BioTechnology
An Indian Journal

The research on calculation of Chinese tax collection efficiency based on DEA

Min Guo
Xi'an International University, Xi 'an 710077, (CHINA)

ABSTRACT

The tax revenue has been the main part of China's fiscal revenue. Therefore, the efficiency of tax collection and administration is directly related to China's fiscal income level. In other words, it has relation to the whole China's social development and progress. At present, China's tax collection and administration efficiency has been in a lower level, remaining to be further improved. Through the review of relevant literature and based on relevant information in the China statistical yearbook, this study is about the survey and research on tax collection and administration of China's 30 provinces (municipalities directly under the central government, autonomous regions) in 2007. According to the DEA model, the mathematical statistics and calculation of the efficiency of tax collection and administration has been made and the main factors that influence efficiency of China's tax collection and administration has been analyzed. What's more,we puts forward constructive opinions and Suggestions on how to improve the efficiency of China's tax collection and administration at the same time. Studies found that factors influencing the efficiency of China's tax collection and administration level are mainly Chinese enterprises operating surplus as a share of GDP, China the second and the third industry added value (on behalf of the Chinese economic development level), and the Chinese tax authority staff quantity and quality, etc. The study shows that the main ways of improving the efficiency of China's tax revenue and tax collection and administration are: speeding up the development of small and medium-sized enterprises, providing enough tax sources, accelerating the development of the second and the third industry, promoting the orderly development of national economy, improving the staff's cultural quality, streamlining the Chinese tax authority staff.

KEYWORDS

China; Efficiency of tax collection and administration; Measure; DEA model; The national economy.

THE INTRODUCTION

With the continuous development of national economy, China's tax revenue has maintained a steady growth trend, which has made a great contribution to the rapid growth of China's fiscal revenue. According to statistics, China's tax revenue has exceeded 7 trillion yuan in 2010, increased by 23%than in 2009. During the 16 years from 1994 to 2010, China's tax average annual growth rate is about 18%[1]. Tax collection and administration efficiency improvement of the tax revenue also made an indelible contribution to the fast steady growing. We can effectively evaluate the level of the Chinese tax authority through measurement and evaluation of effectiveness of tax collection and management.

China social progress bring more and more attention to tax collection and administration efficiency. In foreign countries, aizenman used cross-country data to empirical analyze the political and economic factors on the structure and the influence of value-added tax collection and management efficiency in 2008. The study found that economic development, political stability, urbanization, openness to trade and effective political participation were beneficial to the improvement of the efficiency of tax collection and administration, while the increase of the proportion of agricultural income gap could reduce collection efficiency[2]; In 2009, Hybka depicted the efficiency of tax collection and administration based on tax productivity and evaluated Poland's tax collection and administration efficiency after its joining the European Union, which concluded that the tax system and economic factors are the important factors influencing the efficiency of tax collection and administration[3]. In terms of domestic situation, the data envelopment analysis (DEA) is the evaluation of China's tax collection and administration efficiency, one of the most common analysis method, created by the famous calculation researchers Charnes and Cooper. It was developed on the basis of the relative efficiency of a method of efficiency evaluation, which has the advantages of economic significance and expanding its application field[4]. DEA model does not require specific function formula, instead, it uses the optimization to get the production frontier for innovative significance of evaluating China's tax collection efficiency.

Based on the DEA method, this study of China's 30 provinces (municipalities directly under the central government, autonomous regions) in 2007 measuring and evaluating the efficiency of tax collection and administration analyses factors that influence the efficiency of tax collection and administration level and improves the efficiency of China's tax collection and administration and brings forward comments and Suggestions. Therefore,it makes contribution to the development of Chinese society.

The Research Objects And Methods

The objects of study

This study takes tax collection and administration of China's 30 provinces (municipalities directly under the central government, autonomous regions) as the research objects, mainly in the consent of the tax revenue, companies operating surplus as a share of GDP, high-centralized industry growth situation and the tax authority staff Numbers and the tax authority staff data such as level of education.

