positive distribution offer [2]; in the dictator game, the dictator

offers positive amounts [3]; in the trust game, investors will make investment for trustees and trustees will repay for it [4]; in the gift exchange game, reciprocal behaviour appears for both participators [5]; and in the public good game, coordinated behaviours also appears [6]. These series of game experiments show strong evidence to reject the Economic Man hypothesis, and gave birth to the social preference theory.

The core of social preference theory is that people not only care about their own interests when making decisions, but are also affected by factors such as their emotions, past experiences, other people's gains and so on. And people's social preferences, such as altruism, equity and reciprocity preference, are also important components of their utility function. By incorporating these preferences into people's utility function as a modification of the Economic Man hypothesis, and use game theory model to construct game equilibrium, the social preference theory reveals people's motivation to make decisions. Therefore, this theory is widely used in the study of collective action problems, incentive mechanism design, institution reform and so on.

1.2.2. Theories Of Horizontal Intergovernmental Relationship Among Local Governments

The horizontal intergovernmental relationship is the intergovernmental relationship among local governments with equal status. This relationship is dominated by competition and corporation. Researches about the horizontal intergovernmental relationship stems from the gradual prosperity of metropolitan economies in western countries since the 1950s-60s. During this period, public choice theory became well-known, and the concepts of administrative decentralization and polycentric governance were increasingly accepted by governments all over the world. As so, local governments gradually become the main body in implementing public policies, and interactions among local governments has also been strengthened.

The micro base of the theoretical research on horizontal intergovernmental relationship lies in the assumption that local government can be seen as rational agents and public resources are scarce. On the one hand, local governments, as public policy makers and implementers, are bounded by the actions of political voters to "vote by feet" and "vote by hands", as well as the pursuit of their own political interests. So, they will take the maximization of local interests as their action goal, and compete with each other to achieve it. On the other hand, with the development of economy, regional linkages are strengthened and regional market becomes more integrated, which increase the importance of the provision of regional public goods. The potential positive spillover effect and scale economy brought by regional cooperation have been gradually strengthened, while if local governments act in their own way, problems such

as negative externalities, repeated construction, fragmentation of public good provision appear. The overlapping of the above two opposite forces gave birth to the contradiction between the micro self-interest of horizontal local governments and the collective macro rationality, and brought about the collective action problem in public goods provision across administrative regions: rational local governments are more willing to share the benefits of regional public goods in the way of "free riding", rather than actively and voluntarily enhance intergovernmental coordination and cooperation.

The decentralization reform brought about by reform and opening up has also given Chinese local governments greater discretion power. Under the Chinese-style market-maintenance federal framework, local governments take the main responsibility to deal with economic affairs and local public goods provision within their jurisdiction, and their government spending capacity is closely linked to their government income. Meanwhile, the official promotion evaluation mechanism implemented by central government makes all local officials face the pressure of Political Tournament(Appendix-Terminology). Coupled with the national development strategy of focus on economic construction, we can see that the behavior of Chinese local governments has an obvious trend of interest orientation. Therefore, the research on intergovernmental relationship between horizontal local governments in Chinese academic circles mostly focuses on the government competition and cooperation game under the premise of interest maximization. Xie Qingkui [7] argues that the core of intergovernmental relationship is first and foremost an interest relationship. Ding Huang [8], Xie Wei & Jiang Yungen [9], Tian Qianshan [10], Song Linlin & Peng Fengmin [11], and Wang Yusheng [12] all thought of that the formation of horizontal intergovernmental relationship is through the game among local governments to maximized each of their benefits. Cui Lili [13] proposed that local governments always pursue for maximize local interests when implementing public policies, hence free-rider problem appears and leads to policy block. And Wang Weiquan [14] pointed out that localism and local protectionism are main obstacles to achieve regional cooperation among local governments.

1.2.3. Social Motivations of Intergovernmental Cooperation in Mega-region

However, although the Economic Man hypothesis has been applied to many studies on horizontal intergovernmental relationship among local governments, we can still observe the tendency of intergovernmental coordination and cooperation among many local governments in the development of metropolitan areas and urban agglomerations within Mega-region, such as the New York Metropolitan Planning Organization and

its Civilian Regional Planning Association. In China, spatial development policies of many local governments have gradually changed from decentralized urban competition strategy to coordinated development strategy of regional urban agglomerations, and Mega-regions such as Pearl River Delta and Yangtze River Delta have developed closely related urban agglomerations and metropolitan areas.

Meanwhile, further studies on collective action problem show that the formation of horizontal intergovernmental competition-cooperation relationship is affected by factors beyond the Economic Man hypothesis. Olson [15] points out that the public identity of cooperative groups will affect the strategies of members of collective actions. Ostrom [16] regards collective members as individuals with bounded rationality who have the willingness to solve the dilemma by their own force and the capabilities to participate and change the binding regulations. North [17] put bounded rationality as a premise and point out the effectiveness of ideology of individuals and the group morality and contract constraints on restricting those destructive behavior on collective actions. Putnam [18] uses the concept of social capital (Appendix-Terminology) to demonstrate the importance of social networking, social relationships, trusts and other social institutions in solving the collective action problem. Richard Feiock synthesizes these discussions and applies them to the analysis of metropolitan governance in his book *Metropolitan Governance: Conflict, Competition, and Cooperation* [19]. He proposed the institutional collective action theory: local government are been regarded as composite actor defined by institutionally determined position, authority and aggregation rules. Its ability to make strategic actions depends on the preference of group members and the capability to solve the conflicts among different members' preference. And its expected gains by participating regional cooperation are mainly include the collective gains (efficiency improvement, economies of scale, resolving externalities, etc.) and selective gains (reputation, trusts, status, social capitals, etc.) When there are common policy objectives in the region, active initiatives by policy entrepreneurs, and existing systems, organizations and groups that can be used to pursue regional objectives, it is easier to form a regional governance system.

1.3 Research Prospect

Based on the above existing theoretical framework, this paper holds that the horizontal intergovernmental relationship among local governments is essentially a dynamic competition and cooperation game relationship which dominated by local governments' own interests while been affected by a series of social factors at the same time. Introducing social preference theory as an explanation angle can help to reveal the social motivation

in local government's interactive game strategy (choose to compete or cooperate, and decide the degree to cooperate) during decision-making process, hence to better explore the impact of social factors on horizontal intergovernmental relationship.

Specifically, local government in the Mega-region are not only stand on their local interests, but also need to take the larger social space of the Mega-region into consideration when they interact and make decisions. Members in this larger social space usually have close economic ties, including frequent flow of goods, capitals, information and talents, the coupling development of industrial clusters, the gradient urban economic radiation network with one or more core cities, and so on. Also, due to their close geographical connection, they often have common regional history and culture, which to some degree help them to form a sense of regional identity. The recognition on common regional identity makes the interactive game strategy of these local governments not only be driven by their local interests, but also be affected by the actions of other local governments in the region. That is, they have specific social preferences. When there are regional policy objectives, the sense of ownership brought by regional identity will encourage local governments to pay more for common policy objectives (hereinafter referred to as "sense of ownership"). Meanwhile, when a local government makes significantly less policy efforts than others, other local governments will also feel unfair and exert pressure on the government's political reputation, and been afraid of this pressure, local government choose to work for the regional goal (hereinafter referred to as "political reputation").

