

High-Speed Rail, Market Segmentation and Economic Growth

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Abstract: *Since the Reform and Opening Up, There have Been Beggar-Thy-Neighbor Market Segmentation Phenomena Such as Market Protection and Vicious Competition in Different Regions of China, and the Impact of Market Segmentation on Economic Growth in Different Regions Remains to Be Explored. The Opening of High-Speed Railway has a Certain Easing Effect on Market Segmentation. This Paper Uses the Relative Price Method to Calculate the Commodity Market Segmentation Index, Labor Market Segmentation Index and Capital Goods Market Segmentation Index in 29 Provinces from 2003 to 2017. The Results Show that the Degree of Labor Market Segmentation is the Highest in the Whole Country, and the Degree Of Market Segmentation In The Eastern Region Is Lower Than That In The Central and Western Regions. On this Basis, the Paper Makes an Empirical Analysis on the Impact of High-Speed Railway on Market Segmentation and the Impact of Market Segmentation on Economic Growth. The Segmentation of Commodity Market is Beneficial to Economic Development in the East, While the Segmentation of Labor Market Plays a Negative Role. Finally, Policy Suggestions are Put Forward According to the Results.*

Keywords: *High-Speed Rail, Market Segmentation, Economic Growth*

1. Introduction

1.1 Research Background and Significance

1.1.1 Selected topic Background

Since the reform and opening up, there have been "beggar-thy-neighbor" market segmentation phenomena such as market protection and vicious competition in various parts of China. On the one hand, due to the market itself, the price of various commodity elements varies in different regions. At the same time, influenced by regional administrative forces, local governments take administrative measures to restrict the flow of resources and commodities in order to safeguard local interests. Although this may promote regional economic growth in the short term, it will also cause the inter-provincial economy to fall into prisoner's dilemma, which is ultimately not conducive to market integration and overall economic development.

The opening of high-speed rail may ease the fragmentation of the market. The opening of high-speed rail will have an indirect impact on the regional urban economy, promote the optimization of its industrial and spatial structure, strengthen the communication between regions, reduce travel time, and promote economic growth. But at the same time, we should also note that a large part of China's high-speed rail operations are in the red, except for the high-speed rail connecting developed regions in the east. Therefore, we should comprehensively explore the impact of high-speed rail opening on urban economic development from a more macro perspective.

1.1.2 Theoretical Significance

Historically, the period of rapid economic growth in the United States, Europe and Japan overlapped with the period of large-scale construction of transportation facilities such as railways. Some economists also believe that the construction of transportation facilities played a very important role in the economic growth of a certain region. In China, there is also a saying that "build roads first to get rich". However, there is another view that the opening of high-speed rail has no clear relationship with economic development, especially for some remote areas, the effect is even less obvious, sometimes even negative effects. There are also many views on the overall economic impact of three categories of market segmentation. Therefore, it is of great significance to study the relationship between the opening of high-speed railway, market segmentation and economic growth in China.

1.1.3 Practical Significance

By exploring the relationship between the opening of high-speed railway, market segmentation and regional economic growth, we can better guide the construction of the opening route of high-speed railway. Through the optimization of high-speed rail operation lines, the possible effects of high-speed rail on economic growth can be reduced as far as possible, so that high-speed rail can better contribute to economic development. At the same time, it can make us more clear the role of market segmentation on economic growth, so as to provide theoretical guidance and reference for local governments' market integration policies.

1.2 Research Ideas

Firstly, this paper summarizes the current domestic and foreign researches on the opening of high-speed rail, market segmentation and economic growth. Based on the achievements of scholars, the "price method" is used to measure the market segmentation degree of goods, labor and capital goods in 29 provinces of China from 2003 to 2017. Secondly, based on the relevant theories of influencing factors of GDP growth and market segmentation, the panel econometric model is established to make an empirical analysis of the impact of the opening of high-speed rail and three types of market segmentation on GDP growth. Finally, based on the above analysis, relevant conclusions are obtained and policy suggestions are given.

2. China's High-Speed Railway Operation Status

2.1 Basic Information of China's High-Speed Railway

China's high-speed railway began with the construction of Qinshen passenger dedicated line in 1999. Through continuous technological improvement and innovation, China's high-speed railway development began with the opening of Beijing-Tianjin intercity high-speed railway in 2008 and entered a period of rapid development. At present, a "four horizontal and four vertical" high-speed rail network pattern has been basically formed. By the end of 2019, The total length of China's high-speed railways in operation reached 35,000 km, ranking first in the world. It has now covered most provincial capitals and cities with a population of more than 500,000 except Lhasa, and more than 90% of the national population [1].

