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Effects and mechanism of influence of China's resource tax reform: A regional perspective

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ABSTRACT

China's resource tax reform, beginning with Xinjiang as a pilot area in June 2010, marked a new stage in the progression of China's resource tax system. Based on the 2007 social accounting matrix (SAM) for Xinjiang, constructed by ourselves, this paper takes a regional perspective on China's resource tax reform to quantitatively calculate its degree of influence and qualitatively analyze its mechanism of influence by adopting an energy computable general equilibrium (CGE) model and a SAM price model. The results show that the main significance of the reform lies in bolstering local government finances rather than energy conservation or carbon reduction. This is because revenue will be transferred from resource enterprises and the central government to the local government, while simultaneously the low tax rate, narrow tax scope and unreasonable price mechanism will combine to prevent the reform from reaching its environmental goals. Promoting resource price mechanism reform and deepening resource tax reform will be two key elements of China's future energy strategies. Because resource enterprises will bear the increased burden caused by the reform, the degree of sectoral price increases will be limited; therefore, the fear that resource tax reform will push up inflation is unnecessary and should not be a barrier to reform.

1. Introduction

China's resource tax system has been improving gradually over the past thirty years. In 1984, to adjust differential income derived from resources, China began collecting resource taxes by volume on crude oil, natural gas, coal, metal ore and non-metal ore products. Ten years later, the scope of resource taxation was expanded to all mineral resources. This resource tax system was applied for more than a decade without fundamental change until June 2010, when the State Administration of Taxation and the Ministry of Finance jointly issued the "Provisions on Several Issues Concerning the Reform of Resource Tax on Crude Oil and Natural Gas in Xinjiang". It indicated that China's resource tax reform would start with Xinjiang as a pilot area. Why did China first reform resource taxes in Xinjiang rather than in other provinces? First, it is one of a series of central government support policies to promote the development of Xinjiang's economy (Xian, 2010). Second, as an important part of China's energy base (Qian et al., 2012), Xinjiang has conditions that are suitable for reform.

According to its provisions, Xinjiang's resource tax reform involves crude oil and natural gas, and the resource tax will be levied based on price instead of on production volume, with a tax rate of 5%. In December 2010, the resource tax reform was extended to twelve western provinces. In November 2011, China extended the regional resource tax on domestic sales of crude oil and natural gas to the whole country, increased the tax rate to 5–10%, and widened the tax to include coking coal and rare earths. The reform has great significance and indicates that China's resource tax system is entering a new stage. First, the resource tax base is much more reasonable. The traditional volume-based resource tax encourages resource companies to develop and utilize high-quality mineral resources and quite low-grade resources, which results in a waste of state-owned mineral resources (Xu and Wu, 2011; Zhang and Zhou, 2007). Additionally, the volume-based resource tax cannot reflect resource price changes (Sun, 2007), neglecting the relationship between resource taxes and price. Second, the resource tax rate is increased. The traditional low rate of resource taxation cannot reflect the real value of resources, leading to overexploitation and depletion of natural resources (Cao et al., 2011) and contributing little to local public finances (Zhang, 2006). Therefore, it is of great importance to analyze the economic and environmental effects of resource tax reform.

The Chinese government said the reform was mainly for the purpose of resource conservation and environmental damage reduction. For example, on July 19, 2011, Chinese Premier Wen Jiabao chaired a leading group conference on the national response to climate change focused on working toward energy savings and emission reductions, and the conference noted that promoting the reform of resource and environmental taxes would contribute to the improvement of the permanent mechanism for energy savings and emission reductions. Previous research generally also concluded that resource tax reform contributes to energy saving and emission reduction (Barker et al., 1993; Berkhout et al., 2004; Guo et al., 2011; Lin and He, 2008;

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Peretto, 2009; Tarek, 2007; Wei, 2009; Wissema and Dellink, 2007). However, there are few quantitative calculations of the energy conservation and emission reduction effects of China's resource tax reform, especially from the provincial level. In addition, these studies overlook the impact of China's energy price mechanism, which may influence the environmental effects of resource tax reform. It is widely believed that the reform will also cause a larger portion of resource companies' profits to flow to the public finances of local governments. Previous studies mainly analyzed the impacts of resource tax reform from a national perspective (Guo et al., 2011; Lin and He, 2008; Wei, 2009) and failed to present the impact of the reform on local revenue, which has great significance especially for western provinces. With Xinjiang as an example, we developed a regional social accounting matrix (SAM) model and established an energy computable general equilibrium (CGE) model to quantitatively simulate the economic and environmental effects of resource tax reform from a regional perspective. During the reform process, the main concern was that the reform may push up inflation (Zhu, 2011). However, the existing literature on China's resource tax reform (Cao et al., 2011; Guo et al., 2011; Lin and He, 2008; Wei, 2009; Xu, 2011; Xu and Wu, 2011) failed to provide a detailed analysis of the impact of resource tax reform on sectoral price levels or of the tax burden caused by the reform. As an effective supplement to CGE analysis, price multiplier and structural path analysis were adopted in this paper to analyze the resource influence mechanism and discuss why certain sectors will bear the increased tax burden caused by the reform.