In addition to the above, a series of social factors will influence the strength of local government's social preferences, hence influence local government's interactive game strategy. Mainly, there are three social factors influence the strength of social preference the most. The first is social networking, including culture tie, economic linkages between enterprises and individuals in the region, structures system of urban agglomerations and so on. Strong social networking makes the tie among local governments as well as ties between local governments and other social subjects in Mega-region closer, hence strengthen the sense of social identity. Closer tie means more political pressure when government doing few in reaching regional common goals, and local government are to somehow more responsible to the regional development to maintain this networking. The second is government thinking. A group of cities with opener mind to regional cooperation and more positive attitudes to metropolitan agglomeration strategy can help to bring about more sense of ownership, therefore improve regional cooperation. Also, if government expect other take the same attitude of no regional cooperation, they will also expect no loss of political reputation if not cooperate. The third is regional

coordination mechanism. Good regional coordination mechanism, organization and regulations unite government together and bind government to cooperate in order to avoid reputation or other forms of punishments, which strengthen the foundation for both social preferences.

Next, based on the above social preferences, this paper will construct models and make case study to further research on the interactive game strategy of local governments in Mega-region. In the second part of the paper, a social preference model of local governments based on public goods game will be constructed. And based on this model, we will propose relevant propositions and analysis main influencing social factors. In the third part, we will focus on the case of how horizontal intergovernmental relationship change during the integration process of Yangtze River Delta, in order to verify our hypothesis.

2. MODEL CONSTRUCTION

To further research on the interactive game strategy of local government, this paper chooses city government as the research objects and construct basic public good game model below.

Suppose there are n cities in a certain region and each of these city governments have y units of endowments (including their disposable financial income, local economic resources, their discretion power on local economic affairs etc.). And suppose these city governments can choose their own strategies on how much to invest on local or regional public goods. Assume city government i invest g_i unit on regional public goods where its marginal return from local public good investment is generalized as 1 and the constant marginal return from public good investment is denoted as a, we can demonstrate the utility function of this city government i as following:

$$U_i = y - g_i + a \sum_{j=1}^n g_j, \left(\frac{1}{n} < a < 1\right)$$

In this model, U_i is the benefit city government get from investment. Obviously, if $a > 1$, since the marginal return by investing on regional public goods is larger than the marginal return from domestic investment, the city government will definitely choose to cooperate and the collective action problem does not exist. On the other hand, if $a < \frac{1}{n}$, even if all city governments in the region choose to cooperate, they still cannot get larger benefits comparing with investing on local public goods and there is no possibility to cooperate. To focus on what we investigated, we set $\frac{1}{n} < a < 1$. Under this premise, we can clearly see the collective action problem in regional cooperation: the aggregate utility is maximized if each player chooses $g_i = y$. However, a marginal investment into public good causes a utility loss of (1-a), hence the

dominant strategy is to choose $g_i = 0$ for all city governments if they only care about their local interest ($g_i = 0$ for all $i \in \{1, \dots, n\}$).

Now we put the two social preferences introduced in the first part of this paper into the above public good game model and get the following utility function:

$$U_i = y - g_i + a \sum_{j=1}^n g_j - \frac{\alpha_i}{n-1} \sum_{j \neq i}^n \max\{g_j - g_i, 0\} + \frac{\beta_i}{n-1} \sum_{j \neq i}^n \max\{g_i - g_j, 0\}$$

In this utility function, the social preference of "political reputation" is represented by the expression of $-\frac{\alpha_i}{n-1} \sum_{j \neq i}^n \max\{g_j - g_i, 0\}$, and the social preference of "sense of ownership" is represented by the expression of $\frac{\beta_i}{n-1} \sum_{j \neq i}^n \max\{g_i - g_j, 0\}$.

Based on the above model to deduce the interactive game strategy of local governments, we get the following two propositions (Appendix- Proof of proposition):

1.If a city government satisfies $a + \alpha_i < 1$ and $\alpha_i > \beta_i$, then it is a dominant strategy for that player to choose $g_i = 0$. Under this situation, it is a unique equilibrium for all players $i \in \{1, \dots, n\}$ to choose $g_i = 0$

2.Assume no player in the group satisfies $a + \alpha_i < 1$ and $\alpha_i > \beta_i$. If some players satisfy $a + \beta_i < 1$ and $\alpha_i < \beta_i$, it is a dominant strategy for those players to choose $g_i = 0$.

In this case, let k denote the number of players with $a + \beta_i < 1$ and $\alpha_i < \beta_i$, we have:

a) If $(\beta_i - \alpha_i)k < (a + \alpha_i - 1)(1 - n)$, then it is a unique equilibrium for all players $i \in \{1, \dots, n\}$ to choose $g_i = 0$.

b) If not, then there do exist other equilibria with positive contribution levels. In these equilibria all k players with $a + \beta_i < 1$ and $\alpha_i < \beta_i$ must choose $g_i = 0$ while other players contribute $g_j = g \in (0, y]$.

The basic intuitions behind above propositions are like the following: both of the term α_i and β_i note the marginal non-pecuniary benefits city governments can get if choose cooperation. Sorting by taking which term as the main motivation force, we have two possibilities:

For $\alpha_i > \beta_i$, the main social preference for city governments to cooperate is dominated by the "political reputation", since by spending 1 unit of endowment on public investment, the city government get a units as monetary return and at most α_i unit of non-pecuniary benefits. When $a + \alpha_i < 1$, the non-pecuniary benefits from the "political reputation" are not enough to cover the opportunity cost by switching from local investment to regional goal satisfaction. This may because city government think there is no need to obey the binding force of regional cooperation framework, the social tie is

too weak to pose political pressure on city government, and so on. But whatever it is, the dominant strategy for the city government is to contribute nothing. Further, other cities will suffer too much from free-riders and they will not choose to cooperate either.

For $\alpha_i < \beta_i$, the main social preference for city governments to cooperate is dominated by the “sense of ownership”, since by spending 1 unit of endowment on public investment, the city government get a units as monetary return and at most β_i unit of non-pecuniary benefits. When $a + \beta_i < 1$, the non-pecuniary benefits from the “sense of ownership” are not enough to cover the opportunity cost by switching from local investment to regional goal satisfaction. This may because the regional tie is weak and city government are not keen on a more integrated region. And it is a dominant strategy for the city to contribute nothing. But under this situation, since city who want to contribute is motivated by a more endogenous power, these potential contributors are not very upset about the disadvantages given by free riders. So, if there are sufficient number of contributors satisfy $(\beta_i - \alpha_i)k > (a + \alpha_i - 1)(1 - n)$, cooperation can be sustained among themselves even if the other players do not contribute.

Therefore, through above propositions and their explanations, we argue that the relative strength of local government’s social preferences to its interest-maximization motivation has a large impact on the interactive game strategy of local governments. And during this process, the three main social factors mentioned before plays a role by influencing the strength of city government’s social preference.