The research methods

Model building

On the basis of DEA method, model is as follows:

Suppose there are n DMU (decision-making units), each unit needs m investment $j = 1, 2, \cdots,$, input function is = $(, \cdots)$, each unit has s output ($s = 1, 2, \cdots,$), output function is = $(,...)$. Each decision-making unit corresponds to v = $(,...)$, u = $(,...,)$ have corresponding index of efficiency evaluation:

$$h_j = \frac{u^T Y_j}{v^T X_j}, j = 1, 2, \cdots, n \tag{1}$$

We can always find the right combination of v and u to make it meet the hj ≤1, 2, …, n.

To evaluate the efficiency of J0 decision-making units f, each decision-making unit evaluation index is not greater than 1, select the appropriate v and u, maximize h0, get the following models:

$$\max h_0 = \frac{u^T Y_o}{v^T X_0} = V_{\overline{p}} \tag{2}$$

$$(\overline{P}) st \begin{cases} h_j = \frac{u^T Y_j}{v^T X_j} \leq 1, j = 1, 2, \cdots, n \\ v \geq 0, u \geq 0 \end{cases} \tag{3}$$

Using C2 transformation which is similar to fractional programming to an equivalent linear programming (Charnes-Cooper transformation), we will make () into an equivalent linear programming problem. see:

$$t = \frac{1}{v^T X_0}, w = tv, \mu = tu \qquad \qquad (4)$$

The original type can be turned into:

$$(P_1) \begin{cases} \max \mu^T Y_0 = V_{p1} \\ st W^T X_j - \mu^T Y_j \geq 0, j = 1, 2, \cdots, n \\ W^T X_0 = 1 \\ w \geq 0, \mu \geq 0 \end{cases} \qquad \qquad (5)$$

If the combination of the optimal solution meet =, = 1, it is called a weak DEA effective. If there is one and only one optimal solution meet =, = 1, at the same time also meet > 0, > 0, it is called a DEA effective.

Index selection

Tax collection and administration in some sense can be interpreted as a simple process of input - output. The main input tax collection and administration are human, material and financial resources, such as paying tax authorities, whose output is mainly tax revenues. This study takes enterprise surplus account (unit: %), the second and third industry added value (unit: one hundred million yuan) the tax authority staff number (unit: people) and quality as input of tax collection and administration and take the tax revenue (unit: RMB ten thousand) as a measure of the output tax collection and management and single index.

RESULTS AND ANALYSIS

Analysis of input and output of tax collection and administration

### The input of tax collection and administration

Enterprise operating surplus as a share of GDP and the number of the tax revenue are not only affected by the enterprise absolute purpose, but also under the influence of enterprise development. Operating surplus refers to the resident units to create added value of a country or region which deducts workers pay[5]. So the percentage of GDP of enterprise operating surplus can objectively reflects the country's economic development level and the level of tax. This study will also take enterprise operating surplus as a share of GDP as the research tax collection efficiency factors. From Figure 1, we can see that the share of GDP of the enterprise operating surplus have relations, showing that the higher the quality of tax is, the more tax revenues will be.
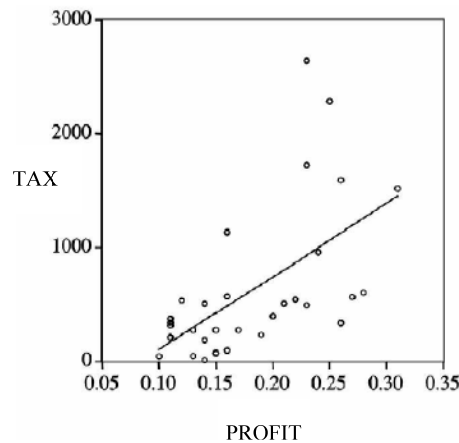
Figure 1 : The influence of tax revenue on enterprise operating surplus as a share of GDP

