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The impact on regional "resource curse" by coal resource tax reform in China—A dynamic CGE appraisal

Xiaoliang Xu [a,c,1,*], Xuefen Xu [b,1], Qian Chen [a], Ying Che [a]

[a] School of Humanity and Social Science, Nanjing University of Science and Technology, 200 Xiaolingwei, Nanjing 210094, People's Republic of China
[b] School of Pharmacy, China Pharmaceutical University, Nanjing 210009, People's Republic of China
[c] School of Economy and Management, Southeast University, 2 Sipailou, Nanjing 210096, People's Republic of China

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ABSTRACT

The phenomenon of regional "resource curse" appeared gradually with the rapid development of Chinese economy. China with heavy energy consumption reliance on coal tried to get balance between economic stability and regional development by resource tax reform. In our dynamic computable general equilibrium model (CGE), the paper looked into the influences on economy, resource and environment with different coal resource tax policy scenarios from a regional perspective. The stimulated results showed coal resource tax reform had a negative influence on Gross Domestic Product (GDP). However, coal resource tax reform can increase regional revenues (especially in resource-rich regions) which helped to explain the exaltation of GDP in some regions, and seemed to be a highly potential way for narrowing regional economic gap. "Resource curse" regions reduction depended on resource tax rate which affected the supply and demand of elementary factors, and prevented human and capital resource crowded from the processing of the productions. And resource tax burden has alleviated as resource value subsidy for households and firms by using more alternative resources. Meanwhile, subsidy improved the quality of resource and environment. So we suggested that resource tax rate and subsidy should be taken into account in eliminating regional "resource curse" and coordinate resource and environment system within coal resource tax reform.

1. Introduction

"Resource curse" (Auty and Warhurst, 1993) was a paradox between economic development and nature resources, which indicated rich nature endowments did not support local sustained economic development; and after a brief "resource boom", the economy was in trouble with a long-term stagnation, such as Venezuela, Zambia. While on the contrary, some natural resource poor countries and regions have gained a rapid development of economy (such as Japan, Korea) which was verified based on the 95 developing countries (Sachs and Warner, 1999). And the results showed that a negative correlation existed between economic growth and nature resources. The paradox was well accepted as "resource curse".

As we know, China is rich for its abundant coal resources which account for 13% of the world recoverable reserves, and the total amount of coal consumption in 2013 arrived at as much as 36 million tons (nearly 50% of the world). In current energy consumption structure, coal resource will be the dominate part in a long time. However, with Chinese robust economy more and more reliant on resource inputs, regional "resource curse" appeared with the rapid growth of economy in recent years, even worse in some regions such as western and northeast areas. For example, the GDP growth rate of Shanxi province which was the most abundant coal resources area and heavily rely on coal resource, was only 6% in 2013; and as the coal price going down, its economy has been stagnation. Chinese regional "resource curse" was also verified by empirical studies from the national or provincial level respectively (Xu and Wang, 2006; Wang and Yao, 2007; Chen et al., 2012; Fan et al., 2011, 2012; Huang et al., 2011; Lei et al., 2013; Liu, 2014; Shao and Yang, 2014).

Among the questions that remained to be resolved were what caused regional difference of "resource curse" in such a big country with superior natural bounty. The researches focused on the transmission mechanism, the substitution variables and existence of the "resource curse". The mechanisms inducing regional "resource curse" have received a great deal of attention. Some scholars proposed that the main causes of "resource curse" in resource rich regions may come by extrusion of human capital and investment, which resulted in crowding and hindered economic

* Corresponding author.
E-mail address: Xuxiaol2004@126.com (X. Xu).
[1] Contributed equally to this article.

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growth. And rent-seeking, corruption, lack of capacity in resource management of the government may also lead to regional "resource curse" (Pegg, 2010). It has been reported that many factors including the crowed out effects of human resource and capital may block the economy in resource-rich regions because of high profits in nature resource with easy way. Further studies are done to determine the special causes of regional "resource curse" in China. Pathways and countermeasures of "resource curse" have been an area of intense investigation. There is now a general consensus that unreasonable rule and its evolution led to the regional "resource curse" phenomenon (Wang and Yao, 2007); and the improved quality of the designed policy and system maybe a useful tool to break out the dilemma of regional "resource curse". However, few researches associated regional "resource curse" with resource policy, which leaded to the ignorance the power of government rule to get rid of regional "resource curse" by guiding resource exploiting and consumption. And more importantly, it has yet to be fully defined how much the influence on regional "resource curse" by different resource policy design.

