

# ***Empirical Study on the Impact of Hebei Province's Water Rights Policy on Rural Revitalization***

**Zijiao Wang<sup>1,a,\*</sup>**

<sup>1</sup>*School of economic, Xiamen University, Xiamen, Fujian Province, China, 361005*

*a. 2562437560@qq.com*

*\*corresponding author*

**Abstract:** Establishing water rights-related policies encourage agricultural producers who cover land to save water to benefit. On this basis, the paper discusses whether the welfare of agricultural practitioners can be improved but does not provide possible empirical suggestions for subsequent rural revitalization policies. This paper is related to the water rights policy. The empirical results of the migration of rural residents using the dual difference method show that the establishment of water rights-related policies in Hebei Province has not significantly reduced the speed of the rural population's urban migration, indicating that the willingness to migrate is still strong, and the overall welfare in the countryside is still lower than the overall welfare in the city. On the basis of empirical evidence, the deficiencies and improvement suggestions in the specific implementation of water rights-related policies are put forward.

**Keywords:** Hebei province water right confirmation policy, rural population migration, differences-in-differences

## **1. Introduction**

China suffers from severe drought and water shortage, an uneven distribution of water resources, and an uneven combination of soil and water resources distribution, meanwhile, the northern region with poor water resources bears the responsibility of agricultural production. In the main grain producing areas in northern China, there is a very serious problem of over extraction of groundwater, with a large number of rural residents migrating to the city. The large-scale migration of population from the countryside to the city in a short time and the accelerating urbanization in China will certainly lead to a decrease in rural agricultural workers and the decline of the rural economy. To protect agricultural production and farmers' interests, the State Council has issued the Strategic Plan for Rural Revitalization (2018-2022) to improve the level of the rural economy and alleviate the severe out-migration of rural population and the imbalance between urban and rural development. In agricultural production, there is a large demand for water, low efficiency problems, Tong Jinping, etc [1]. The study found that most agricultural provinces with inadequate precipitation adopt an extensive water use mode, and Hebei province has extremely low water use efficiency and is faced with the problem of extreme water shortage. In 2017, the Measures of Hebei Province were issued to strengthen the management of water resources, including the water right system and the water intake permit system, respectively. Improving water resource efficiency can reduce production costs and profits and contribute to the rural revitalization strategy. Government embodies in improving agriculture This

paper aims to influence the implementation of agricultural water rights policy on agricultural production efficiency and agricultural rural population migration through different methods and provide possible suggestions for the national rural revitalization strategy.

## **2. Theoretical Mechanism**

In practical experience, water rights related policies have a significant role in promoting the improvement of agricultural water efficiency. The agricultural season and climate are large, and when the agricultural production profit is insufficient, migration is necessary to obtain profits. Against the backdrop of severe water shortages and extensive agricultural production in Hebei Province, the Hebei Water Resources Department imposed excess fees for excess water use. Such a policy can encourage the transfer of agricultural population to cities, increase the cost of irrigation in agricultural production, and increase the enthusiasm of agricultural labor to migrate to cities. The introduction can improve the utilization rate of water resources in agricultural production, reduce costs, and improve the profit of agricultural production. Anand discusses that the establishment and governance mechanism of water rights has a greater contribution to the welfare improvement of the poorer people [2]. The water market encourages farmers to innovate in agricultural technology and transfer water rights to high-consumption industries for additional benefits policy paper [3]. According to the content, the agricultural water rights are transferred and used together with the land contract management rights when they are transferred. If the cultivated land is changed to non-agricultural construction land, the agricultural water rights shall be recovered free of charge by the unit issuing the right of water. Farmers obtain transfer income to engage in agricultural production, and the incentive to stay local will be enhanced. The above mechanisms suggest that people engaged in agricultural production after the policy may increase their income. The free movement of people can directly lead to higher income and more job opportunities [4]. With economic development, the improvement of urban income levels creates more demand for the service industry and more employment opportunities for low-skilled workers to get service jobs [5]. The income disparity between urban and rural areas will create a migration incentive for the rural population to move to cities. When the income difference between cities and staying in the countryside decreases, the flow of farmers decreases, the speed of transfer to cities slows down, and diversified production and operation modes are engaged in the original residence to drive the sustainable development of rural areas.