The second and third industry added value. From a certain degree, industrial added value of a country or a region can represent the level of the local GDP as a measure of the tax revenue. But as a result of China's tax system reform, which rescinded the agricultural tax, this study will take the added value of the second and third industry as the main source of tax revenue. As it can be seen from the Figure 2, the second and third industry added value presents have positive correlation

with income tax, namely the high-centralized industrial added value, the more the tax base is, the greater the higher tax revenues will be.
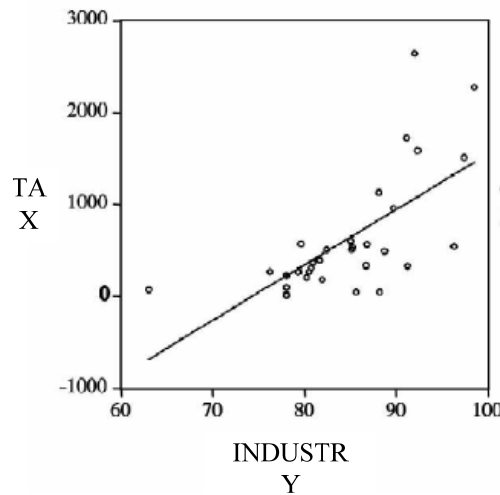
Figure 2 : The added value of the second and third industry's influence on tax revenue

(3) The quantity and quality of tax authority staff. Tax authorities work needs certain offices and other expenses, referred to as the management cost. The number of workers directly determines the management cost. Generally speaking, under the condition that we can guarantee the normal work of the tax administration and operation, management cost is higher, showing that the lower the efficiency of tax collection and administration tax authorities. This study will take the number of staff as a measure of efficiency of tax collection and administration levels of the standard, whose results show that the tax authorities to the number of staff and negatively correlated to the efficiency of tax collection and administration.

Moreover, the quality of staff in tax authorities also has influence on tax efficiency. This research takes as well as the quality of the tax staffs as input variables, which can be seen from Figure 3.The tax authorities of staff quality and efficiency of tax collection and administration were positively correlated, the tax authorities the higher the quality of the staff, the higher the tax income level is, and the higher levels of efficiency of tax collection and administration.
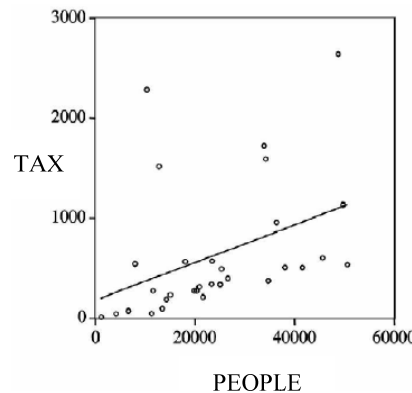
Figure 3 : The quality of the staff influence the tax revenue

The output of tax collection and administration

As the main output of tax collection and administration, tax revenue is affected by the surplus of business accounted for GDP, the added value of secondary and tertiary industries and the tax authority staff quantity and quality. This study will take tax revenue as the only standard to measure the efficiency of tax collection and administration. In general, the higher the efficiency of tax collection and administration is, the higher the tax income level is.

The contrast of input and output of tax collection and administration

There are some related calculated data in 'China statistical yearbook 2008". It can be seen that in terms of enterprise operating surplus accounted for GDP, heilongjiang, Inner Mongolia, Shanxi Province in north China, northeast China, such as tianjin leading the way; In terms of the added value of secondary and tertiary industries, the regional difference is too big, guangdong, jiangsu, zhejiang, Shanghai and other cities in east China, south China ranked first; In terms of tax authorities to the total number of staff, guangdong, hubei, henan, as well as the south China, central China's largest cities. In terms of

personnel quality, Beijing, chongqing, zhejiang economy more developed regions such as the tax staff of bachelor degree or above accounted for 60% or more. For tax revenue, 3 and other first-tier cities are still at the top of the list, and regional tax income gap is more obvious, which can be further verification, tax collection and administration efficiency and the enterprise operating surplus as a share of GDP, the high-centralized industry added value tax authorities and the overall quality of staff were positively correlated, and negatively correlated with the total number of staff with the tax authorities. we can estimates efficiency of tax collection and administration of other provinces (municipalities directly under the central government, autonomous regions) with deap2.1, including the technical efficiency and scale efficiency. Among them, the technical efficiency is in the case of a given input tax revenue's ability to get the maximum, and the scale efficiency indicates whether the tax revenue is under the most appropriate scale of operation[6]. Technical efficiency multiply scale efficiency of the product equals the comprehensive efficiency of tax collection and administration in China.

