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The Impact of High Speed Railway on the Economic Growth of China

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Abstract: With the rapid development of high speed railway construction in China, the impact of high speed railway on economic development has become a hot topic for scholars. By reviewing the impact of high speed railway on China's economic growth, this paper argues that, for the overall economy, high speed railway promotes its economic growth, but inhibits the economic growth of some underdeveloped areas. And try to explore the impact mechanism, this paper argues that, high speed railway has agglomeration effect and siphon effect on regional economic growth. The impact of high speed railway on regional economic growth is the result of the combined effect of agglomeration effect and siphon effect. When agglomeration effect is greater than siphon effect, it shows positive effect, and vice versa, it shows negative effect. Finally, according to the conclusion, this paper put forward relevant suggestions.
Keywords: High Speed Railway; Impact Mechanism; Economic Growth; Siphon Effect.

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1. INTRODUCTION

Since the reform and opening up, with the unremitting efforts of our generations, China has made remarkable achievements in economic development, leaping from a poor and backward country to one of the most influential countries in the world, and China's international status has gradually been recognized by the people of the world. In economic growth theory, the infrastructure is generally regarded as one of the important factors in promoting economic development. In recent years, China's rapid economic development puts forward greater demand on factor flow, so that China's existing railway transportation cannot meet the needs of China's sustainable economic development, in this case, large-scale investment and construction of high-speed railway has become a necessary choice of our country.

High speed railway has developed rapidly and has become the trend of transportation development in the world, due to its high sustainability, high transport efficiency, environmental protection, high speed, less energy consumption, comfort and safety. Up to now, almost all developed countries have opened high speed railways. By April 2017, the total length of high speed railways in operation and under construction had reached 53,200 kilometers, marking the global era of high-speed railways. The construction of China's high speed railway started later than other western developed countries, but since the opening of the first high speed railway in China, China has vigorously carried out the construction of high speed railway. By the end of 2018, the total operating length of high-speed railway is 300,000 kilometers, 44.5 times that of 2008, with an average annual growth of 46.2%. The operating length of high speed railway is more than two-thirds of the total length of high speed

railway in the world, ranking first in the world, and China has become the only country with high speed railway network in the world.

In recent years, with the planning of high speed railway lines and the construction of high speed railway lines by the State Railway Administration, more and more people realize the welfare of high speed railway. The rapid development of high speed railway has changed China's traffic pattern, changed people's choice of travel mode, convenient and enriched people's life. Some areas along the high speed railway even regard the opening of high speed railway as a change in the fate of local economic development. So what is the impact of high speed railway on economic growth? In addition, what are the mechanisms for these effects? Therefore, this paper will explore these issues.

2. THE IMPACT OF HIGH SPEED RAILWAY ON ECONOMIC GROWTH

At present, scholars at home and abroad hold two views on the role of high speed railway in economic growth. One is that high speed railway promotes economic growth, the other is that, for the overall economy, the opening of high speed railway promotes its growth, but inhibits the economic growth of underdeveloped regions.

2.1 The positive effect of high-speed rail on economic growth

One is that high speed railway promote economic growth. Luo Yao and Lin Xiaoyan (2013), domestic scholars, selected three indicators, namely, industrial structure change, spatial connection and employment, and explored the impact of high speed railway on economic growth by using the method of "with or without comparison". It is concluded that the opening of high speed railway has indeed promoted regional economic growth [1]. Chinese scholars Hu Naiwu and Zhang Keyun (2004) believe that the development of infrastructure such as high speed railway can accelerate the transfer of industries to the central and Western regions, and accelerate the economic development of the central and western regions [2]. The research of Yang Kaizhong and Jiang Ling (2010) shows that the improvement of high speed railway and other modern transportation trunk network is conducive to the transformation of China's economic zoning, so as to establish a unified economic zoning system nationwide [3]. Zhou Xiaowen (2010) research shows that the construction of high speed railway in China's main transport corridors will greatly improve the effective supply of high speed railway transport capacity, which can provide new changes and opportunities for the economic development of the areas along the line [4]. Wang Yufei and Ni Pengfei (2015) used the data of 284 prefecture-level cities in China and adopted spatial econometric model and hyper cartography to control the shortest distance between cities after the opening of high speed railway, so as to test the impact of high-speed railway on economic development. The results show that transportation infrastructure has growth effect on economic development, and the opening of high speed railway does improve the spillover effect of inter-regional economic growth [5]. Zhang Li (2013) et al. constructed a fuzzy comprehensive evaluation model of the impact of high speed railway on regional economic development, and took shanghai-nanjing intercity high speed railway as an example to conduct an empirical analysis, and the results showed that high speed railway has a positive effect on regional economy [6]. Lai Fengbo, Liu Chunmei et al. (2010) combed the impact path of high speed railway on regional economic development in detail, tested the causal relationship between high speed railway and regional economic development with the Granger causality test model, and analyzed the impact of high-speed railway on industrial structure. Taking wuhan-guangzhou high speed railway as

an example, the empirical analysis shows that the opening of high speed railway can not only promote regional economic growth, but also promote the transformation and upgrading of industrial structure [7].