## **3. Research Method**

### **3.1. Sample Selection**

The annual housing price per square meter comes from National Bureau of Statistics data. The data on employees and output value in this paper are from the provincial statistical yearbooks and the China statistical Yearbook, and the remaining supplementary data are from the National Statistical Yearbook, the Science and Technology Statistical Yearbook and provincial statistical bulletins. In terms of sample selection, this paper selects the data of Anhui Province and Hebei Province for comparative research, and takes Anhui Province with small economic gap and small cultivated land area as the control group. Because the proportion of the primary industry in the two provinces is similar, the population is in a state of net out-migration. Moreover, the geographical location of the two provinces is similar, the natural environment is similar, and the rural revitalization policy has policy influence. In terms of timing, the implementation of the actual water rights policy in Hebei Province is earlier than the formal issuance of policy documents. At the end of February 2017, Cheng'an County, Handan City, Hebei Province was used as a pilot area for agricultural water rights. According to the public information of the Water Resources Department of the Anhui Provincial

Government on December 9, 2021, the first water rights transaction in the Xin'an River Basin in Anhui Province was successfully signed in that month. Thus, the intervention's impact period is set between 2017 and 2020, based on the actual situation. In the specific content of water rights in Hebei Province, the rural residents who can transfer the way to obtain water rights can obtain the income, and the rural population data in Hebei Province can not be used as the research object. The impact of water rights on rural areas is not limited to the will of production employees in the primary industry. The content of water rights confirmation in Hebei Province can be obtained, and the income of agricultural water users in water rights is matched with their actual demand, which can affect the migration intention to a certain extent. In conclusion, this paper will employ the proportion of the rural population that consists of permanent residents for regression analysis.

### 3.2. Model Setting and Variable Interpretation

$$Y_{it} = \alpha + \beta D_i + \omega_i + \tau(D_i \times T) + X'_{it}\gamma + \varepsilon_{it} \quad (1)$$

Among them,  $i$  represents the city, and  $t$  represents the year, because the variable at the provincial level, an annual rural resident population proportion is the virtual variable of policy implementation, said  $i$  province in  $t$  years whether water right policy implementation of the city, is 1, not is 0, is the time virtual variable, 0 before policy implementation, after 1, is the core independent variable, coefficient reflects the effect of water rights policy implementation.  $D_i \times T\tau\omega_i$  represents a time-fixed effect.  $X'_{it}$  is the control variable, which is the other factors that may affect the proportion of the rural resident population in a certain year. For example, continued urbanization may cause rural populations to migrate from the countryside to the cities. The income gap between urban and rural areas is increasing, and adjacent cities can provide more jobs and reduce the number of permanent residents in rural areas. Therefore, water rights-related policies can narrow the income gap between urban and rural areas to a certain extent and reduce the desire for population migration. The degree of road traffic accessibility changes the traffic cost of inter-regional mobility, affects the migration of urban and rural population, and changes the proportion of rural permanent residents. Since real estate occupies an important position in the allocation of household assets, affected by factors such as traditional concepts and household registration policies, real estate prices also play an important role in population migration. Owning urban housing increases rural population's motivation to migrate to cities. Neither of the two provinces is characterized by a strong provincial capital city, and the difference between the housing prices of the provincial capital city and other cities is small, so the average price of urban housing prices can be used as a representative.  $\alpha$  is the constant term and  $\varepsilon_{it}$  is the error term.

## 4. Empirical Analysis

### 4.1. Descriptive Statistics for Variable Variables

Table 1: Descriptive statistics of variable variables in Hebei Province (2000-2020).

variable	Obs	Mean	Std. Dev.	Min	Max
Urbanized rate(%)	21	44.413	9.674	26.32	60.07
Highway mileage(10000km)	21	142000	52085.34	59152	205000
Residential average price(¥)	21	3930.61	2361.828	1327	8251

Table 2: Descriptive statistics of variable variables in Anhui Province (2000-2020).

variable	Obs	Mean	Std. Dev.	Min	Max
Urbanized rate(%)	21	43.15	9.594	28	58.33
Highway mileage(10000km)	21	145000	57687.85	44493	236000
Residential average price(¥)	21	3825.652	2170.318	994	7775

According to the descriptive statistics of variable variables in the two provinces, as is shown in Table 1 and Table 2, the gap between the two provinces and the provincial capital cities and other cities in the two provinces is small, and the trend and difference of control variables over time are small. Therefore, it is feasible to choose Anhui Province as the control of Hebei Province. According to the descriptive statistics, it can be seen that the standard difference between the average housing price and the highway mileage in the province is too large, so we will use the logarithmic treatment in the regression.

#### 4.2. Parallel Trend Test

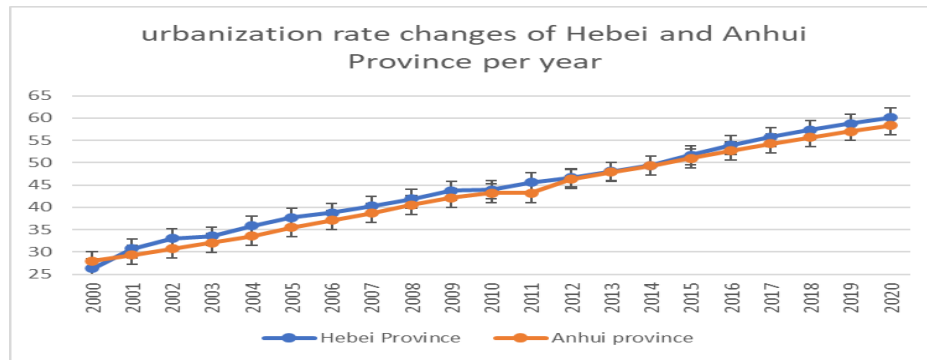


Figure 1: Urbanization rate changes of Hebei and Anhui Province per year.