3. CASE STUDY

3.1 Background

Yangtze River Delta is the 6th largest urban agglomeration worldwide, as well as the largest Economic Circle and one of the areas with the highest degree of economic and social development in China. With an area of 3.72% of China’s land area, it accounts for 16.7% of China’s total population and 24.1% of the total GDP of China. Its urbanization rate is 69.5%. Since it is located at the strategic intersection of the "One Belt One Road" region and the "Yangtze River Economic Belt" area, the Yangtze River Delta plays a pivotal and strategic role as the engine of economic development of China.

The concept of Yangtze River Delta originated from the concept of Jiangnan in Chinese history. With time change by, its core region also changes. Now, narrowly speaking, Yangtze River Delta includes 16 cities(Appendix-Terminology). While broadly speaking, according to the Yangtze River Delta Regional Integrated Development Plan [20], the range of Yangtze River Delta

includes Shanghai Municipality and three provinces (Jiangsu, Zhejiang and Anhui province), and its central area covers 27 cities (see figure below). Since our research focus on the time change analysis through the integration process of Yangtze River Delta, the case study will mainly focus on the narrowly defined Yangtze River Delta and refers to the broadly defined region, but will not restrict to a certain range.

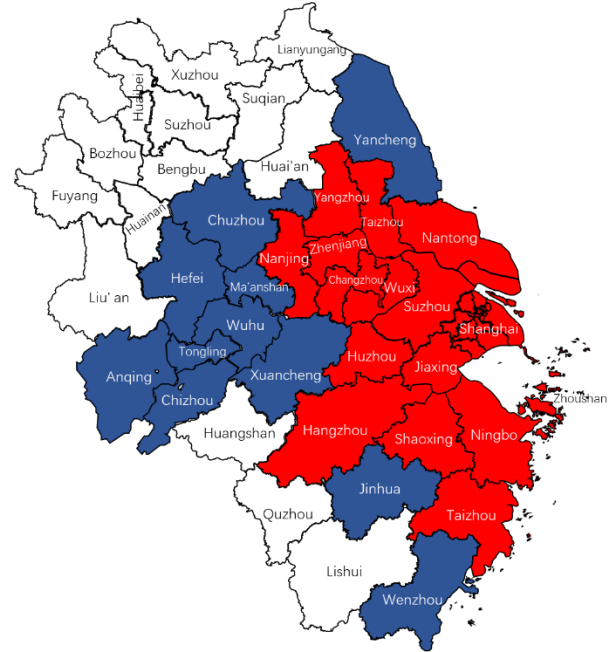


Figure 1 Map of Yangtze River Delta

(Red areas are Yangtze River Delta narrowly speaking, blue areas are added central areas of Yangtze River Delta broadly defined.)

Historically, Yangtze River Delta has been characterized by its near lands, close folks, kindred cultures and integrated economies, which means it have a sound base to develop into a Mega-region. The Jiangnan region in history has long been the core economic area of China, with frequent economic exchanges and close personnel exchanges. Moreover, cities in the core area of current Yangtze River Delta are mostly in the Wu-Yue cultural belt, and the same culture root brings about the sense of identity recognition. Therefore, as early as in the 1920s-1930s, there is a natural tendency of regional integration in Yangtze River Delta. With Shanghai’s opening of commercial port in 1842, it quickly became an international metropolis in early 20th century, and capitals, labors, agricultural goods and raw materials for light industries from the neighboring regions of Jiangsu and Zhejiang province had kept pouring into Shanghai. The free flow of factors of production led the integrated development of regional economy. Moving into the planned economy period in 1950s-1970s, a vertical division-of-labor system was established by central government and led by the East China Bureau in Shanghai in this region, with Shanghai focusing on the industry development and Jiangsu and

Zhejiang province focusing on the agriculture development. However, since central government dominated the resource allocation process, autonomous horizontal interactions and coordination are limited.

Since the reform and opening up in 1978, with the financial decentralization and the continuous transition of China's economic system from planned to market economy, the opportunity of regional integration in Yangtze River Delta re-appeared, and this integration process has continued to make new progress after then due to a series of events, such as the opening-up of Pudong new district in Shanghai, the holding of the World Expo, the introducing of Yangtze River Delta Integrated Development Strategy as a national strategy, and so on. During this development process, local city government adopt complicated and changeable interactive game strategy. On the one hand, interest competitions among local government became more and more fierce, obvious administrative boundary effects exists among cities and provinces, and collective action problems demonstrated by diseconomies of scale, negative externalities and so on still exist, which hinder the coordinated development process of the whole region. On the other hand, large progresses in horizontal government cooperation are achieved. Within the Yangtze River Delta, several hierarchical and structured metropolitan areas and urban agglomerations are developed, for example the Shanghai Metropolitan area, the Nanjing Metropolitan area, the Hangzhou Metropolitan area, the Suzhou-Wuxi-Changzhou urban agglomeration, as well as a series of industrial belts. And local governments have constantly explored the collaboration mechanisms in various fields such as transportation, economy and information, and established collaboration frameworks such as joint meeting and joint institutions. It can be said that although there are a series of twists and turns during the integration process, the intergovernmental relationship among local governments in Yangtze River Delta as a whole is gradually changing from complete competition to orderly cooperation.

Therefore, this paper thinks that the integration process of Yangtze River Delta since reform and opening up provides good cases to research on the change of horizontal intergovernmental relationship and the interactive game strategies taken by local government during this changing process. Next, we hope to make analysis on the interactive game strategy of local government through each stage during the integration process of Yangtze River Delta and to find proofs for our propositions and hypothesis.

3.2 Analysis on Each Stage during the Integration Process of Yangtze River Delta

This paper chooses the period from the start of China's reform and opening up (1978) to the set-up of

Yangtze River Delta Regional Cooperation Office in 2018 as the period for case study, and divided it into four periods. The first period (the stage of the formation of strategic competition relationship) starts from the reform and opening up in 1978 and ends in 1991. During this period, township collective economy and private economy (based on family) gradually grew up in Jiangsu and Zhejiang Province, while the Shanghai Economic Area experienced the process from its establishment to its abolishment. This is the first try for the coordinated development of Yangtze River Delta. The second period (the stage of the development of strategic competition relationship) starts form 1992 when 14 cities in Yangtze River Delta established a joint meeting for city cooperation and ends in 2001 (China joined WTO at the end of this year). During this period, due to the opening up of Shanghai Pudong New District, foreign capital quickly poured into Shanghai and the development of market economy speeded up the regional economic transfer process. Local governments at this period compete with each other to seize the development opportunity, and through their competition, they first realized the importance of regional cooperation. The third period (the stage of exploration of institutionalized competition-collaboration relationship) starts from 2002 and ends in 2008 in which the State Council established a "three-tier operation" regional collaboration mechanism framework to promote the regional integration of Yangtze River Delta. During this period, with the opportunities bring by China's joining of WTO and the smooth progress of preparatory work for holding the World Expo, local governments realized the important to seize the globalization opportunity and moved into the quick development period for regional cooperation. The narrowly-defined 16 cities in Yangtze River Delta were defined during this period. The fourth period (the stage of construction of institutionalized competition-collaboration relationship) starts from 2009 and ends in 2018 when the Yangtze River Delta Regional Cooperation Office was set up. During this period, central government put the regional integration of Yangtze River Delta into national development strategy and the regional cooperation moved into a high-quality development period.