Now, resource tax reform is becoming a critical resource regulation tool for Chinese government to adjust relationship between regional economy and resource, and the quality of resource policy has been improved gradually over the past years. In 2010, Xinjiang has begun to be a pilot of resource tax reform, which marked a new stage of reform in Chinese resource regulation. According to "Provisions on Several Issues Concerning the Reform of Resource Tax on Crude Oil and Natural Gas in Xinjiang" issued by the State Administration of Taxation and the Ministry of Finance, resource tax reform involved crude oil and natural gas, which tax rate is levied on the basis of price with ad valorem 5%. From December 1st 2014, coal resource tax has been reform where tax rate can be decided by the provincial governments within a given range (2–10%). Although resource tax reform can reflect resource inner values and further improve resource price mechanism in the theory researches, compelling evidence by qualitative appraisal on regional "resource curse" is still lacking.

CGE model which used the module in each part to establish connection among all participators is flexible for evaluate resource tax; and with a wide spectrum of parameters and mass data dynamic processing, CGE model has a stronger adaptability of analysis on Chinese resource tax policy simulation (Boqiang et al., 2012; Zhang et al., 2013). However, previous studies focused on the impact of resource tax reform from a national perspective and failed to connect between resource tax reform and regional "resource curse". So the paper brings to bear a perspective from the regions of China to get rid of regional "resource curse" within the resource tax reform. We built a dynamic CGE model with multi-region and multi-sector designed for the quantitative evaluation of regional "resource curse" in China by coal resource tax reform in different policy scenarios with the General Algebraic Modeling System (GAMS), based on social accounting matrix (SAM).

When analyzing the impact of coal resource tax reform, two critical questions should be answered. For one thing, how many resource tax rate is appropriate, which could stabilize the economy and narrow economy gap between different regions? It means that the impact of resource tax implemented in Xinjiang must be appraised exactly. For another, is it necessary to implement the subsidy within the coal resource tax reform? Unstill now, there is no shortage of controversy among researchers. More importantly, however, it seem have been a positive view toward resource subsidy gradually. In fact, it has been a long time to subsidy for firms and individuals in other reforms such as the reform of rural tax revenue, which proved to be a greater effect than expected.

To circumvent this argument, we extended classic CGE model with distinguishing features including technology rigidities, production factors market flow freely, and alternative coal resource tax policies in China. The paper tried to appraisal the influence on regional "resource curse", resource and environment system within different resource tax policy scenario. The paper is organized as follows: Section 2 divides China into different regions by the level of "resource curse". Section 3 constructs a dynamic CGE model, and works out the SAM. Section 4 simulates the results and discusses the empirical results, followed by main conclusions in Section 5.

2. "Resource curse" regions distribution with empirical observation in China

2.1. The comparison between energy production and regional economic development

To directly characterize the relationship between resource and regional economy, this paper firstly observed the preliminary relationships among regional economic development, resource tax and resource endowments based on historical data from 1994 to 2010 year, as shown in Fig. 1.

Consistent with the trend of GDP growth rate, energy underwent a dramatic contraction between production and consumption speed which provided evidence that there was a great correlation. To further confirm the relationship, we used the index of energy production after heat conversion by using the formula from Chinese science academy which was as following:

$$Q_E = Q_C \times 0.7413\,\mathrm{T} + Q_O \times 0.74/1000 \times 1.4714\,\mathrm{T} + Q_G 12.143/10,000\,\mathrm{m}^3 \quad (1)$$

where Q_E is total energy production, Q_C is coal production, Q_O is oil production, Q_G was natural gas production, T is ton, m^3 is cubic meter.

Meanwhile, the formula of the average proportion of energy production in all regions is

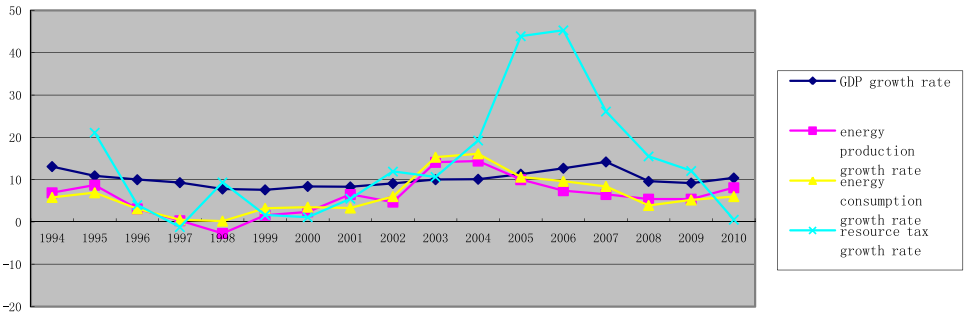

Fig. 1. The relationship of economy, resource tax and resource.