Enhance the efficiency of tax collection and administration

Encourage healthy and rapid development of small and medium-sized enterprises and enlarge sources of tax

We need to increase the number of small and medium enterprises with high quality to provide more China's tax revenue sources, facilitating the increase of tax revenue and improving the efficiency of tax collection and administration. Although China now take preferential tax policies for small and medium-sized enterprises, it maintains a corresponding tax on small and medium-sized enterprises. Therefore, the increasing number of small and medium-sized enterprises will increase China's tax revenue and promote the efficiency of tax collection and administration.

Improve tax authority personnel quality and ensure the quality of tax

The cultural level of the staff also has the effect on tax collection and administration efficiency. According to statistics, women are accounted for more than half of China's tax authority staff if the higher the efficiency of tax collection and administration in the region is[8], which shows that the increase of female staff is of great significance for China to enhance the efficiency of tax collection and administration.

And the number of staff also has influence on the efficiency of tax collection and administration. In general, the more staff is, the more the cost of tax collection and management will be, which suggests that the lower the efficiency of tax collection and administration. Therefore, simplify the tax authority staff is also a way of improving the efficiency of tax collection and administration.

Second, improving the quality of tax staff so as to reduce tax evasion or practice favoritism is also a way to increase tax revenue and improve the efficiency of tax collection and administration.

CONCLUSION

This study investigates and studies tax collection and administration through the China's 30 provinces (municipalities directly under the central government, autonomous regions) in 2007which measure and evaluate the efficiency of China's tax collection and administration based on the DEA method. It also calculated the factors influencing efficiency of China's tax collection and administration and the ways to improve the efficiency of China's tax collection and administration. Through the survey, we can see the major factors that influence efficiency of China's tax collection and administration are enterprises operating surplus as a share of GDP, high-centralized industrial added value, and the Chinese tax authority staff quantity and quality, etc. Among them, the enterprise operating surplus as a share of GDP, the high-centralized industry added value and the quality of the staff to the Chinese tax authority and tax collection and administration efficiency is a positive relationship, tax authorities and the number of staff and a negative relation with the efficiency of tax collection and administration. Thus, to improve the efficiency of China's tax revenue and improve tax collection and administration, we need to encourage especially the rapid development of small and medium-sized enterprises must accelerate enterprises, promoting the healthy and stable development of the second and third industry. Continuously improving the quality of the staff by tax authorities and reducing the Chinese tax authority staff are also necessary.

ACKNOWLEDGEMENT

REFERENCE

[1] Li Jianjun, Zhao Guizhi, Shan Nianhong; Empirical analysis of China's tax collection and administration efficiency-- based on three-stage DEA method [J], Tax and Economy, **1(15),** 85-92 **(2012)**.

[2] J.Aizenman, Y.Jinjarak; The collection efficiency of the value added tax, and found the and international evidence [J], The Journal of International Trade and Economic Development, **(3)**, 391-410 **(2008)**.

[3] M.M.V.Hybka; AT collection efficiency in poland before and after accession to the european union [J], J.Ekonomika, **30**, 7-18 **(2009)**.

[4] Wu Yuhua, Liu Xihua, Guo Junpeng; Quantity of the economic management method [M], Beijing: Economic Science Press, **5(12)**, 77-79 **(2008)**.

[5] Yang Deqian; China's tax collection and administration efficiency based on DEA method [J], Journal of Tax and Economy, **3(15)**, 77-82 **(2010)**.

[6] Lu Huan; Tax's influence on the efficiency of tax collection and administration evaluation [J], Journal of Finance, **5(2)**, 108-109 **(2008)**.

[7] Wu Weihong, Jiang Song, Li Chang; The macro tax burden, Tax Revenue and Economic Growth Based on the Research on China's Macroeconomic Data [J], Journal of Shanghai financial institute, **2(18)**, 82-97.

[8] Li Jiaming Yan Yanyan; Tax collection efficiency research review [J], Journal of Chongqing University (Social Science Edition), **2(6)**, 39-46 **(2014)**.