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# An Analysis of the Factors that Affect Collective Construction Land Transfer Price: A Case Study of Yichang City

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**Abstract** The transfer of the rural collective construction land is increasingly accelerating, and the factors affecting transfer price are manifold. In this paper, the research area is Yichang, and we establish hedonic price model to explore and analyze the factors which affect the collective construction land transfer price. The simulation results show that in geographical factors, the higher degree of prosperity, road accessibility and soundness of infrastructure will result in higher collective construction land transfer price; in economic factors, the higher farmers' per capita net income and added value of the village's tertiary industry will lead to higher collective construction land transfer price; in ownership factors, the integrity of usufruct, disposition and possession has increasingly significant impact on collective construction land transfer price. In the process of establishing rural collective construction land circulation market, the government should gradually improve conditions of collective construction land; strengthen the construction of the rural economy, improve the economic attribute of the collective construction land; establish and improve China's rural collective construction land-related laws and regulations, make the rural collective construction land use rights clear, and give the whole rights of occupation, use, earning and disposition.

**Key words** Rural collective construction land, Transfer price, Hedonic price model

## 1 Introduction

With the development of new urbanization construction, establishing a unified urban-rural construction land market has become inevitable, and the land transfer will also accelerate. China's rural collective construction land is five times more than the urban state-owned construction land, and its transfer will be common. The collective construction land transfer price is the key factor in its circulation, and there are many factors that affect the collective construction land transfer price, so the comprehensive study of these influencing factors is of great significance to resolving construction land transfer issues, and promoting collective land use system reform. Yichang City is Hubei's second largest city following the provincial capital of Wuhan, and its urban development is accelerating with the construction of the Three Gorges Project. Currently, Yichang City is making great efforts to promote the construction of a modern mega-city, and create a good investment environment for development. The urban construction is gradually expanding, and the collective construction land transfer is accelerating. Therefore, with some regions in Yichang City as the study areas, this paper builds hedonic price model to study the factors affecting the collective construction land transfer price, and makes some recommendations for reasonable rural collective construction land transfer.

## 2 Methods

**2.1 Fundamentals** Hedonic price model is a model used for the analysis of relationship between heterogeneous commodity

differences and commodity prices. The consumer theory developed by Lancaster (1966) and the supply and demand balance model of Rosen (1974) form the theoretical basis of hedonic price model. Hedonic price model assume that the price of a product reflects embodied characteristics valued by some implicit or shadow prices. Hedonic price regression models are estimated using secondary data on prices and attributes of different product or service alternatives. Suppose consumer preferences are similar to consumer income levels, the collective construction land price is the function of these attributes. The function is set as follows:

$$p = \alpha_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots \beta_n x_n \quad (1)$$

where  $p$  is collective construction land price;  $\alpha$  is the constant term;  $x_1 \cdots x_n$  are the collective construction land attributes;  $\beta_1 \cdots \beta_n$  are the implicit prices of collective construction land attributes.

The previous land price assessment based on hedonic price model is mainly focused on urban land, and closely associated with hedonic price model of real estate. There are few studies on agricultural land and rural collective construction land price, and the factors affecting the collective construction land transfer price are very different from urban land, for example, the plot ratio, building density and greening rate having a great impact on urban land prices, seldom affect the collective construction land transfer price. Therefore, when establishing the model, we need to consider the characteristics and special properties of collective construction land to select influencing factors.

**2.2 Model selection** Based on the experience of domestic and foreign scholars on hedonic price model research, this paper uses the semi-logarithmic function (Equation 2) to establish the hedonic price model for researching regional rural collective construction land, uses SPSS17.0 for multiple regression analysis, and employs OLS to estimate unknown parameters and get regression equation

model. By the statistical test of regression coefficient, the non-significant factors are excluded, to get the optimal model.

$$\ln P = a_0 + \sum a_i \ln X_i + \sum a_j X_j + \varepsilon \quad (2)$$

where  $P$  is the collective construction land transfer price;  $a_0$ ,  $a_i$ ,  $a_j$  are the coefficients to be estimated;  $X_i$  is the continuous characteristic variable;  $X_j$  is the dummy variable;  $\varepsilon$  is the error term.

