

토지개발 및 토지가격에 대해서 정부 개발 정책의 영향 린이시 중심으로

The Impact of Government Development Policy on Land Investment and Land Price: Evidences from Linyi

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요약

토지는 중국 정부의 중요한 자원이다. 부동산 토지 개발은 도시경제 발전의 중요한 부분이다. 이 논문은 중국 임기시를 중심으로 정부 개발 정책이 토지개발 및 토지 가격에 어떤 영향을 주는지 연구하였다. 정부는 도시계획, 신도시 개발, 경제 개발 특별구 설립하는 여러 가지 개발 정책을 통해서 토지개발 및 토지가격에 큰 영향을 준다. 이 논문은 린이 시에 있는 196개 토지개발 프로젝트와 관련 있는 데이터를 수집하였다. 수집한 프로젝트들은 세 가지 지역에 위치한다(린이시의 옛 구역, 신도시 지역, 경제 개발 특별구). 논문에 활용한 데이터는 개발토지의 투자액, 토지가격, 토지면적, 건설면적, 건설밀도, 토지위치 등이다. 부동산 개발의 투자액 및 토지가격은 종속변수로서 회귀 모형을 만든다. 토지개발 및 토지가격에 대한 영향 변수를 분석한다. 정부 개발 정책은 토지개발 및 토지가격에 미치는 영향의 합리성을 찾아서 향후의 개발 정책에 반영할 수 있는 의견을 제공할 수 있다.

■ 중심어 : | 토지개발 | 토지가격 | 정부 정책 | 경제발전 특별구 |

Abstract

Land is key natural resource that Chinese government actually owns. Real estate and land development have played an important part in China's urban development and economic development. The Chinese local governments' land development policies can mainly be characterized as the establishment of economic development zones and the development of new towns. Given the great importance of these measures, we can expect that these policies can generate noticeable impacts on land development and land price. However, little research has explored these impacts empirically. Using the data collected from land development projects of three districts in Linyi city—old town, new town, economic development zone, this paper attempts to investigate the impact of government development policy on land development and land price. This research chooses investment amount and land price as dependent variables. The multiple regression results demonstrate that the local government's land Development policies can affect land investment size and land price significantly. As we have noticed, the target of government development policy is to make use of urban land resources more scientifically and efficiently. Based on my empirical analysis, some useful insights can be provided for improving our understanding concerning the effects of these government land development policies.

■ keyword : | Government Policy | Land Investment | Economic Development Zone | New Town |

I. Introduction

1. Background of the Research

There is an important relationship between the government and the land. Since land is nationalized in China, the government development policies make significant influence on land development and land prices. Under the socialist public ownership of land, local governments have absolute dominance over the land market (land use right transfer market).

The government's development policy reflects the planning and development of urban land, which is mainly the establishment of EDZ (economic development zones) and the development of new town districts. In order to cope with the complex situation of new town development, the government needs to analyze and predict the development potential of the area and adjust land prices. The government's development policy can also drive the construction of new urban areas and affect the development of old urban areas. In view of the complexity of the land market, it is important to explore the determinants of China's land price and land investment scale.

The location of Linyi City is $34^{\circ}22' \sim 36^{\circ}13'$ north latitude and $117^{\circ}24' \sim 119^{\circ}11'$ east longitude. It has a total land area of 17,191.2 square kilometers and a permanent population of 10.624 million, which is the largest city in Shandong Province.

Linyi's GDP in 2019 was 460.025 billion yuan, with an increase of 3% over the last year. Among them, the added value of the primary industry was 40.948 billion yuan; the added value of the secondary industry was 174.248 billion yuan; and the added value of the tertiary industry was 244.829 billion yuan.



source: www.baidu.com

Figure1. LOCATION OF LINYI ON SHANDONG PROVINCE

Linyi EDZ(Economic Development Zone) was established in 2003 by the Shandong Provincial Government. It is only 6 kilometers away from Linyi Airport and 20kilometers away from the Beijing-Shanghai Express Luozhuang Main Line. Up to now, the development zone has attracted 125 companies specializing in all industries. Linyi EDZ(Economic Development Zone) has a land area of 223 km² and a population of 230,000. it achieved a total income of 42 billion yuan, of which the total industrial output value was 32 billion yuan.