2.2 Profit and Loss Status of High-Speed Rail Lines

As for the profitability of China's high-speed railways, as early as 2015, it was publicly reported that only six lines connecting economically developed areas--Beijing-Shanghai, Shanghai-Nanjing, Ning- Hangzhou, Guangzhou-Shenzhen, Beijing-Tianjin and Shanghai-Hangzhou -- were profitable, while the rest of the high-speed railways were in the red. In 2018, for the first time, the profitability of the affiliated companies of China Railway Group was announced. Only six railway bureaus, including Those in Taiyuan, Wuhan and Shanghai, were profitable in 2018, while the remaining 12 were all in the red.

3. The Measurement of Market Segmentation

As for the measurement of the degree of market segmentation, there are mainly production law, trade law and price law. Because the first two methods are not easy to generate panel data, and both have inherent defects [2]. Therefore, this paper adopts the price method to measure. The data in this paper are derived from the regional commodity price index, regional wage index and regional fixed asset investment commodity price index in the China Statistical Yearbook. The data are collected from 29 provinces, municipalities and autonomous regions in China from 2003 to 2017. This paper selects adjacent provinces for analysis, because China has a vast territory and the market segmentation between provinces with large distances is mainly dominated by geographical factors. Since Hainan province does not border any other provinces, and There is a lack of multi-year data for Tibet, no statistics are made for Hainan Province and Tibet Autonomous Region. The specific steps are as follows:

- 1) The absolute value of the first difference of relative prices

$$GDP_{it} = \beta_0 + \beta_1 \ln X_{it} + \beta_2 \ln L_{it} + \beta_3 \ln K_{it} + \beta_4 HSR_{it} + \beta_5 I_{it} + \beta_6 E_{it} + \beta_7 R_{it} + \varepsilon$$

2) The average of the relative prices of all the neighboring regions in the region

$$GDP_{it} = \beta_0 + \beta_1 \ln X_{it} + \beta_2 \ln L_{it} + \beta_3 \ln K_{it} + \beta_4 HSR_{it} + \beta_5 I_{it} + \beta_6 E_{it} + \beta_7 R_{it} + \varepsilon$$

3) Calculate the variance of the relative changes of various commodities (elements), and take the mean of the variance of all neighboring provinces

$$GDP_{it} = \beta_0 + \beta_1 \ln X_{it} + \beta_2 \ln L_{it} + \beta_3 \ln K_{it} + \beta_4 HSR_{it} + \beta_5 I_{it} + \beta_6 E_{it} + \beta_7 R_{it} + \varepsilon$$

4. Quantitative Analysis

4.1 Sources of Data

According to the availability and actual needs of data, panel data of 29 provinces, municipalities and autonomous regions from 2003 to 2017 were selected as samples. Hainan is not included because it is not adjacent to any other province, and Tibet Autonomous Region is not included because of the lack of data. The data sources are China Statistical Yearbook of each year, statistical yearbook of each province and government bulletin. The east, central and western regions were divided according to the seventh Five-Year Plan adopted at the fourth Session of the sixth SESSION of the National People's Congress in 1986.

4.2 Establishment and Analysis of the Model

GDP is used as an indicator of economic growth, the GDP of 29 provinces, autonomous regions and municipalities in each year is taken as the explained variable, commodity market segmentation index, labor market segmentation index and capital goods market segmentation index are taken as the explanatory variable, and the opening of high-speed railway is taken as the dummy variable. The investment of fixed capital goods, export value and R&D investment which are closely related to GDP are selected as control variables. Record the above variables as GDP, X, L, K, HSR, I, E and R respectively. Consistent with the previous model, logarithmic processing is performed for the three types of market segmentation to eliminate heteroscedasticity and keep the data stable. After the regression of the national data, the regression of the central and western regions was carried out respectively.

$$GDP_{it} = \beta_0 + \beta_1 \ln X_{it} + \beta_2 \ln L_{it} + \beta_3 \ln K_{it} + \beta_4 HSR_{it} + \beta_5 I_{it} + \beta_6 E_{it} + \beta_7 R_{it} + \varepsilon$$

Stata was used to perform regression on the above data, and the following results were obtained:

Table 1 to Regression table of economic growth in China, the East and the Central and western regions