The simulation scenarios are determined according to the actual situation and future trend of the resource tax system. First, the tax rate we set is 5–20%, which is larger than the present tax rate (5–10%). China's Ministry of Finance has indicated that the resource tax reforms would be further deepened when appropriate and that the resource tax rate would be further increased, considering that a tax rate between 5 and 10% was still much lower than that of developed countries. For instance, the resource tax rate of Australia reaches as high as 30%. The existing literature also agrees that the resource tax rate will be further increased. For example, the highest tax rate reaches as high as 50% in the research of Wei (2009). Thus, we believe that it is possible that the resource tax rate could be 20% as the reform continues. Second, the resource tax items we analyze are not only crude oil and natural gas but also coal. In September 2012, Minister of Finance Xie Xuren said that the scope of the reform will be further widened, especially the tax on coal, which is the main source of energy for China. At present, only coking coal is in the scope of reform, but it is widely believed that coal resource tax reform will be implemented in the future. For example, Guo et al. (2011) calculate the effects of different rates of ad valorem taxes for coal.

The paper is organized as follows: Section 2 introduces the construction and structure of Xinjiang's SAM of 2007, along with data on energy consumption and carbon emissions. Section 3 mainly describes the simulation models. Simulation results and discussions are given in Section 4, followed by main conclusions and policy implications in Section 5.

2. Data

The data used as the basis of this paper are Xinjiang's SAM of 2007, constructed by ourselves, and energy consumption and carbon dioxide emission data. Here, we describe the construction and structure of Xinjiang's SAM and the sources of energy consumption and carbon dioxide emission data.

2.1. Social accounting matrix

As the basis for constructing a CGE model, a SAM represents flows of all economic transactions that take place within a regional or national economy. As far as we know, there is no ready-made social accounting matrix of Xinjiang suitable for our research. Therefore, we had to develop Xinjiang's SAM of 2007 according to the research demands and actual situation. There are two approaches to create a SAM: top-down and bottom-up. The former emphasizes data consistency, while the latter emphasizes data accuracy. Due to incomplete data coverage and limited resources, we used the top-down approach, which seems appropriate in the current situation. First, we compiled the macro-SAM, as shown in Table 1. Then, the micro-SAM was compiled according to the macro-SAM and data from multi-purpose surveys such as household income surveys. In the end, the RAS method was used to balance the micro-SAM.[1] Xinjiang's SAM of 2007 was constructed mainly based on input–output tables for Xinjiang and other data from the China statistical yearbook (2008), Xinjiang statistical yearbook (2008), Financial yearbook of China (2008), Financial yearbook of Xinjiang (2008), and Tax year book of China (2008).

The structure of Xinjiang's micro-SAM is determined by the research demands, which comprise a total of 42 accounts, including 30 productive sectors. For example, to reflect the resource tax reform comprehensively, we present the energy industry as specific as possible. There are nine energy sectors in the micro-SAM, including the primary energy sector (coal, crude oil, natural gas, and hydropower) and secondary energy sector (coke, coke gas, petroleum products, heating, and thermal power). Here, we mainly describe the construction of the local and central government accounts. Resource tax reform has a direct influence on the revenues of local and central governments. To analyze the impact of resource tax reform on local and central government revenues, we split the government account into central government and local government mainly through three approaches. For the first type of accounts with detailed data for both local and central governments, we split the government accounts directly. For example, the personal income tax collected by the local governments are taken from the "Xinjiang financial revenue and expenditure balance sheet of 2007", and the personal income tax collected by the central government are taken from the Tax Year Book of China (2008). For the second type of accounts, we split the government accounts indirectly. For instance, the consumption data for the central government are the difference between the government consumption from the IO table and the consumption for local government taken from "Xinjiang's financial revenue and expenditure balance sheet of 2007" and "Xinjiang's final account of revenue and expenditure of extra-budgetary funds of 2007". The third type includes local and central government savings accounts, which are balancing items.

2.2. Energy consumption and carbon dioxide emission data

In addition to the economic data provided by Xinjiang's SAM, we need the energy consumption and carbon dioxide emission data of 2007 to analyze the environmental impacts of resource tax reform. There are no direct statistics of CO_2 emissions; therefore, we have to calculate CO_2 emissions based on the method provided in IPCC (2006). The calculation is based on the final fossil fuel consumption data and fossil fuel transformation data from the energy balance table (National Bureau of Statistics of China, NBS, 2008). With the assumption that all the carbon in the fuel is completely combusted and transformed into carbon dioxide (Guo et al., 2012; Meng et al., 2011), we can obtain the CO_2 emissions from each type of energy by multiplying the relative emission factors (IPCC, 2006). The data for final energy consumption and carbon dioxide emissions are presented in Table 2. "Crude oil" in Table 2 represents the crude oil that is used directly, except that transformed into petroleum products. We calculate the CO_2 emissions for final crude oil consumption and petroleum

[1] For simplicity, we broadly describe the construction of Xinjiang's SAM in this paper; the detailed construction process and data sources can be provided upon request.