The functional positioning of the new district includes municipal services, cultural centers, sports centers, higher education, luxury residences and leisure vacations. The construction land was approved in 2009 by the "Linyi City 2009-2025 Urban Land Planning" document, and its sources include institutional land and village-level land. Construction funds are mainly obtained through "government plans, financial support, and market operations".

2. Research Objectives and Significance

With the establishment and improvement of China's socialist market economic system, land price has gradually played a big role in optimizing the allocation of urban land resources structure, and regulating the conditions of the real estate market. Under the socialist public ownership of land, the local

governments have the absolutely dominance for the primary market of land (land use right transfer market). How could the governments balance between their monopoly of land market and the leverage of the land price by regulating land prices will affect the effectiveness of land use. With the real estate market developing quickly, the effect of urban land price mechanism on urban land market will even become more important. By 2003, however, only 20% of construction lands in my sample were sold through the bidding, auction or listing, while most of the construction lands were sold by agreement. This situation limited the effect of economic leverage rule on land prices and the means of price regulating in economic market.

The government development policy reflects urban land planning and development, and can mainly be characterized as the establishment of economic development zone and development of new towns currently. The development of new town is actually a huge project, in which the reserve of the construction lands and the approval of investment projects are controlled by the local governments generally. In order to deal with the complex situation of the development of new town, the government needs to predict and analyze the development potential of the region and regulate land prices. The governments' development policies can also drive the construction of new town districts, and affect the development of old towns. Given the complex situation of land market, it is important to explore the determinants of land price and land investment size in China.

Land price is the rent capitalization, while it is also affected by the forces of market supply

and demand for land. My research makes use of the data of land actual transactions to investigate the determination of land price in Linyi city. In particular, I pay special attention to the effects of Linyi local government's land development policies or measures on land prices. Besides, since land investment size also has important implication for land markets and the urbanization process, my research also examines the effects of the development policies or measures on land investment size because land development usually needs a large amount of funds. My researches can shed new light on the determination of land prices and land investment size.

II. Literature Review

Due to the different institutional systems, western researchers mainly focus on the impact of land planning and land supply market restrictions on housing prices. Stevens, a well-known real estate scholar, said, "The government's land supply policy and taxation are the main factors pushing up housing prices" [1]. Gerald [2] believes that planning will affect land supply from four aspects: (1) limit the total supply of land; (2) limit the location of developing land; (3) limit land development methods; (4) change the sequence of land development. Monk, Sarah & Whitehead, C. M[3,4] studied the impact of land planning on housing supply, housing prices and housing supply structure in the United Kingdom. The basic conclusion is that the land planning will affect land prices and housing prices through a series of channels, such as restricting land supply, controlling the density of development,

and causing speculation. Another scholar believes that land supply control will lead to monopolistic zoning, which will have a strong xenophobic effect, resulting in an increase of house price in the entire region[5-7].

Yu Jinkun and Li Fuzhong[8] studied the relationship between land supply policies and real estate market, and pointed out that a reasonable land supply policy will help the real estate industry develop in a intensive direction, reduce credit risks, promote structural balance, and increase the effective supply of land, which can guide house prices back to a rational range. Wang Chong [9][10] based on the single-equation and simultaneous-equation spatial measurement model of panel data of 282 cities from 2003 to 2008, tested the influence of urban government's strategic interaction around land supply market share, land credit financing and land transfer monopoly, it is concluded that the land supply policy affects the land price by re-dividing the market share of supply.

In terms of the implementation of land supply policy, Liu Yanhua, Li Jia et al. [11] studied the internal mechanism of land supply affecting real estate, and believed that land supply policy has a timelag in real estate regulation.