As is shown in the Figure 1 that the blue lines in the icon show the trend chart of the urbanization rate in Hebei Province over time, and the red lines show the trend chart of the urbanization rate in Anhui Province over time. It can be seen from the figure that the parallel trend hypothesis is met for a long time, so the basic conditions of DID can be met.

#### 4.3. Estamination Results

After controlling the provinces and years, the basic DID regression results are shown in the figure, where vil is the proportion of rural population to the total population of the area, minus the overall urbanization rate, lp is the logarithm of the unit price per square meter of housing, ltra is the logarithm of the total highway kilometers in the province, and D is the interaction term of the processing variables and period variables.

Table 3: Regression results of basic DID analysis.

	Robust					
vil	Coef.	Std. Err.	t	P> t	[95%Conf. Interval]	
D	-.3306014	.3427368	-0.96	0.437	-1.805279	1.144076
lp	-.4007723	9.953548	-0.40	0.726	-46.83438	38.81894
lc	5.684129	4.959407	1.15	0.370	-15.65448	27.02274
_cons	-9.475089	39.24493	-0.24	0.832	-178.3324	159.3822

Table 3 shows that rural population reform pilots have no obvious incentives for rural areas. The p-value for all variable interactions reached 0.572. This result was not statistically significant. However, the p-values of the expressway grade and the average house price are 0 and 0.141, respectively, which are relatively significant, indicating that the province's roads and housing prices will have a strong correlation with rural population migration. (Regression R-squared value is 0.9988)

#### 4.4. Analysis of Heterogeneity

Based on our country's economy after the reform and opening up, which has a fast development speed and the characteristics of fast urbanization, the time span may lead to the national level of other major development policies and international forms of the national economic development direction and change the urbanization rate, therefore, returning to shortening and regression to explore the influence of water rights policy on rural in Hebei Province population migration. Based on the Ningxia water rights pilot policy issued in 2014, that is, the impact after 2015, the sample time was shortened to 2015–2020 and returned again. (R square: 0.9994)

Table 4: Regression results of heterogeneity analysis.

	Robust					
vil	Coef.	Std. Err.	t	P> t	[95%Conf. Interval]	
D	-.3384924	.3844884	-0.88	0.472	-1.992812	1.315828
traffic	.0000228	.0000201	1.13	0.374	-.0000637	.0001093
houseprice	-.0003141	.0007615	-0.41	0.720	-.0035905	.0029622
_cons	42.13582	3.615207	11.66	0.007	26.58084	57.69079

By the regression data comparison between basic analysis and heterogeneity analysis(in Table 3 and Table 4), even if the study time shrinks, interaction p value is still high, 0.437, and statistically not significant. Even after removing the international economic impact (such as the 2008 global financial crisis affecting world economic factors and long-term industrial upgrading of urbanization) and reducing the overall economy with time rapid development of rural population migration urban behavior incentive treatment, the establishment of water rights policy is still not very good for the rural population shift migration idea, and in the foreseeable future for rural revitalization policy is effective.

## 5. Conclusion

This paper is intended to present empirical data on the urban and rural populations' empirical analysis of the implementation of water rights related policies in Hebei Province to determine the impact on the welfare of urban and rural populations, and then to provide insights for the subsequent rural revitalization policy.

Based on the results of the DID study, for Hebei province's water rights after the implementation of relevant policies, the implementation of water rights policies did not significantly affect the trend of urban and rural population migration, indicating that it is related to rural areas. The degree of welfare improvement among the employees is limited and not sufficient to offset the welfare effects of migration out of rural areas.

In addition, the sample size of study in this paper is still small, which will still have a certain impact on the measurement of actual results. It is hoped that future research can expand the scope and sample of the study, which can increase the representativeness of the findings.

## References

- [1] Tong Jinping, Ma Jianfeng, Wang Huimin, Qin Teng, Liu Gaofeng. *Water use efficiency and technological advances in agriculture: an empirical study based on agricultural panel data in China* [J]. *Resource science*.2014,36(09):1765-1772
- [2] P. B. Anand. *Right to water and access to water: an assessment* [J]. *Journal of International Development*. 2007 (4)
- [3] Hengquan Zhang, Qin Zhou, Chenjun Zhang. *Evaluation of agricultural water-saving effects in the context of water rights trading: An empirical study from China's water rights pilots* [J]. *Journal of Cleaner Production*.313(2021):127725
- [4] Lu Ming, Li Pengfei, Zhong Huiyong, 2019: *The New Era of Development and Balance —— The Space Political Economy of New China, The Management of the World*, No.10
- [5] Lu Ming, Gao Hong, HiroSato, 2012: *Urban Scale and Inclusive Employment, China Social Sciences*, No.10