### 2.3 Variable selection and quantification

Based on litera-

ture, collective construction land characteristics and related rules and regulations, 13 variables are selected as the independent variables of model, which are divided into three categories (location characteristics; economic characteristics; ownership characteristics). The quantification of characteristic variables and the impact sign based on theoretical expectation can be shown in Table 1.

**Table 1** Collective construction land characteristics and quantification

Characteristics category	Quantitative indicators	Variable explanation	Expected sign
Location characteristics	Degree of prosperity ( $X_1$ )	The linear distance between the village committee and the nearest township government, unit: km	–
	Road accessibility ( $X_2$ )	The highest score of road near the village committee (national highway, 6 points; expressway entrance, 5 points; provincial highway, 4 points; county road, 3 points; township road, 2 points; village road, 1 point)	+
	Traffic convenience ( $X_3$ )	The number of long-distance lines from the village to the urban area and other towns, 1 point for 1, 5 points for more than 5	+
	Soundness of infrastructure ( $X_4$ )	The village's infrastructure: water, electricity, road, communication and gas, 1 point each, maximum of 5 points	+
	Soundness of public facilities ( $X_5$ )	The village's public facilities: schools, hospitals (or clinic), grocery stores, cultural and entertainment centers, 1 point each, maximum of 4 points	+
Economic characteristics	Arable land area per capita ( $X_6$ )	The arable land area per capita in the village in 2011, unit: mu	–
	Rural per capita net income ( $X_7$ )	The three-year average rural per capita net income in the village during 2010–2012, unit: $10^4$ yuan	+
	Added value of the village's primary industry ( $X_8$ )	The three-year average added value of primary industry in the township during 2010–2012, unit: $10^4$ yuan/year	+
	Added value of the village's secondary industry ( $X_9$ )	The three-year average added value of secondary industry in the township during 2010–2012, unit: $10^4$ yuan/year	+
	Added value of the village's tertiary industry ( $X_{10}$ )	The three-year average added value of tertiary industry in the township during 2010–2012, unit: $10^4$ yuan/year	+
Ownership characteristics	Possession ( $X_{11}$ )	Whether the ownership affirmation can be registered, dummy variable, yes 1, no 0	+
	Usufruct ( $X_{12}$ )	Whether it is transferred only by way of joint venture, yes 1, no 0	–
	Disposition ( $X_{13}$ )	Whether it can be transferred again, dummy variable, yes 1, no 0	+

**Table 2** Regression analysis of hedonic price model

Independent variables	Definition	Coefficient	$T$ value
<i>CONSTANT</i>	Constant term	–298.973	–0.801
<i>PROSPROUS</i>	Degree of prosperity	–13.789 ***	–2.779
<i>ROAD</i>	Road accessibility	388.204 **	2.197
<i>INFRASTRUCTURE</i>	Soundness of infrastructure	657.656 ***	3.473
<i>FACILITY</i>	Soundness of public facilities	9.031	0.635
<i>PLOUGH</i>	Arable land area per capita	7.932	0.032
<i>NET INCOME</i>	Rural per capita net income	124.861 **	1.903
<i>PRIMARY</i>	Added value of the village's primary industry	70.182 **	3.112
<i>SECONDARY</i>	Added value of the village's secondary industry	119.734 **	1.756
<i>SERVICE</i>	Added value of the village's tertiary industry	123.795 ***	7.009
<i>OCCUPY</i>	Possession	289.097 **	2.113
<i>USE</i>	Usufruct	90.639 **	3.194
<i>DISPOSITION</i>	Disposition	139.012 **	1.381

Note: \* represents 10% significant level; \*\* represents 5% significant level; \*\*\* represents 1% significant level.

## 3 Empirical analysis

### 3.1 Data description

This paper takes five regions (Xiaoting

District, Yiling District, Zhijiang District, Yidu City, Dangyang City) in Yichang City as the study areas. The total sample size is

65, the actual sample size for model is 60, and the land transfer time span is 2012 and 2014. Data sources include questionnaire survey and online enquiry.

