



An Empirical Analysis on Influence of Water Rights Business from China's Experience

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Water resources are scarce. It is important to measure the effect of water resources utilization. This paper builds a DCEG model to estimate the influence of water rights business from China. This paper uses data of 29 municipalities, autonomous regions and provinces of China in 2019. The results show that it is helpful for the economic growth of China.

Keywords: DCEG model, Influence, Water rights business

Introduction

Under the new normal conditions, China's economy begins to develop towards high quality.^{1,2} Water scarcity has become an important factor affecting China's economic growth. In China, there are both market mechanism and government regulation mechanism. And water resource management department which is government mechanism make many polices about water right allocation, and China have established specific measures for the water right business, such as Three Gorges Dam and the Yellow River's water right business management procedures, and so on.

Through the collation of related to water rights business, China has formed many ways to water right business, one of the most important ways is water right business between the governments and the most enterprises. The main method is government bidding, and investment and trading by the enterprises. This is the model adopted by the Three Gorges Dam. This kind of pattern has saved the expense and has obtained the very good result. In order to understand the situation more accurately, we use a DCEG model to evaluate the economic benefit of water rights business from China. And it turns out that it has a positive effect on economic growth.

Materials and Methods

Evaluation model

Colby hold the opinion that the market value of water is influenced by regional market characteristics,

thus estimation of water market value and assessment of the redistribution of water resources must take into account the characteristics of water right and its transfer.³ Sanchez, R., L. Rodriguez and C. Tortajada suggest that there could be up to 21 transboundary aquifers between Mexico and Texas.⁴ In China, beside the government, market also plays an important role in the allocation of resources and productive elements, and the influencing factors and solutions in different fields.⁵ Yanli Deng used the computable general equilibrium model (CGE model) to study the water right business of ecological compensation type.⁶ Lin, He and Hao calculated the industrial pollutants emission with the CGE model.⁷ Alejandro, Juan, Margarida and José⁸ study determinants of procedure innovation. Therefore, the CGE model is a good method to estimate the benefits of inter-sector water rights, other scholars use similar methods.⁹

In order to maximize revenue and minimize production costs, we add dynamics to the CGE model, to better dynamic tracking research. We build a DCEG model to calculate the influence of water rights business, and observe its efficiency and change of domestic sales and exports. And data updated to 2019. We assume that unit j's total output is Q_j and intermediate inputs are Q_{ij} , labor inputs Q_j^{LAB} , capital invest Q_j^{CAP} , land input Q_j^{LND} , water input Q_j^{WTR} . And j represents the intermediate inputs. The model is constructed as follows:

$$\text{Min } \sum_i P_{ij} Q_{ij} + (P_j^{LAB} Q_j^{LAB} + P_j^{CAP} Q_j^{CAP} + P_j^{LND} Q_j^{LND} + P_j^{WTR} Q_j^{WTR}) \dots (1)$$

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$$Q_j^{CAPW} = CES(Q_j^{CAP} / A_j^{CAP}, Q_j^{WTR} / A_j^{WTR}) \quad \dots (2)$$

$$Q_{ij} = CES(Q_{ij}^{SRC} / A_{ij}^{SRC}, SRC = IMP, DOM) \quad \dots (3)$$

$$Max P_i^{DOM} Q_i^{DOM} + P_i^{EXP} Q_i^{EXP} \quad \dots (4)$$

$$Q_i = CET(Q_i^{DOM}, Q_i^{EXP}) \quad \dots (5)$$

Now we calculate the effect of water rights business. In the above formula, P_i^{DOM} represents the selling price of domestic goods i . P_i^{EXP} represents the selling price of export goods in Eq. (5) is the constant elasticity transform function (CET). In general, GDP consists of three part: consumption, investment and export. In the model, the commodity composites of unit j 's investment are aggregated by a Leontief function. After the model is built, it can be estimated according to the statistical data.

Evaluation Indicators and Data Description

This paper uses the input-output table of China in 2019 to build a DCGE model to estimate the influence of water rights business from China. All the data are from China Statistical Yearbook 2019 and from The Water Resources Bulletin of China 2019.

According to the above statistics, we dynamically calculated the effects of industrial and agricultural water use and effect of water rights business. The calculation results are as follows.

Results and Discussion

We conducted calculations, and the results of real GDP and the index of correlation is as follows in Table 1.

- (1) The results of real GDP growth 0.00935 and second, cause of the GDP deflator fell by 0.00836; furthermore, net exports also increase.
- (2) The export effect plays an important role in real GDP growth. And local market mechanism also plays a role.
- (3) Aggregate employment increased by 0.00960.

Conclusions

Due to scarce of water resource, it plays an important role in economic development, water rights business cannot be overemphasized. In order to improve water use efficiency, we should pay more

Table 1 — Effect of water rights business

Variables	ROC
RG	0.00935
GPI	-0.00836
EVI	0.03482
IVI	-0.00731
AE	0.00960

Note: Rate of Change-ROC. Real GDP- RG; GDP price index-GPI; Export volume index-EVI; Import volume index-IVI; Aggregate employment -AE

attention to water right business and allocate water resources reasonably. In a word, the water rights business can contribute to real GDP growth and increase the employment.

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