3.2.1 The Stage of the Formation of Strategic Competition Relationship (1978-1991)

The 1978 reform and opening-up policy led to a transition from China's planned economic system to a planned commodity economy based on public ownership. On the one hand, to reduce the risk of reform, the policy started in China's rural areas and spread to small and medium-sized towns in late 1980s, which makes the township collective economy and private economy become the main force of economic reform and development in Yangtze River Delta. Leading by the Southern Jiangsu Model in which local grass-root-level

government as township collective enterprises representers directed local economic growth and the Wenzhou Model in which many small family businesses direct the local market economy, a large number of small and medium-sized economies are active in the market, carry out economic exchanges frequently, and launch fierce competitions in light industrial commodity market. On the other hand, the state-owned economic system in Shanghai was relaxed, and many state-owned enterprises and their skilled workers have carried out close exchanges with emerging small and medium-sized enterprises in the region. New inter-enterprise interaction model of technology and industrial transfer was formed in the form of "Horizontal Alliance", "Sunday Engineers" and "Brand Sharing" and so on, and there is even formed a jointly-operated enterprise cooperation system characterized by urban-rural vertical division of labour. Meanwhile, the central government's fiscal decentralization and the new pattern of reform and opening up in coastal areas have expanded the discretion power of local governments. In order to strive for competitive advantage for local development, local protectionism has sprung up, and there has been a multi-level networking segmentation pattern of social economy under the "block economy". Each "block" is relatively closed, resulting in the obstruction of factor flow and the difficulty in cross-regional factor allocation, which build up administrative barriers and hinder the integrated regional development. The relationship between local governments in the Yangtze River Delta was also dominated by competition during this period.

Based on this background, the central government tried to promote regional integration in Yangtze River Delta and put forward a horizontal alliance system. In 1982, it approved the establishment of Shanghai Economic Zone with ten cities around Shanghai as members, (Shanghai; Suzhou, Wuxi, Changzhou, Nantong, Hangzhou, Jiaxing, Huzhou, Ningbo and Shaoxing). This economic zone then expanded to five provinces and one city (Jiangsu Province, Zhejiang Province, Anhui Province, Jiangxi Province, Fujian Province, Shanghai Municipality). However, the overall planning and coordination function of this economic zone soon tended to be weakened and marginalized, and it was finally abolished in 1988.

The reasons behind the short-lived Shanghai Economic Zone reflected the local government interactive game strategies and social factors behind to a great extent. Firstly, due to the influence of the main economic development model (decentralization plus market-oriented competition) in this period, local government interests became rigid and the pursuit for maximizing interests became an overwhelming trend. Competitions among local government also became fiercer. Secondly, local government worried about that the regional integration strategy will bring all localities back to the relatively fixed regional division-of-labor

system in the era of planned economy, so they held a strong sense of vigilance and distrust for regional cooperation. Even Shanghai, as the core city of the region, has held the introverted idea of "not being the leader of the alliance and not being the first" in a long period of time [21]. Thirdly, there was a trend of trade-offs between the market-oriented economic development model represented by township collective enterprises and private enterprises and the state-owned economic system represented by those state-owned enterprises in Shanghai during this period. The old vertical division-of-labour system was gradually replaced by the horizontal market-oriented competition system, resulting in the dissolution of the original social network, while the new social network is still under reconstruction. This makes Shanghai's leading status very unstable (Appendix-Terminology) [22], causing regional cooperation lacked focus and cohesion. Fourthly, the planning office of Shanghai Economic Zone was a consultative platform and planning research institution. It did not have administrative functions, and its authority and administrative regulation were also not enough to promote regional cooperation (Appendix-Terminology) [23]. Fifthly, the excessive expansion of Shanghai Economic Zone made different regions with weak geographical ties and large cultural differences gather under one banner, which significantly increase the cost of communication and coordination.

But even through intergovernmental competition is the mainstream during this period, we can also see some small-scale regional cooperation within Yangtze River Delta. For example, Nanjing proposed to held a regional economic coordination meeting in 1986 and 16 cities from three provinces (Jiangsu, Anhui and Jiangxi province) joined this meeting. In the same year, four cities in Zhejiang Province established a fellowship association for cooperation and this association was upgraded in 1986 to a mayoral joint meeting. We can also see that although the Shanghai Economic Zone was at last abolished, it still provided many conveniences for those township collective enterprise and family businesses to make use of Shanghai's economic resources (mainly resources from Shanghai's state-owned enterprises). The tendency of intergovernmental coordination is gradually emerging through competition.

3.2.2 the Stage of the Development of Strategic Competition Relationship (1992-2001)

The development and opening up of Shanghai's Pudong New District in 1990s provided an important opportunity for the development and opening up of Shanghai Pudong New Area in the 1990s provided a major opportunity for the mutual integration and coordinated development of Yangtze River Delta and brought the second wave of regional cooperation. Although the mainstream of intergovernmental

relationship among local governments in this period is still competition, and phenomenon such as administrative barriers, market segmentation, industrial isomorphism, rat race for foreign capital, development fragmentation and so on were still widely exist among cities in the Yangtze River Delta, the prelude of intergovernmental cooperation has been launched.

Firstly, the horizontal market-oriented competition model in the Yangtze River Delta gradually became stable. The decision of Pudong's development and opening up has greatly promoted Shanghai's own market-oriented economic reform. Measures including reform of state-owned enterprises, regional market construction and industrial integration promotion had been implemented to build up a diversified and high-quality market system in line with international standards and to turn Shanghai into an international economic centre city. At the same time, enterprises in Jiangsu and Zhejiang provinces also began to improve their degree of marketization and strive to be bigger, better and stronger. The reform of enterprises includes a series of property rights and modern enterprise management system reforms of township collective enterprises under the "new Southern Jiangsu model", as well as the joint-stock cooperation system reform of enterprises under the "New Wenzhou model" in Zhejiang province. These series of market-oriented reforms have greatly promoted the development of regional enterprises and formed more complex market and social network(Appendix-Terminology)[23], and those enterprises released a lot of demand for regional integration and promoted the government to carry out regional cooperation.

Secondly, Shanghai's leading position has been gradually consolidated, and a hierarchical network of urban agglomeration in the region has begun to take shape during this period. A large number of foreign capitals poured into Shanghai with the development and opening up of Pudong, and meanwhile, due to the relative surplus of the domestic market at this time, the development model in Yangtze River Delta began to turn to export-oriented economic model. Among them, cities in the Southern part of Jiangsu province began to turn its original technology transfer channel between state-owned enterprises in Shanghai and its own township collective enterprises into a larger industrial platform in order to undertake Shanghai's foreign capitals and resources, as well as setting up a large number of Industrial Parks(Appendix-Terminology). While in Zhejiang province, many cities tried to use those famous brands in Shanghai to make their private enterprises to "go global". All of those measures made the connection among Shanghai and other cities in Yangtze River Delta much more strengthened. Although the main purpose of local city governments is still to compete for foreign capital and maximize local benefits, huge number of economic resources made them to consider improving their mutual cooperation in industrial development in

order to optimize economic layout and realize a win-win situation. The urban agglomeration networking system in the region had gradually formed.

