

Research on the Relationship Between the Financial Revenue and the Three Main Industries of Heyuan City Based on the Gray Correlation Model

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Keywords: *financial revenue, three main industries, gray correlation model*

ABSTRACT. Based on the relevant data of Heyuan City from 2005 to 2018, this paper uses the gray correlation model to analyze the relationship between the financial revenue and the three main industries of Heyuan City. The results show that the correlation between the financial revenue and the value-added of the tertiary industry is the highest, followed by that of the secondary industry, and that of the primary industry is the lowest. Based on the results of empirical analysis, this paper puts forward policy advice.

1. INTRODUCTION

In recent years, Heyuan's financial revenue and three major industries have shown a good trend of sustainable development. As shown in Table 1, the value-added of the primary industry in Heyuan City increased from 4.24214 billion yuan in 2005 to 10.774 billion yuan in 2018, with an average annual growth of 7.61%; the value-added of the secondary industry increased from 8.06557 billion yuan in 2005 to 38.561 billion yuan in 2018, with an average annual growth of 13.98%; the added value of the tertiary industry increased from 8.18589 billion yuan in 2005 to 51.266 billion yuan in 2018, with an average annual growth of 15.23%. In the same period, the scale of Heyuan's financial revenue continued to expand, from 0.85177 billion yuan in 2005 to 7.695 billion yuan in 2018. The financial revenue in 2018 was about 9 times of that in 2005, with an average annual growth of 18.99%.

Table 1 Data of financial revenue and value-added of three main industries in Heyuan City from 2005 to 2018

Year	Added value of primary industry (100 million yuan)	Added value of secondary industry (100 million yuan)	Added value of the tertiary industry (100million yuan)	Financial Revenue (100 million yuan)
2005	42.4214	80.6557	81.8589	8.5177
2006	44.3308	125.5329	94.4452	12.5367
2007	43.977	175.2231	108.8852	15.16
2008	52.7629	216.5743	124.7959	17.61
2009	53.2792	210.865	141.3514	20.1839
2010	60.436	244.4457	170.2579	25.09
2011	72.3885	306.5458	200.3523	31.37
2012	78.2249	299.7001	237.3346	37.6403
2013	83.0752	337.1093	260.1451	48.7872
2014	87.5738	362.0435	319.3333	60.4671
2015	94.01424	370.3155	345.7496	67.4801
2016	100.8107	391.4173	406.4882	68.8934
2017	102.4556	376.5220	467.1831	71.1903
2018	107.74	385.61	512.66	76.95

From table 1, we can see that the financial revenue and the value-added of the three industries in Heyuan City have been growing steadily, but is there a certain relationship between the financial revenue and the value-added of the three industries? The author has consulted the related literature. At present, there is little research on the relationship between financial revenue and the three

industries. FuYan and Yang Hong (2011) collected the data of three main industries and financial revenue in Sichuan Province in the past 30 years, and used co integration analysis to find that the three main industries in Sichuan Province have an impact on fiscal revenue, but to different degrees [1]. He Lingyun and Hu Zhenhu (2013) proposed that the scale and growth of financial revenue must adapt to the level of economic growth by establishing the measurement model of financial revenue and GDP [2]. Zou Fang (2017) concluded that the development of modern service industry and the growth of financial revenue complement each other and promote each other by building VAR model [3].

By collecting the data of financial revenue and three main industries of Heyuan City from 2005 to 2018^[4], this paper uses the gray correlation model to analyze the influence of each industry on the financial revenue of Heyuan City from the relationship between the value-added of three main industries and the financial revenue. Through the model, we can measure the correlation between the financial revenue and the value-added of the three main industries, find the industries with strong correlation with the financial revenue, and make corresponding policy advices.

2. MODEL ESTABLISHMENT

2.1. Standardization of original data

That is to say, the dimensionless processing of data can generally be carried out by means of averaging, which can be recorded as follows:

$$x_i(k) = \frac{X_i(k)}{X_i(t)} \quad i = 0, 1, 2, \dots, n \quad (1)$$

Where $X_i(L)$ is the average number of sequence I , K is the time sequence number, $k = 1, 2, \dots, M$

2.2. Calculation of correlation coefficient between comparison sequence and reference sequence

Select reference sequence:

$$x_0 = \{x_0(k) / k = 1, 2, \dots, n\} = (x_0(1), x_0(2), \dots, x_0(n)) \quad (2)$$

Where k is the moment. Suppose there are m comparison sequences

$$x_i = \{x_i(k) / k = 1, 2, \dots, n\} = (x_i(1), x_i(2), \dots, x_i(n)) \quad i = 1, 2, \dots, m \quad (3)$$

Also called:

$$\zeta_i(k) = \frac{\min_i \min_k |x_0(k) - x_i(k)| + \rho \cdot \max_i \max_k |x_0(k) - x_i(k)|}{|x_0(k) - x_i(k)| + \rho \cdot \max_i \max_k |x_0(k) - x_i(k)|} \quad (4)$$

In order to compare the correlation coefficient of reference sequence x_0 at k time between sequence x_i and reference sequence x_0 , Where $\rho \in [0, 1]$ is the resolution coefficient.