**3.2 Regression results** Using stepwise regression, 10 independent variables with statistical significance (10% significant level) are selected (Table 2), including degree of prosperity, road accessibility, soundness of infrastructure, rural per capita net income, added value of the village's primary industry, added value of the village's secondary industry, added value of village collective tertiary industry, possession, usufruct, and disposition. Then these 10 characteristic variables are put into the semi-logarithmic model for testing. From the regression results (Table 3), it can

be found that F test value of regression equation is significant at the 0.01 level, and the adjusted  $R^2$  is 0.8621, indicating that the fitting equation is highly significant, and the characteristic factors into the equation have a significant impact on collective construction land transfer price  $\ln P$ . In terms of the  $VIF$  value of all characteristic variables, the minimum is 1.098 and maximum is 1.467, less than 10, indicating that the collinearity between variables is not serious.  $DW$  value is 1.872, and it can be judged that there is no autocorrelation in the model at the 0.01 significance level. In the White test,  $Obs * R\text{-squared} = 26.011$ ,  $P = 0.123 > 0.01$ , so there is no heteroscedasticity in model at the 0.01 significance level.

**Table 3 Regression results of semi-logarithmic hedonic price model**

Explanatory variables	Regression coefficient		<i>t</i>	<i>Sig.</i>	Collinearity statistic	
	<i>B</i>	$\beta$			Tolerance	<i>VIF</i>
Constant term	7.652		4.967	0.009		
Degree of prosperity	-0.137	-0.623	-13.883	0.001	0.794	1.112
Road accessibility	0.109	0.411	5.195	0.011	0.789	1.467
Soundness of infrastructure	0.057	0.156	6.870	0.005	0.667	1.331
Rural per capita net income	0.073	0.199	3.621	0.017	0.781	1.132
Added value of the village's primary industry	-0.105	-0.321	-5.113	0.001	0.872	1.098
Added value of the village's secondary industry	-0.088	-0.213	-3.979	0.009	0.763	1.231
Added value of the village's tertiary industry	0.115	0.487	6.998	0.000	0.915	1.300
Possession	0.314	0.710	3.763	0.001	0.698	1.209
Usufruct	-0.101	-0.229	-2.004	0.007	0.851	1.187
Disposition	0.122	0.597	2.013	0.013	0.716	1.210

Note: Adjusted  $R^2 = 0.8621$ ;  $F = 82.42$  (significant at 1% level);  $DW = 1.872$ ;  $Obs * R\text{-squared} = 26.011$ ,  $P = 0.123$ .

### 3.3 Analysis of regression results

**3.3.1 Qualitative analysis of influencing factors.** Due to different units, the degree of influence of the factors affecting collective construction land transfer price can not be directly compared, but the standardized regression coefficient  $\beta$  is obtained after standardization of all variables, and it is comparable, so its absolute value is used for ordering of the degree of influence. The factors that affect collective construction land transfer price are divided into four categories. Classification criteria: first category  $\beta \geq 0.50$ ; second category  $\beta \geq 0.30$ ; third category  $\beta < 0.10$ . The ordering and classification results are shown in Table 4, and we can find that there are differences in the degree of influence of 10 factors having close relationship with collective construction land transfer price. The factor with the greatest influence on collective construction land transfer price is possession, and the factor with the minimal impact on transfer price is soundness of infrastructure. In location characteristics, the factor with the greatest influence on collective construction land transfer price is the village collective's degree of prosperity; in economic characteristics, the factor with the greatest influence on collective construction land transfer price is the added value of village collective tertiary industry; in ownership characteristics, possession has the greatest influence.