2.2 The negative effect of high-speed railway on economic growth

On the other hand, some studies believe that the opening of high-speed rail has inhibited the economic growth of underdeveloped areas. Zhang Xueliang and Nie Qingkai (2010) believe that the opening of high speed railway can promote regional economic development, promote urban integration and achieve regional economic integration, but at the same time it will bring imbalance of resource flow and negative spillover effect [8]. Wang Yufei and Ni Pengfei (2015) explored the influence of transportation infrastructure on regional economic development by drawing time maps of different transportation modes including high speed railway, and studies showed that the improvement of transportation infrastructure including high speed railway changed the spatial structure of the region and the city. Specifically, eastern and central cities become the center of economic development due to their relatively good economic foundation, while western and northeastern regions are at risk of being marginalized due to their relatively weak economic foundation [5]. Wang Yao et al. (2014) used DID method to empirically analyze the impact of the opening of high speed railway on regional economic development by using the data of 287 prefecture-level cities in China from 2006 to 2010. The results show that under the background of the current economic slowdown, the high speed railway will not stimulate regional economic growth in the short term[9]. Zhang Kezhong&Tao Jiedong (2016) used panel data of prefecture-level cities in China from 2001 to 2012 to explore the impact of high speed railway on economic growth by using a fixed-effect model. They believed that the opening of high-speed rail significantly reduced the economic growth rate of non-regional central cities along the way [10].

3. THE IMPACT MECHANISM OF HIGH SPEED RAILWAY OPENING ON ECONOMIC GROWTH

At present, scholars at home and abroad do not agree on the impact of high speed railway on economic growth. One kind of research thinks that the impact of high speed railway on economic growth is positive, while some studies think that the impact of high speed railway on economic growth is negative. This paper holds that the opening of high speed railway has promoted the overall economic growth, but for some underdeveloped areas, the opening of high speed railway has inhibited its economic development. What is the mechanism behind this?

By reviewing the existing literature, there are two views on the impact of transport infrastructure on the economic growth of a region. One is that transport infrastructure can promote regional economic growth, manifesting as agglomeration effect on surrounding areas; the other is that transport infrastructure can inhibit the economic growth of underdeveloped areas, which is manifested by the siphon effect.

One kind of research finds that improving transportation infrastructure can promote economic agglomeration from surrounding cities to central cities and promote the development of central cities. Economic agglomeration effect refers to the concentration of various industries and economic activities to a certain region, improving economic efficiency and consequently saving costs to produce economic effects. Chandra & Thompson (2000) [11] used data from 1969 to 1994 to study

highways and economic growth, and found that counties connected to highways increased the agglomeration to surrounding counties not connected to highways, promoting the economic growth of these counties. Faber (2014) [12] found that China's highway construction will promote the economic agglomeration of central cities to surrounding counties. Li Yuwei and Ni Pengfei (2013) [13] adopt the vector autoregressive model and use the data of some cities in China from 1990 to 2008 to find that the improvement of transportation network promotes the agglomeration of factors to the central city, while the economy of the central city is growing because of the agglomeration of factors. The agglomeration effect of transportation infrastructure on economy is also reflected in industrial agglomeration. YSong et al. (2012) Studied the relationship between industrial agglomeration and traffic accessibility in Seoul. It was found that because of the convenient transportation, the core industries were mainly concentrated in the center of Seoul, while the basic industries (such as agriculture and heavy industry) were distributed in the periphery [14]. Daniel and Mulley (2011) [15] studied the mechanism of transportation infrastructure promoting industrial agglomeration. The research shows that transportation infrastructure plays an important role in promoting industrial agglomeration. There are two main mechanisms: one is to be able to transport people to their destinations, so that land use efficiency is higher; the other is that transportation can increase informal and unplanned interactions between people. Henderson et al. (2001) [16] reviews the existing literature on Influencing Factors of industrial agglomeration, pointing out that these documents ignore the very important factor of "geography". He believes that transportation facilities are a necessary condition for industrial agglomeration, and the industrial agglomeration formed in a certain geographical environment depends on the investment of public facilities such as transportation. Xu Kangning (2006) [17] believes that if a region has convenient transportation conditions, such as developed ports, land transportation and aviation, it will be conducive to the large-scale agglomeration of related industries in the region. Ji Yahui and Wen Jing (2016) [18] studied the impact of transportation infrastructure on the spatial distribution of manufacturing industry, using data from 30 provinces, autonomous regions and municipalities directly under the Central Government from 1993 to 2013.