Different from the existing literature, this study uses actual land transaction data to investigate the determination of land prices in Linyi City. And from the perspective of government policy, the influence of government policy on land price and land investment is studied. In addition, my research also examines the impact of development policies or measures on the scale of land investment. My research can provide new ideas for the determination of land price and land investment scale.

III. Data & Method

1. Collecting of Data

This research uses the real land transactions data which include 196 development land projects from 2009 to 2014 in Linyi city. The lands are located in Linyi old town, Linyi economic development zone, Linyi new town and other districts.

2. The Basic Information of Data

[Figure 2] shows the distribution of these land development projects. The data is collected from more than 190 land development projects. It provides the information about land investment size, land price, land area, plot ratio, building density, rate of green space, construction area of building, land location. Among them, plot ratio is calculated by dividing the construction area of building above ground by land area. Building density represents the building coverage ratio. The rate of green space means the ratio of green land in the total development land.



Figure2. LOCATION OF INVESTMENT PROJECTS

3. Model Specification and Selection of Variables

Scholars' researches on land prices mainly starts from the macro and micro aspects. The macro aspect mainly considers the influence of government policies, institutional issues and

other macro theories. At the micro level, it is based on the "Hedonic Price Model" (HPM). Through empirical analysis of the model, it is verified how various factors affect land prices.

According to the micro-factors adopted by the empirical research of scholars, fully considering the selection principle of micro-influencing factors in the HPM model, and combining the relevant content of the "Urban Land Grading Regulations" and "Urban Land Valuation Regulations", we can know that there are mainly three micro-factors affect land price as follows: 1. Location factors, such as public transportation, trunk distance, environmental quality, and urban center influence. 2. Neighborhood factors, eg school factors, hospital factors. 3. Individual factors, such as floor area ratio, building density, greening rate. However, due to the data limitations of this article, we choose key variables as follows: whether an investment project is located in the new town district or not, whether an investment project is located in the economic development zone or not, and the distance to old town center. Control variables: consist of land area, plot ratio, building density, rate of green space, construction area of building.

In addition variable invest amount mainly refers to 1. public welfare projects and infrastructure projects investment 2. Profitable infrastructure projects, such as rail transit, toll roads, water plants, gas, heating power, sewage, garbage treatment facilities, etc.

The definition of the relevant variables and the calculation methods are shown in [Table 1].

Table 1. VARIABLE

Variable Type	Variable Name	Variable Definition/Calculation Methods.
Dependent Variable	LANDP	Land Price
	IA	Investment amount
Independent Variable	DCA	Distance to Old TownCenter
	EDZ	Located in EDZ (or not)
	NC	Located in New Town District (or not)
Control Variable	LAND	Land Area
	CONSTRUCT	Construction Area of Building
	DENSITY	Building Density, building coverage ratio
	GREEN	Rate of Green Space the ratio of green land in the total development land
	PLOT	Plot Ratio which is calculated by dividing the construction area of building above ground by land area

The models are shown as follows:

MODEL 1:

$$\begin{aligned}
 LANDP = & \alpha_1 DCA + \alpha_2 IA + \alpha_3 LAND \\
 & + \alpha_4 CONSTRUCT + \alpha_5 DENSITY \\
 & + \alpha_6 GREEN + \alpha_7 PLOT + \epsilon_1
 \end{aligned}
 \tag{1}$$

MODEL 2:

$$\begin{aligned}
 LANDP = & \beta_1 EDZ + \beta_2 IA + \beta_3 LAND \\
 & + \beta_4 CONSTRUCT + \beta_5 DENSITY \\
 & + \beta_6 GREEN + \beta_7 PLOT + \epsilon_1
 \end{aligned}
 \tag{2}$$

MODEL 3:

$$\begin{aligned}
 LANDP = & \chi_1 NC + \chi_2 IA + \chi_3 LAND \\
 & + \chi_4 CONSTRUCT + \chi_5 DENSITY \\
 & + \chi_6 GREEN + \chi_7 PLOT + \epsilon_1
 \end{aligned}
 \tag{3}$$