**3.3.2 Quantitative analysis of the influencing factors.** In the model, the sign of influencing factors  $\alpha_i$  and  $\alpha_j$  indicates the direc-

tion of action on collective construction land transfer price increase or decrease, and the value represents the price elasticity of influencing factors. (i) In terms of location factors, the characteristic coefficient  $\alpha_1$  shows that for each additional 1% of distance between village committee and township government, the collective construction land transfer price will decrease by 13.7%, indicating that attracted by urban economic center, it forms a trend of decreasing collective construction land transfer price with urban area as center. The characteristic coefficients  $\alpha_2$  and  $\alpha_4$  show that for each additional 1% of road accessibility and soundness of infrastructure, the collective construction land transfer price will increase by 10.9% and 5.7%, respectively, because the improvement of rural land conditions and farmers' living standards has increased the collective construction land transfer price. (ii) In terms of economic factors, the characteristic coefficients  $\alpha_7$  and  $\alpha_{10}$  show that for each additional 1% of rural per capita net income and added value of the village's tertiary industry, the collective construction land transfer price will increase by 7.3% and 11.5%, respectively. The characteristic coefficients  $\alpha_8$  and  $\alpha_9$  show that for each additional 1% of added value of the village's primary industry and added value of the village's secondary industry, the collective construction land transfer price will decrease by 10.5% and 8.8%, respectively. Results show that the higher the income of farmers, the higher the collective construction land

transfer price, and the development of the rural collective tertiary industry is the core power for collective construction land transfer price increase. (iii) In terms of ownership factors, the collective construction land transfer price when the land use rights are confirmed and registered is 36.9% higher than the price when the land use rights are not confirmed and registered (i.e.,  $e^{0.314} - 1$ , the same below), and the collective construction land transfer

price when the transfer is allowed again is 13% higher than the price when the transfer is not allowed again. The collective construction land transfer price when the land is transferred only by joint venture is 9.6% lower than the price when the land is transferred by other modes, and the measuring results show that the ownership integrity has a significant impact on the collective construction land transfer price.

**Table 4 The degree of influence and classification of the factors affecting the collective construction land transfer price**

Characteristics category	Characteristic variables	Absolute value of standardized regression coefficients	Ordering of degree of influence	Category ordering	Classification of degree of influence
Location characteristics	Degree of prosperity	0.623	2	1	1
	Road accessibility	0.411	5	2	2
	Soundness of infrastructure	0.156	10	3	3
Economic characteristics	Rural per capita net income	0.199	9	4	3
	Added value of the village's primary industry	0.321	6	2	2
	Added value of the village's secondary industry	0.213	8	3	3
	Added value of the village's tertiary industry	0.487	4	1	2
Ownership characteristics	Possession	0.710	1	1	1
	Usufruct	0.229	7	3	3
	Disposition	0.597	3	2	1

## 4 Conclusions and policy recommendations

**4.1 Conclusions** The rural collective construction land transfer is accelerating, and there are many factors affecting the transfer price. Taking Yichang City as the study area, this paper establishes hedonic price model to analyze the factors that affect collective construction land transfer price. The simulation results show that in geographical factors, the higher degree of prosperity, road accessibility and soundness of infrastructure will result in higher collective construction land transfer price; in economic factors, the higher farmers' per capita net income and added value of the village's tertiary industry will lead to higher collective construction land transfer price; in ownership factors, the integrity of usufruct, disposition and possession has increasingly significant impact on collective construction land transfer price. The lack of ownership is the main reason for collective construction land transfer price fluctuations. The imperfect laws and regulations related to rural collective construction land transfer have caused the lack of possession, usufruct and disposition.

**4.2 Policy recommendations** (i) The government should gradually improve the collective construction land conditions in rural construction, enhance rural road accessibility, and strengthen infrastructure building. (ii) It is necessary to strengthen rural economic construction, improve the rural industrial structure, invigorate the rural economy, rely on market economic means to activate idle rural collective construction land, change land use patterns in rural areas, improve the social security system, and improve economic attributes of collective construction land. (iii) It is necessary to establish and improve the laws and regulations related to China's rural collective construction land, define rural collective construction land use rights, give full possession, usufruct

and disposition, and strengthen the supervision over rural collective construction land transfer to reasonably use it and fully protect farmers' interests.

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