On the other hand, transportation infrastructure promotes economic agglomeration to central cities and promotes economic growth in central areas. For non-central cities, transportation infrastructure may inhibit their economic growth. This effect is known as the "siphon effect" of transport infrastructure. Siphon effect refers to the one-way transfer of production factors to the economically developed big cities, which weakens the development foundation of other small cities and has negative effects on economic development. Faber (2014) [12] found that although the construction of Expressway in China promoted the agglomeration of surrounding counties to central cities and promoted the economic growth of central cities, it inhibited the economic growth of marginal counties. On the other hand, transportation infrastructure promotes economic agglomeration to central cities and promotes economic growth in central areas. For non-central cities, transportation infrastructure may inhibit their economic growth. This effect is known as the "siphon effect" of transport infrastructure. As an emerging transportation infrastructure, high speed railway, like other transportation infrastructure, has agglomeration effect and siphon effect on economic growth in China. The construction and development of high-speed railway enhances the mobility of resources between cities and regions, facilitates the flow of production factors to regions with higher economic

development level and better development environment, strengthens the dominant position of big cities, improves the attraction of big cities, and enables them to gather more powerful development potential. For some developed areas, the agglomeration effect of high-speed rail is greater than the siphon effect, showing a positive effect. On the contrary, regions with slow economic development and insufficient resource endowment are faced with the risk of further loss of scarce production factors such as talents, capital and technology, which weakens their own development momentum and further widen the development gap with big cities. Therefore, during the development of high speed railway, resources will flow along the high speed railway to more developed regions due to the differences among cities with different levels, scales and economic development levels in the regions along the high speed railway. For economically underdeveloped regions, the siphon effect of high speed railway opening is greater than the agglomeration effect, which shows a negative effect.

4. CONCLUSIONS AND SUGGESTIONS

This paper discusses the impact of the opening of high speed railway on China's regional economic growth. On the basis of summing up the previous research results, the following conclusions are drawn:

Firstly, the opening of high speed railway promotes the overall economic growth, but inhibits the economic growth of underdeveloped areas. Secondly, The impact mechanism of high-speed rail on economic growth includes agglomeration effect and siphon effect, agglomeration effect promotes economic growth, siphon effect inhibits local economic growth. The impact of high- speed railway on regional economic growth is the result of the combined effect of agglomeration effect and siphon effect. The agglomeration effect is more positive than siphon effect, and the negative effect is negative. Otherwise, it shows negative effect. The impact of high speed railway on regional economic growth is the result of the combination of agglomeration effect and siphon effect. If agglomeration effect is greater than siphon effect, it shows positive effect, otherwise it shows negative effect.

According to the conclusion of this paper, some suggestions are put forward:

At the national level, firstly, the state should determine the construction time of high speed railway reasonably according to the economic development level of different regions and the scale of passenger transport demand. Secondly, national policies should fully consider the "siphon effect" of high speed railway on underdeveloped areas, formulate supporting fiscal transfer payment policies and industrial policies, promote the coordinated development of underdeveloped areas and central cities, and promote regional coordinated development.

From the perspective of less developed regions, these regions should grasp the development opportunities brought by high speed railway, at the same time they should establish a sense of crisis and actively deal with the "siphon effect" of high speed railway. Firstly, we should adhere to opening up to the outside world and optimize the local investment environment. After the opening of high speed railway, the accessibility of it with various regions has been improved, and the primary factor determining the industrial transfer is no longer the location, but the comprehensive environmental advantages. Only by relying on the comprehensive environment of supporting industries, market potential, government services and other factors, can the "high-speed rail effect" be maximized and the "siphoning effect" be avoided. Secondly, adhere to industrial dislocation development, and neighboring areas to form complementary advantages. After the opening of the high speed railway,

the accessibility of the central city has been improved. For the less developed areas, the economic development is slow, and talents and resources will gather along the high speed railway to the central city, which inhibits the local economic development. So for the less developed areas, local governments should overall planning, according to the characteristics of each region, starting from the global, considering the local orientation, according to the orientation for development planning, industry layout planning, avoid redundant construction, form the dislocation competition advantage, avoid resources and talent to the center city agglomeration, deal with the influence of "siphon effect" scientifically and reasonably avoid the possible risks. Only when each region finds its own positioning, each region develops in a dislocation and forms complementary advantages among regions, can underdeveloped regions find a new engine of economic development.

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