MODEL 4:

$$\begin{aligned}
 LANDP = & \lambda_1 DCA + \lambda_2 EDZ + \lambda_3 NC \\
 & + \lambda_4 IA + \lambda_5 LAND + \lambda_6 CONSTRUCT \\
 & + \lambda_7 DENSITY + \lambda_8 GREEN + \lambda_9 PLOT + \epsilon_1
 \end{aligned}
 \tag{4}$$

IV. Empirical Analysis

1. Data description

The descriptive statistic results for three variables of interest and five variables are reported in [Table 2]. The total number of samples is 196. The maximum land price and investment price are 1 and 2 yuan respectively. The minimum is 3 and 4 yuan respectively. In addition, the farthest distance from the center of the old city is 25,000 meters, and the closest distance is only 600 meters.

2. Univariate Correlation Analysis[Table 3]

3. Variance Inflation Factor

It can be seen from [Table 4] that since the maximum VIF is 1.11, which is much less than 10, there is no multicollinearity problem.

Table 4. Multicollinearity Test

Variable	VIF	1/VIF
LANDP	1.06	0.94623
IA	1	0.999338
DCA	1	0.999663
EDZ	1.03	0.968626
NC	1.11	0.904859
LAND	1	0.999702
CONSTRUCT	1.05	0.956527
DENSITY	1.03	0.966906
GREEN	1	0.999403
PLOT	1	0.999522
Mean VIF	1.03	

Table 2. DESCRIPTIVE STATISTICS OF VARIABLES

	Land Price (RMB yuan)	Investment Price (RMB yuan)	Distance to Old Town Center (M)	EDZ	NC	Land Area (M2)	Construction of Building area (M2)	Density of Building	GREEN	PLOT
Mean	1.01E+08	5.43E+08	8070.22	0.528	0.205	107522.9	230245.5	25.88	0.3578	2.190
Median	6.66E+07	2.80E+08	7900	0.223	0.119	63750	150000	25	0.3289	1.910
Max	1.26E+09	7.00E+09	25000	1	1	1289311	2022400	55	0.8773	6.840
Min	1600000	12800000	600	0	0	3572	7404.96	0.67	0.3024	0.620
Std. Dev.	1.39E+08	8.19E+08	3516.26	0.407	0.198	161715.8	267726.7	8.13	0.3635	0.989

Table 3. UNIVARIATE CORRELATION ANALYSIS

	A	B	C	D	E	F	G	H	I	J
A	1	.784	.040	-.036	-.137	.739	.107	.058	.134	.784
B	.784	1	-.173	-.117	-.036	.851	.246	-.118	.287	.831
C	.040	-.173	1	.389	-.183	.089	-.197	.121	-.422	.046
D	-.036	-.117	.389	1	-.336	-.029	.027	.056	-.129	.050
E	-.137	-.036	-.183	-.336	1	.045	.060	-.011	.077	-.122
F	.739	.851	.089	-.029	.045	1	.169	.024	.169	.856
G	.107	.246	-.197	.027	.060	.169	1	-.285	.387	.274
H	.058	-.118	.121	.056	-.011	.024	-.285	1	-.039	-.021
I	.134	.287	-.422	-.129	.077	.169	.387	-.039	1	.208
J	.784	.831	.046	.050	-.122	.856	.274	-.021	.208	1

Note: A: land price, B: land area, C: plot ratio, D: building density, E: rate of green space, F: construction area of building, G: economic development zone, H: new towndistrict, I: distance to old town central area, J: investment amount.