Thirdly, based on the formation of urban agglomeration networking system, the views of local city governments on cooperative development also began to change. First, node cities in Yangtze River Delta, such as Suzhou and Nanjing, hope to change the fragmented development pattern and form its own metropolitan area. The leading city, Shanghai, had firstly put forward a bidding subject of "Shanghai and the coordinated development strategy in Yangtze River Delta" to scholars when formulating its 10th five-year plan in 1999[21]. In addition, small cities and towns in Yangtze River Delta want to develop their block economy from bottom to top, and they need the benefits bring by regional cooperation. Therefore, the attitude of city governments towards cooperative development is no longer as vigilant and distrustful as in the previous stage.

In this context, in 1992, after fully learning the lessons of the failure of the Shanghai Economic Zone, a mayoral joint meeting system covering 14 cities in Yangtze River Delta for regional cooperation was established, and these cities held centralized discussions on how to break the administrative boundary and better promote regional cooperation and agreed that regional economic cooperation should be more organized and coordinated. Although issues this joint meeting system can coordinate is still limited, and the power of the system is not really strong, but it kept operating stably since then. In 1997, this system was upgraded into the Yangtze River Delta Urban Economic Coordination Committee, and its member included the original 14 cities and Taizhou in Jiangsu province who just separated from Yangzhou as an independent city. It adopted the Articles of Association of the Yangtze River Delta Urban Economic Coordination Committee which systematically specifies and expounds the basic purpose, principles, tasks, organizational structure and activity forms of the committee and determines to hold a mayor's meeting every two years. The Committee also held thematic discussions on tourism and business cooperation, and established a model of promoting regional cooperation through thematic research [24]. Therefore, local governments in the Yangtze River Delta began to accept and explore for coordinated development, promote cooperation among multiple subjects such as enterprises and non-governmental organizations, and jointly promote regional integration in the Yangtze River Delta. The focus of inter-city cooperation is the joint development of tourism market and products, cross-border transportation infrastructure, etc. Institutionalized integrated development such as comprehensive transportation system development in the Yangtze River Delta has begun to take shape. It can be said that changes in those social factors in this period awakened the sense of ownership of local governments, and this pushes those

governments to form more solid collaboration framework in order to maintain the cooperation.

3.2.3 the Stage of Exploration of Institutionalized Competition-Collaboration Relationship (2002-2008)

Entering into 21th century, with China's accession to the WTO and Shanghai's qualification to host the World Expo, the process of integration of the Yangtze River Delta has also entered the "fast lane" with the continuous growth of the total economy, the continuous improvement of regional transportation, frequent urban exchanges, continuous industry communications and more frequent government interactions. The regional integration development of Yangtze River Delta has witnessed a remarkable coexistence of cooperation and competition. And full exploration of institutionalized cooperative relationship is the most distinctive feature of interactive game strategy of local governments in Yangtze River Delta during this period.

To be specific, firstly, high-level cooperation institutions among local governments has been improved day by day. The Yangtze River Delta Economic Coordination Committee continued to develop steadily. Taizhou of Zhejiang province was added to the Coordination Committee in 2003, and other cities in the broad Yangtze River Delta were invited to participate in subsequent meetings; In 2004, the biennial mayor meeting was changed to annual meeting; In 2006, a series of cooperation mechanisms were adopted, such as regular working conference for committee officers, thematic system for urban cooperation, financial management system and press release system for the economic coordination committee office. The coordination institutions of local governments within the Yangtze River Delta were basically formed [25]. Also, since 2001, economic cooperation and development symposiums had been held for many times by the government of Shanghai municipality and Jiangsu and Zhejiang province, and a Main Leader Symposium consultation mechanism was built in 2004 to determine regional cooperation consensus in a series of fields. In 2008, on the basis of continuous exploration, a "three-tier operation" regional collaboration mechanism framework was established with a specific mechanism, in which a joint meeting of government leaders of the two provinces and one city in Yangtze River Delta will be hold regularly to clarify the directions of integrated development and coordinate particular contents of collaboration and a special office and a focus group will coordination details in implementation. In addition, institutionalized cooperation frameworks were established in various fields and among cities. On the one hand, since the new century and starting with the key fields of industry, transportation, tourism, ecology, information and talents,

cities in the Yangtze River Delta have signed a series of cooperation treaties and established corresponding cooperation mechanisms, and carried out all-round cooperation and linkage in all aspects from investment invitation to industrial cooperation, transportation, enterprises and academia. For example, during the year of 2003-2004, according to an incomplete statistic, nearly 20 cooperation agreements were signed by city governments in Jiangsu, Zhejiang and Shanghai in this year, which greatly promoted the integration process [26]. On the other hand, cities in the region began to establish cooperation framework and build up metropolitan area jointly. For example, within Jiangsu Province, the construction of Suzhou-Wuxi-Changzhou urban agglomeration and Nanjing metropolitan area had now on the agenda.

The reason why there is a change of intergovernmental relationship from competition to the coexistence of competition and cooperation is mainly in two aspects. On the one hand, many regional challenges are difficult for a single government to tackle and need to use the power of the region as a whole. Therefore, local government have a more open mind to regional cooperation. For example, after China's accession to the WTO, the internationalization trend of the Yangtze River Delta has accelerated, and it is urgent for governments to reach a cooperation consensus in order to get better status in a larger international market. Take another example, after Shanghai got the opportunity to host the World Expo, a highly intensive flow of people, logistics, capital, information and technology flew into Shanghai, resulting in much larger demand for labor [27]. Thus, break the regional market barriers for free flow of labor became important for Shanghai to be fully prepared. On the other hand, after the development of the previous period, the Yangtze River Delta region has made great progress in regional integration, no matter in terms of social networking or government consensus, or in terms of the institution construction with the economic coordination committee as the core, and quantitative change eventually leads to qualitative change.

Take the successful government cooperation in tourism market in Yangtze River Delta as an example. In 1990s, Yangtze River Delta began to explore joint cooperation in the development of tourism market, and made preliminary attempts in planning regional tourism routes, carrying out festival cooperation, launching joint activities such as "Jiangsu-Zhejiang-Shanghai Tourism Year" and strengthening the communication and cooperation of respective tourism distribution centers. [28] However, at that time, the tourism market was not perfect and local governments had insufficient understanding on how to cooperate in tourism, which eventually led to a lack of specific effective cooperation mechanisms through the process of regional cooperation. The administrative barriers of the tourism market were high and there was a very obvious boundary effect [29]

However, after the SARS epidemic in 2003, the tourism market integration process had quickly embarked on the fast lane. A Yangtze River Delta Tourism City Summit Forum had been held continuously, regional tourism cooperation agreement was signed and Barrier-Free regional tourism circles was under construction. In few years, cities participating into regional tourism cooperation process expanded from 16 cities in 2003 to 26 cities in 2006, and remarkable results have been achieved in the construction of tourism circles such as brands, regulations and public services provision. Like what Cui Fengjun Said [30], the regional tourism cooperation in Yangtze River Delta is a successful model of China's Regional Tourism Cooperation.