2.3. Calculation of correlation degree

$$r_i = \frac{1}{m} \sum_{k=1}^n \zeta_i(k) \quad \text{Note} \quad (5)$$

is the correlation degree of the comparison sequence x_i to the reference sequence x_0 .

The larger r_i is, the higher the correlation between fiscal revenue and the industry is, the greater the interaction between fiscal revenue and the industry is.

3. Analysis of the Relationship Between Fiscal Revenue and the Three Main Industries

3.1. Index value after dimensionless treatment

The data in this paper comes from the statistical yearbook of Guangdong Province from 2005 to 2018. The dimensionless processing of financial revenue and value-added of three industries is carried out. The results are shown in Table 2.

Table 2 dimensionless treatment table

Year	The primary industry	The secondary industry	The tertiary industry	Revenue
2005	0.5803	0.2908	0.3302	0.2122
2006	0.6064	0.4527	0.381	0.3124
2007	0.6015	0.6318	0.4392	0.3777
2008	0.7217	0.7809	0.5034	0.4388
2009	0.7288	0.7604	0.5702	0.5029
2010	0.8267	0.8814	0.6868	0.6252
2011	0.9902	1.1054	0.8081	0.7816
2012	1.07	1.0807	0.9573	0.9379
2013	1.1364	1.2156	1.0493	1.2156
2014	1.1979	1.3055	1.2881	1.5066
2015	1.286	1.3353	1.3946	1.6814
2016	1.379	1.4114	1.6396	1.7166
2017	1.4015	1.3577	1.8844	1.7738
2018	1.4737	1.3905	2.0679	1.9173

3.2. Calculation of gray correlation degree

By substituting the data in Table 2 into the relevant formula, we can calculate the correlation coefficient between the financial revenue of Heyuan City and the three main industries, as shown in Figure 1.

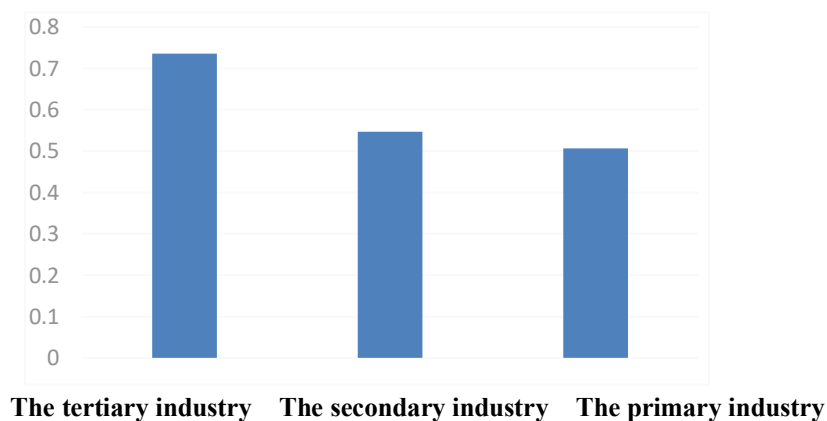


Figure 1 Correlation between Heyuan financial revenue and three main industries

It can be seen from the analysis of the gray correlation model that, as shown in Figure 1, the correlation between the financial revenue and the tertiary industry in Heyuan City is 0.7357, with the highest correlation degree; the correlation between the financial revenue and the secondary industry is 0.5472, with the middle correlation degree; the correlation between the financial revenue and the primary industry is 0.5069, with the relatively weak correlation degree.

4. Conclusion

It can be seen from the empirical analysis that among the three main industries, the financial revenue has the highest correlation with the value-added of the tertiary industry, which has a direct relationship with Heyuan's efforts to develop the tertiary industry in recent years. In recent years, Heyuan City has made great efforts to develop ecological Heyuan, to build Heyuan as the back garden of Guangdong, Hong Kong, Macao and Dawan District, to develop tourism, accommodation and catering industry and various service industries have also brought new development, promoting the growth of Heyuan's financial revenue. Therefore, The government should continue to

vigorously develop the tertiary industry, give full play to the resource advantages of Heyuan City, promote the development of tourism and service industry, and make greater contributions to financial revenue.

The correlation between financial revenue and the value-added of the secondary industry is moderate. In order to protect the high quality water resources in Heyuan, the development of the secondary industry in Heyuan is relatively weak. However, in recent years, Heyuan City has developed seven industries and established many industrial parks, which to a certain extent promoted the development of Heyuan industry. Although the development of the second industry is not as good as that of the third industry at present, it has great potential in the future. In addition, The industries with high scientific and technological content should be vigorously developed , which to form industrial clusters, and promote the development of the secondary industry.

The relationship between financial revenue and the value-added of the primary industry is relatively weak. Although Heyuan is a large traditional agricultural city with a large rural population and a large cultivated area, its agricultural development is backward, its farming methods are relatively backward, and the level of agricultural industrialization is low. The agricultural industrialization should be developed, and the primary, secondary and tertiary industries could be integrated, which to promote the integration of agriculture and tourism, pension, health and education industries, and make more contributions to financial revenue.

Acknowledgment

This research was supported by Heyuan City Philosophy and Social Sciences "13th Five-Year Plan" project (Grant No. YSK18ZC08), Heyuan Polytechnic Major Projects(2018JXCGPY08), and Philosophy and Social Sciences Major Projects of Heyuan Polytechnic(2018sk05).

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