4. Multivariate Regression Analysis

(1) Land Price as Dependent Variable

Table 5. ANALYSIS RESULTS(Land Price)

Variable	Land Price			
	(1)	(2)	(3)	(4)
DCA	-4.880*** (1.7600)			-4.850*** (1.7900)
EDZ		-0.315** (0.1513)		-0.054 (0.1588)
NC			0.452*** (0.1295)	0.448*** (0.1332)
IA	0.425*** (0.0597)	0.434*** (0.0616)	0.385*** (0.0586)	0.414*** (0.0500)
LAND	4.320 (7.7200)	4.370 (7.8100)	9.170 (7.8300)	1.100 (7.7000)
CONSTRUC T	1.090** (5.0100)	1.010** (5.0800)	8.110 (5.0300)	7.700 (4.9400)
DENSITY	0.001 (0.0077)	0.002 (0.0078)	0.001 (0.0076)	0.003 (0.0075)
GREEN	0.012* (0.0099)	0.013 (0.0010)	0.014 (0.0098)	0.015 (0.0096)
PLOT	-0.046 (0.0746)	-0.004 (0.0718)	0.029 (0.0684)	-0.053 (0.0728)
C	9.512*** (1.1386)	8.867*** (1.1838)	9.551*** (1.1248)	9.499*** (1.1470)
R-squared	0.564	0.555	0.574	0.595

These four equations are therefore rewritten as follows:

[Table 5] shows that distance to the center of the old town has significantly negative impact on land price, implying that the further the distance to the old town center is, the higher the urban land price is. The development of the old town started earlier, and its economic growth level is relatively low in Linyi city. The planning and design of the old town is short-sighted, and its infrastructure is relatively old as well. In contrast, the development of new town district has received much support from the local government such that the capital investment increases significantly and the real estate development activity is booming.

The projects which located in the economic

development zone are significantly negative correlated to the land prices. This suggests that the land price of economic development zone is still lower than the other areas. The government provides the economic development zone with many incentives in order to attract investment, for example lower land price. This implies that the government land development policy has significant effect on the determination of land prices.

The projects which located in new town have significantly positive correlation with land price. This means that the land prices of the new town district is higher than those of the old town. The new town district will be the city center, business center, and education center of Linyi city in the future. The local government also has made a long-term development planning for the new town district such that the new town district has a greater development potential, higher investment size, and higher land prices.

Besides, the building density, rate of green space and investment size is found to be significantly negative related to the land prices. Land area, investment amount, plot ratio have significant positive impacts on land price.

In summary, the further the distance to the old town center is, the higher the urban land price is. The land price of new town district is higher than those of other areas. The land price of the economic development zone is lower than those of other areas. These mean that the local government development policies and future development planning are more inclined to support the development of new town district.

(2)Investment Amount as Dependent Variable

We take land investment amount as the second dependent variable. Due to the diversity of variables in this analysis, similarly, I divide the variables into the control variables and interest variables. Control variables consist of land area, plot ratio, building density, rate of green space, and construction area of building. Variables of interest include whether an investment project is located in the new town district or not, whether an investment project is located in the economic development zone or not, distance to the center of the old town.

The models are shown as follows:

MODEL 1:

$$IA = \alpha_1 DCA + \alpha_2 IA + \alpha_3 LAND + \alpha_4 CONSTRUCT + \alpha_5 DENSITY + \alpha_6 GREEN + \alpha_7 PLOT + \epsilon_1 \tag{1}$$

MODEL 2:

$$IA = \beta_1 EDZ + \beta_2 IA + \beta_3 LAND + \beta_4 CONSTRUCT + \beta_5 DENSITY + \beta_6 GREEN + \beta_7 PLOT + \epsilon_1 \tag{2}$$

MODEL 3:

$$IA = \chi_1 NC + \chi_2 IA + \chi_3 LAND + \chi_4 CONSTRUCT + \chi_5 DENSITY + \chi_6 GREEN + \chi_7 PLOT + \epsilon_1 \tag{3}$$

MODEL 4:

$$IA = \lambda_1 DCA + \lambda_2 EDZ + \lambda_3 NC + \lambda_4 IA + \lambda_5 LAND + \lambda_6 CONSTRUCT + \lambda_7 DENSITY + \lambda_8 GREEN + \lambda_9 PLOT + \epsilon_1 \tag{4}$$

Table 6. ANALYSIS RESULTS(Investment Amount)