The initial impetus for this achievement came from the contraction of the tourism market caused by the sudden outbreak of SARS in 2003. This external emergency objectively acts as a catalyst, so that the existing social factors in the region can be transformed into the government motivation to decide its interactive game strategy. Firstly, in order to protect the stable development of the regional market, all localities have changed from the cooperation attitude of "cooperate with no real action" (be a free rider) to actively work together to maintain the regional market, which has stimulated the "sense of ownership" of local governments. City governments have actively lobbied provincial governments, requested higher-level governments to provide resources and help to better coordinate different cities' tourism department to carry out regional cooperation[28]; and cities also spontaneous cooperate with each other(Appendix-Terminology) [32] and jointly promote the development of regional tourism market as a group(Appendix-Terminology)[30]. This intergovernmental cooperation consensus and collective identity awareness were strengthened and continued due to the tourism opportunities(Appendix-Terminology) brought by the 2006 Hangzhou World Leisure Expo, the 2008 Beijing Olympic Games and the 2010 Shanghai World Expo[28][30]. In addition, the social networking composed by tourism agencies and tourists, has established a close relationship with local governments after the steady development of the previous stage, and has promoted cooperation among local governments after the epidemic in order to solve the challenges of tourism market development as soon as possible. Those major tourism agencies that have operated cross regional tourism routes since 1990s have quickly embraced the challenges brought by the epidemic through cooperation: various travel agency consortia have been established, and an interactive tourism supermarket plan has been carried out in cooperation with local governments, and activities such as "Spring Tourism Promotion Meeting in Yangtze River Delta" had been held [30]. What's more, effective cooperation institution plays an important role. On the one hand, the Yangtze River Delta Economic Coordination Office has given full play to its role and

issued Guidance for the Technical Rules for the Setting of Road Traffic Guidance Signs in Major Tourist Attractions in the Yangtze River Delta (for Trial Implementation) in 2005 and urges local governments to formulate corresponding general local standards. It is the first regional unified standard in the national tourism industry and effectively improve the quality of tourism public services in Yangtze River Delta [28]. On the other hand, the Tourism City Summit Forum system was upheld and upgraded to a joint conference on tourism cooperation in the Yangtze River Delta, which included four provinces and regions of Jiangsu, Zhejiang, Shanghai and Anhui in 2011. The tourism departments in the Yangtze River Delta have also established a relatively perfect coordination system at different levels, and barrier-free tourism circle continue to expand to joint ticket sales and online shopping Network joint marketing, regional talent flow and other fields [30].

There are also many explorations of horizontal intergovernmental institutionalized cooperation relations similar to the tourism sharing and cooperation mechanism in the Yangtze River Delta during this period, such as the governance of Tai Lake Basin [30] which has achieved a breakthrough under the promotion of public forces and the lobbying pressure of downstream governments on superiors, the construction of regional credit cooperation system in the Yangtze River Delta which is promoted through the institutionalization process [31], and collaborative negotiations on a series of transportation interconnection projects. Of course, not all explorations are smooth. In many cases, the interest maximization motivation of the government still prevails and hinders the formation of cooperative intergovernmental relationship. For example, the efforts to build a common airport in Suzhou-Wuxi-Changzhou urban agglomeration failed to reach a consensus because of the long-term competitive relationship between these three cities in issues such as industry development and foreign capital introduction. There is even a situation that these three cities are unwilling to communicate with each other horizontally, but hope to lobby the provincial government to obtain greater benefits [33]. This fully shows that the impact of social factors on the government's social preferences during this period is heterogeneous, and has created different intergovernmental relations strategies.

3.2.4 the Stage of Construction of Institutionalized Competition-Collaboration Relationship (2009-2018)

After the financial crisis in 2008, China began its exploration on industrial upgrading and high-quality economic development. The need of industrial agglomeration and industrial chain construction lead to closer economic and social link, as well as higher requirement on regional public good provision. County

economy is gradually transferring to metropolitan economy.

Regional collaboration at this stage is characterized by institutionalized collaboration framework construction. National planning was gradually implemented and Anhui province formally joined the regional collaboration framework in 2016. In 2018, a new Yangtze River Delta Regional Cooperation Office under the "three-tier operation" model has been established and would take over collaboration issues. The establishment of this new regional office make regional collaboration of Yangtze River Delta routinize, marks that the intergovernmental relationship among local governments in Yangtze River Delta has move into the stage of construction of institutionalized competition-collaboration relationship. On the basis of the establishment of the Yangtze River Delta Regional Collaboration Office, the central government announced in November 2018 that the integrated development of Yangtze River Delta had been elevated to a national strategy, and a series of development programs were launched to further optimize the top-level design then. The support and intervention of the central government have created conditions for resolving the problems of political division, economic fragmentation and institutional barriers in regional collaboration.

Although at this stage, central government shows a more powerful role in promoting regional development of Yangtze River Delta, still we can see that formalized cooperation institutions are important to push local governments turn to a more cooperative role. In addition, the pushing forward of many regional cooperation projects, for example cross district sharing of public services, are also rely on the consensus of local governments to work together for regional integration. Different from the Shanghai Economic Area plan, in this stage local governments are work in the same direction with central government. Social preferences of local government take effect in a more endogenously way.

3.3. Summary

Summarizing from above, local governments in Yangtze River Delta are gradually making progress on regional cooperation and have partly resolved its collective action problem.

On the one hand, local governments in Yangtze River Delta have obvious competitive characteristics. And it is precisely because of competing interest maximization interests that the administrative boundary effect is particularly pronounced. Through the whole process, all of these local governments sustained their ambitious targets to gain the most social-economic achievement.

On the other hand, when closely review the whole process, with the change of social networking, government attitude on cooperation and continuous

development and the improvement of regional coordination mechanism, the strength of social preferences of local governments are changing in a continuous path.

Firstly, local government's sense of ownership preference changes in a more obvious way. the Yangtze River Delta have the natural advantages of geographical proximity and cultural compatibility historically, especially the core 16 cities, which leads to the sense of ownership. But central planning on regional specialization in planned economy era and the urge to decentralization and grow for local economy at the beginning of the reform and opening up covered up this natural tendency of social preference. When time change by, more frequent economic exchanges, more important and complex region goals activate local government's sense of ownership, make local government hold city forums and informal communication autonomously, and this increasing sense of ownership at last promote for regional cooperation.

In addition, local government's political reputation preference also changes with time. At first all cities expect others to act in a competitive way and be a free-rider on regional affairs, and regional binding force for cooperation is quite week. But with the development of regional cooperation framework and changing attitudes of city governments as well as local social subjects on regional development, local governments are gradually facing more pressure if keeping on taking a more competitive strategy, especially when set of cooperation mechanisms are been developed in constant talks and debates and supported by relevant institutions and policy documents.