Variable	National	East	Midwest
X	-10.29542 (-0.06)	578.3955* (1.69)	-255.1285** (-2.18)
L	-3.729169 (-0.03)	-704.4823*** (-2.60)	348.4637*** (3.98)
K	130.226 (1.15)	-41.3749 (-0.20)	34.36313 (0.39)
HSR	1034.74*** (3.07)	2270.614*** (3.06)	602.0484** (2.36)
I	0.9010781*** (44.87)	0.8294395*** (23.40)	0.8414074*** (35.44)
E	0.0007238*** (30.25)	0.0007299*** (15.03)	0.0004365*** (3.31)
R	-0.0008145*** (-3.71)	0.0193393*** (5.16)	-0.000478*** (-3.07)
Cons	3586.325** (1.99)	592.0947 (0.16)	3420.401*** (2.62)
N	435	150	285
R2	0.9563	0.9675	0.9680
F		14.40	39.96
Hausman test	2.98 (0.7028)	13.68 (0.0178)	10.71 (0.0575)
Notice: ***, **, *Means significant at the level of 1%, 5% and 10%, respectively			

First, from the perspective of the whole country, the R2 of this model reaches 0.9568, which proves a high degree of fitting. The opening of high-speed rail, fixed asset investment, export and R&D investment are all significant. The coefficient of the opening of high-speed rail is positive and large, which proves that the opening of high-speed rail nationwide has a great positive effect on economic growth. The coefficients of fixed asset investment and export volume are both positive, indicating that fixed asset investment and export can promote economic growth, especially fixed asset investment. The r&d input coefficient is negative, which may be because the R&D results usually play a role in the next phase. The three categories of market segmentation is not significant, which proves that the three categories of market segmentation has little impact on economic growth in the whole country.

Second, from the comparison between the east and the Midwest, the R2 of both is larger, which proves that the model can be well fitted. The coefficients of fixed asset investment and export volume are both positive, indicating that they play a promoting role in economic growth. The coefficient of R&D investment in eastern China is positive, while that in central and western China is negative, which may be due to the rapid R&D progress in eastern China, and the benefits can be obtained in the current period, while the r&d progress in central and western China is slow, and the results will appear later. The coefficient of commodity market segmentation variable is positive in the east and negative in the central and western regions, which proves that commodity market segmentation can promote economic development in the east and inhibit economic development in the west. Contrary to the coefficient of commodity market segmentation variable, the coefficient of labor market segmentation is negative in the eastern part and positive in the central and western part, which proves that labor market segmentation has a negative impact on economic growth in the eastern part and a promoting effect on economic growth in the central and western parts. High-speed opened a variable coefficient in the east and Midwest are all positive, and the eastern region of the coefficient of absolute value is greater than the Midwest, high iron open really conducive to the economic development of east and Midwest, and the more effective in promoting the economic development of the east, in the Midwest may not form scale effect, so the impact is relatively small.

5. Research Conclusions and Suggestions

5.1 Conclusion

1) Among the three categories of market segmentation, China's labor market segmentation is the most serious. However, in recent years, there has been a trend of fluctuation and decline. Both commodity market segmentation and capital goods market segmentation show a trend of fluctuation and decline, which indicates that market barriers gradually weaken under the improvement of accessibility and the support of regional integration policies.

2) By comparing the three categories of market segmentation in the eastern and central and western regions, we can conclude that the differences in labor market segmentation are the greatest. Labor market segmentation in the East is much lower than in the Midwest most of the time. This may be related to geographical factors, the eastern terrain is relatively flat, convenient transportation, facilitate population flow; And the central and western terrain complex, traffic is relatively closed; The vast territory, with its cities spaced far apart, is not conducive to the free movement of Labour.[3]

3) From the perspective of the whole country, the three types of market segmentation have no significant effect on economic growth, while the opening of high-speed railway has a significant promotion effect on economic growth. This may be due to the large difference between the eastern and western regions, leading to the inability to draw a conclusion from the whole. Commodity market segmentation in eastern China promotes economic growth, while labor market segmentation has side effects on economic growth. The reverse is true in the Midwest. The reasons for this are complex, which may be related to the level and characteristics of economic development, and the specific reasons need to be further explored. The opening of high-speed rail contributes more to economic growth in eastern China. This has much to do with east itself economic volume. The volume of population and trade in the central and western regions is smaller than that in the eastern part, so even if the high-speed railway is opened to promote the flow of factors, its economic promotion effect is smaller than that in the eastern part.[4]

5.2 Suggestion

Based on the above analysis and demonstration, this paper proposes the following policy

recommendations:

- 1) Increase investment in high-speed railways in central and western China and optimize the layout of high-speed railways in eastern China. [5]
- 2) Promote integration on the basis of institutional reform
- 3) Establish an integrated development mechanism to coordinate the interests of various regions
- 4) Establish and improve laws and regulations, and take long-term and overall interests into account
- 5) Strengthen cultural exchanges and reduce regional discrimination

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