Variable	Investment Amount			
	(1)	(2)	(3)	(4)
DCA	0.236** (0.1084)			-3.620 (1.9600)
EDZ		0.516*** (0.1251)		0.604*** (0.1683)
NC			0.255* (0.1369)	0.284* (0.1468)
LAND	-2.590 (6.8800)	-6.380 (6.6600)	1.770 (8.3400)	-1.380 (9.5100)
CONSTRUCT	1.520*** (4.4400)	1.710*** (4.2000)	2.980*** (4.9800)	2.780*** (5.0100)
DENSITY	0.002 (0.0068)	-0.003 (0.0067)	0.003 (0.0083)	-0.001 (0.0082)
GREEN	0.001 (0.0088)	-0.001 (0.0086)	0.014 (0.0107)	0.016 (0.0106)
PLOT	0.135** (0.0682)	0.117* (0.0604)	0.134* (0.0738)	0.136* (0.0788)
C	5.687*** (1.5630)	8.151*** (1.0248)	17.84*** (0.5045)	17.767*** (0.5317)
R-squared	0.702	0.722	0.541	0.583

Note: ***means significant at 1%, **means significant at 5%, *means significant at 10%.

[Table 5] shows that the distance to the center of the old town is also shown to have a positive effect on land investment amount. This means that land investment amount is an increasing function of the distance to the old central area, implying a greater development potential in the old central area.

Besides, the economic development zone also has positive impact on land investment amount. This implies that if a development project is located in the economic development zone, it will receive a greater investment size due to the favorable policies.

Newtown district is also found to have positive effect on land investment amount. This implies that if a development project is located in the new town district, it will be more likely to receive more investment amount because of the great development potential of the new town district. The two research variables, such as whether a development project is located in

the economic development zone and whether a development project is located in the new town district, have significantly positive impacts on land investment amount. This suggests that the local government's land development policy and planning can have important implications for the amount and direction of land development investments.

And both the construction area of building and the plot ratio has positive impacts on land investment amount.

V. Summary and Conclusions

With the development of urbanization as well as the improving of people's material and cultural living standards, old public facilities and infrastructure in many Chinese cities no longer can meet the needs of people's life and modern urban development. As a result, many local governments have introduced new land development policies which can be mainly characterized as the developments of economic development zones and new town districts. The land development policies are expected to, to a certain extent, influence the direction and size of land development and the land price level. However, these effects still remain unexplored in the previous studies. As a result, my research has attempted to investigate the important implications of the government land development investment policies.

In this research, the micro-level data has been collected from the relevant government departments of Linyi city. I focus on examining the influences of the government development policies introduced into Linyi city.

My empirical results show that the further the

distance to old town center is, the higher the land price is. The land price of new town district is negatively associated with whether a development project is located in the newtown district. The land price of economic development zone is found to be lower than the old town areas. These suggest that the government development policies are more inclined to support the development of economic development zone and new town district. Besides, the land development projects located in the newtown district are found to have received more investment amount than the other areas due to its considerable development potential. Similarly, the development projects located in the economic development zone are also found to receive more investment amount due to the local government's favorable policies. These results imply that the Chinese local governments' land development policies have important implications for the determination of land prices and the direction and size of land development investments.

VI. Limitations and Prospects

As Chinese urban land market has not been established for a long time, the database on urban land prices is not well established, and it is not easy to obtain data on the micro-influencing factors of urban land prices. In this article, the relevant departments do not provide the micro-influencing factors data of land prices (such as school factors, hospital factors, etc.). Unfortunately, the data in this article are not involved.

There are some personal empirical

conclusions in this paper. For example: "the further the distance to old town center is, the higher the land price is." If possible, find the basis for these conclusions in future research.

In addition, due to time and energy constraints, this paper only studies the Linyi land characteristic price model. In fact, there are many cities and well-developed land markets in China, such as Shanghai, Guangzhou, Shenzhen, Ningbo and other cities.

Using the data of these different cities of urban real estate development projects, establishing corresponding urban land characteristic price models to analysis is further study.

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