Therefore, we can say that it is this relative changing path results in the change of interactive game strategy of local governments to a more cooperative way.

4. CONCLUSION

During the formation of mega-region, the horizontal intergovernmental relationship among local governments is, to a large extent, the product of different local governments' micro motivation synthesis. Based on the different scholar's discussion on horizontal intergovernmental relationship and compounding with social preference theory, this paper argues that the horizontal intergovernmental relationship among local governments is essentially a dynamic competition and cooperation game relationship which dominated by local governments' own interests while been affected by a series of social factors at the same time. This paper denotes local governments' social preferences as "sense of ownership" and "political reputation", and construct a public good game model based on this framework, and makes a case study on the integration process of Yangtze River Delta, thereby discusses and analyzes how the local

governments' social preference affects the horizontal inter-governmental relationship and the main social factors influence the social preference.

We get two conclusions through our research: Firstly, final horizontal intergovernmental relationship is determined by the relative strength between local governments 'interest maximization motivation and their social preferences, and this relative strength can be analyzed through the utility function of our public good game model. Secondly, strong social networking within the region, government thinking and existing regional coordination mechanism, organization and regulations are the main three social factors influencing the strength of local governments' social preferences.

This paper still has some limitations. Firstly, in order to simplify the analysis, we assume that the marginal return by investing on regional public goods is smaller than the marginal return from domestic investment, i.e., local governments' pursuit of interest maximization will always have a negative influence on horizontal intergovernmental cooperation. While in reality, local governments' pursuit of interest maximization sometimes also leads to cooperation. Explaining this phenomenon will require further optimization of the model. Second, the case study part is mainly qualitative analysis, and remain rooms for further quantitative analysis.

APPENDIX

Proof of Proposition 1

(a) Assume $a + \alpha_i < 1$ and $\alpha_i > \beta_i$. Consider an arbitrary contribution vector $(g_1, \dots, g_{i-1}, g_{i+1}, \dots, g_n)$ of the other players. Without loss of generality, we relabel the players such that $i=1$ and $0 \leq g_2 \leq g_3 \leq \dots \leq g_n$. If player 1 chooses $g_1=0$, his payoff is given by:

$$U_1(0) = y + a \sum_{j=2}^n g_j - \frac{\alpha_1}{n-1} \sum_{j=2}^n g_j$$

If all other players choose $g_j=0$, then:

$$U_1(g_1=0) = y$$

$$U_1(g_1>0) = y - g_1 + a g_1 + \beta_1 g_1 = y - (1 - a - \beta_1) g_1$$

Since $\alpha_i > \beta_i$, $1 > \alpha_i + a > \beta_i + a$, get $(1 - a - \beta_1) > 0$, choose $g_i=0$ as dominant strategy.

Then $g_1=0$ is an optimal strategy.

If there are at least 1 other player choose $g_j>0$.

When player 1 chooses $g_1>0$, $g_1 \in [g_k, g_{k+1}]$, $k \in \{2, \dots, n\}$, then his payoff is given by:

$$U_1 = y - g_1 + a \sum_{j=1}^n g_j - \frac{\alpha_1}{n-1} \sum_{j=k+1}^n (g_j - g_1) + \frac{\beta_1}{n-1} \sum_{j=2}^k (g_1 - g_j)$$

$$\begin{aligned} &< y - g_1 + a g_1 + a \sum_{j=2}^n g_j - \frac{\alpha_1}{n-1} \sum_{j=k+1}^n (g_j - g_1) + \frac{\alpha_1}{n-1} \sum_{j=2}^k (g_1 - g_j) \\ &= y + a \sum_{j=2}^n g_j - \frac{\alpha_1}{n-1} \sum_{j=2}^n g_j - g_1(1 - a - \alpha_1) = U_1(0) - g_1 + a g_1 + \alpha_1 g_1 < U_1(0) \end{aligned}$$

And definitely, player 1 will not choose $g_1 > \max \{g_j\}$.

Now Suppose that there exists another equilibrium with positive contribution levels. Relabel players such that $0 \leq g_1 \leq g_2 \leq \dots \leq g_n$. From (a) we know all k players choose $g_i=0$, i.e. $0 = g_1 = \dots = g_k$. Consider player $l > k$ who has the smallest positive contribution level, i.e., $0 = g_{l-1} < g_l \leq g_{l+1} \leq \dots \leq g_n$. Player l's utility is given by:

$$\begin{aligned} U_l(g_l) &= y - g_l + a g_l + a \sum_{i=1}^n g_i - \frac{\alpha_l}{n-1} \sum_{i=1}^n (g_i - g_l) + \frac{\beta_l}{n-1} \sum_{j=1}^k g_l \\ &= U_l(g_l = 0) + a g_l - g_l + \alpha_l \cdot \frac{n-k-1}{n-1} g_l + \beta_l \cdot \frac{k}{n-1} g_l \end{aligned}$$

when $U_l(g_l) < U_l(g_l = 0)$, player l will not contribute

At this time:

$$a g_l - g_l + \alpha_l \cdot \frac{n-k-1}{n-1} g_l + \beta_l \cdot \frac{k}{n-1} g_l < 0$$

$$(\beta_l - \alpha_l)k < (a + \alpha_l - 1)(1 - n)$$

But this equation is always true since $(\beta_l - \alpha_l)k < 0 < (a + \alpha_l - 1)(1 - n)$

Proof of Proposition 2:

(a) Assume no player in the group satisfies $a + \alpha_i < 1$ and $\alpha_i > \beta_i$. If player 1 satisfy $a + \beta_i < 1$ and $\alpha_i < \beta_i$, then:

$$\begin{aligned} U_1(0) &> y + a \sum_{j=2}^n g_j - \frac{\beta_1}{n-1} \sum_{j=2}^n g_j \\ &> y - g_1 + a g_1 + a \sum_{j=2}^n g_j - \frac{\beta_1}{n-1} \sum_{j=k+1}^n (g_j - g_1) + \frac{\beta_1}{n-1} \sum_{j=2}^k (g_1 - g_j) > U_1(g_1) \end{aligned}$$

Player 1 will choose not to contribute.

(b) Suppose that there exists another equilibrium with positive contribution levels. Relabel players such that $0 \leq g_1 \leq g_2 \leq \dots \leq g_n$. From (a) we know all k players choose $g_i=0$, i.e. $0 = g_1 = \dots = g_k$. Consider player $l > k$ who has the smallest positive contribution level, i.e., $0 = g_{l-1} < g_l \leq g_{l+1} \leq \dots \leq g_n$. Player l's utility is given by:

$$\begin{aligned} U_l(g_l) &= y - g_l + a g_l + a \sum_{i=1}^n g_i - \frac{\alpha_l}{n-1} \sum_{i=1}^n (g_i - g_l) + \frac{\beta_l}{n-1} \sum_{j=1}^k g_l \\ &= U_l(g_l = 0) + a g_l - g_l + \alpha_l \cdot \frac{n-k-1}{n-1} g_l + \beta_l \cdot \frac{k}{n-1} g_l \end{aligned}$$

when $U_l(g_l) < U_l(g_l = 0)$, player l will not contribute

At this time:

$$a g_l - g_l + \alpha_l \cdot \frac{n-k-1}{n-1} g_l + \beta_l \cdot \frac{k}{n-1} g_l < 0$$

$$(\beta_l - \alpha_l)k < (a + \alpha_l - 1)(1 - n)$$

Assume there are some other players do not satisfy $a + \beta_i < 1$ and $\alpha_i < \beta_i$ and $a + \alpha_i < 1$ and $\alpha_i > \beta_i$ in the group contribution an optimal level g of public goods. Then his payoff is given by:

$$U_j(g) = y - g + a(n - k)g + \frac{\beta_j}{n - 1}kg$$

Suppose player j reduces his contribution level by $\Delta > 0$

$$U_j(g - \Delta) = y - g + \Delta + (n - k)ag - \Delta a - \frac{\alpha_j}{n - 1}(n - k - 1)\Delta + \frac{\beta_j}{n - 1}k(g - \Delta)$$

$$= U_j(g) + \Delta - \Delta a - \frac{n - k - 1}{n - 1}\alpha_j\Delta - \frac{k}{n - 1}\beta_j\Delta$$

$$U_j(g - \Delta) < U_j(g) \text{ when } \Delta - \Delta a - \frac{n - k - 1}{n - 1}\alpha_j\Delta - \frac{k}{n - 1}\beta_j\Delta < 0$$

$$(\beta_i - \alpha_i)k > (a + \alpha_i - 1)(1 - n)$$

Therefore, in these equilibria all k players with $a + \beta_i < 1$ and $\alpha_i < \beta_i$ must choose $g_i = 0$ while other players contribute $g_j = g \in (0, y]$.

Terminology

Political Tournament: the Political tournament explained by Zhou Li'an (2007): For local officials at the same administrative level, no matter what level it is, are all under the political promotion competition where only limited number of people can get promoted and one's promotion will reduce others' chance for promotion. Economic performance indicators are the core of the performance measurement for political promotion.

Social Capital: Social Capital refers to trust, networking and regulation which can push forward coordination and improve social efficiency. It is born internally in people's relationship structure. Individual must be connected to others if they need to own social capital, and it is these connections which bring about social networking, social relationships, trusts and so on to form more social capital.

Yangtze River Delta(narrowly speaking):It is the 15 cities who first established the Yangtze River Delta Urban Economic Coordination Committee plus Taizhou in Zhejiang province who joined this committee later in 2003.

This makes Shanghai's leading status very unstable: In 1970s, Shanghai was accounted for 7% of China's GDP. But since then, its GDP share continued to decline. By 1990 when its Pudong New District began to opening up, Shanghai's GDP share only accounts for 4.08%. Seen from the perspective of GDP growth rate, Shanghai had an average annual GDP growth rate of 7.43% between 1978 and 1991. While in the same period, the growth rate in Jiangsu and Zhejiang provinces were 10.82% and 12.15% respectively. Its GDP value was overtaken by Jiangsu in 1979 and Zhejiang in 1986.

Its authority and administrative regulation were also not enough to promote regional cooperation:Take the governance problem of Tai Lake Basin on the border of Jiangsu, Zhejiang and Shanghai as an example. At that time, there were serious problems of excessive reclamation and water pollution in the Tai Lake Basin. However, due to difficulties in coordinating how to split the 2-billion-yuan governance costs, the Shanghai Economic Zone failed to solve this problem even after two terms of leadership. And as the leader and the coordinator who paid a lot of efforts to coordinate, Shanghai Government sent out the thought of "never taking the leading role again" after this failure. This is a typical example to show how the "sense of ownership" fail to take effect when there are only few contributors.

These series of market-oriented reforms: For example, Shaoxing's Zhongcheng Construction Engineering Group developed and expanded in Shanghai for several years. Then it returned to its hometown and invest 450 million yuan to build up a factory and a local school there. After six years of development in Shanghai, Yongjia's Kaiquan Group invested 120 million yuan to build up a new factory in its hometown in 2001. More often, a number of large enterprises in Jiangsu and Zhejiang province had moved their science and technology headquarters, marketing headquarters and even enterprise headquarters to Shanghai, but left their production headquarters locally and cultivated their contacts locally, which makes the economies of Jiangsu, Zhejiang and Shanghai closely linked.

A large number of Industrial Parks: By 2001, Jiangsu owned 11 national development zones located in different cities, more than any other provinces in China. One of the most famous one is the Suzhou-Singapore Industrial Park.

Cities also spontaneous cooperate with each other: In 2003, the first Yangtze River Delta Tourism Cities 15 + 1 Summit Forum led by Hangzhou Tourism Commission and participated by tourism administrative departments of other cities was held. The summit issued the Hangzhou Declaration on Tourism Cities Cooperation in the Yangtze River Delta, creatively put forward the initiative to jointly build a Barrier-Free tourism area in the Yangtze River Delta. In the following years, uniformed regional tourism signs, tourism brands and tourism regulations were successively launched.

Jointly promote the development of regional tourism market as a group: in 2003, the local government's tourism departments in Jiangsu, Zhejiang and Shanghai jointly launched the unified logo of Jiangsu-Zhejiang-Shanghai tourism year domestically and abroad, and jointly held more than 10 large-scale tourism celebrations;

in 2005, the Yangtze River Delta tourism brand jointly appeared at the China International Tourism Fair and launched the group tourism brand; at the same time, they also established the Yangtze River Delta Tourism broadcasting network and published tourism CD-ROM and the travel manual and traffic map of Jiangsu, Zhejiang and Shanghai as a whole in multiple languages, and domestic and foreign medias were invited to make a joint investigation in the three places. At the two promotion conferences held in the United States and the tourism exhibition held in South Korea in 2006, Jiangsu, Zhejiang and Shanghai appeared together with the group image of "Cultural Jiangsu, landscape Zhejiang and urban Shanghai" and conducted a float parade.

Tourism opportunities: Take the World Expo as an example, after the World Expo, in order to share the exhibition economic effect of the World Expo, 16 cities in the Narrowly-defined Yangtze River Delta organized the Yangtze River Delta Tourism workstation of the World Expo, and established the World Expo tourism leading group and the world expo coordination organization under the leadership of the Shanghai World Expo Bureau to jointly hold tourism promotion conferences, festival celebrations and forums, jointly develop tourism routes, renovate and standardize tourism Market. The Barrier-Free tourism circle in the Yangtze River Delta has improved from basic and transactional shallow level cooperation to deep-water areas involving interests such as tourism industry resource reorganization and regional tourism master planning. Then, the tourism administrative departments of Shanghai, Jiangsu, Zhejiang and Anhui signed the action plan for taking the lead in realizing tourism integration in the Yangtze River Delta in 2014, which promoted regional tourism cooperation to a new stage of integrated development.

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