# Information Technology, Digital Economic Development and Land Price Distortions - An Empirical Examination of Chinese Cities

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**Abstract.** The rapid development of the digital economy has reshaped the socio-economic development model and brought about significant changes to the production factor markets. We studied panel data of 39 prefecture-level cities in China and found after empirical tests that the development of the digital economy raised the auction price of industrial land, but the growth rate slowed down significantly; while the rapid growth of the digital economy significantly widened the gap between the price growth rate of industrial land and the GDP growth rate, deepening the price distortion in the land market.

**Keywords:** Digital Economy, Land Auction, Factor price distortion.

## 1 Introduction

Digital economy was born with the rapid development and wide application of information technology. In the digital economy, traditional economic forms are gradually transformed by information technology, and data becomes one of the core factors of production to participate in the process of goods production. At the same time, new technologies such as the Internet, machine learning and artificial intelligence have reshaped the way producers and consumers behave, thus giving birth to new business forms. In this context, the research paradigm of macroeconomic theory on economic growth has gradually risen from two factors of capital and labor to a multi-factor model of capital, labor, technology and data.

Factor price distortion refers to the price distortion created when factor markets are influenced by external factors and are unable to achieve clearing according to the market supply and demand mechanism, resulting in the marginal output of factors of production deviating from market prices. The rationing system of production factors brought about by the planned economic system over the past 40 years of reform and opening up has been adapted to China's low capital stock, high human resources and export-oriented development strategy, and has been one of the distinguishing features of the country's economic growth process. The distortion of factor market prices helped labour-intensive industries to develop and gain competitiveness of their products in the international market, directly increasing the profitability of producers and thus


H. Wu et al. (Eds.): CSIEDE 2022, ACSR 103, pp. 486–492, 2022.
https://doi.org/10.2991/978-94-6463-108-1_56

indirectly influencing the development pattern and industrial structure of the industry. And as the volume of China's economy continues to expand and the growth rate gradually slows down, high-quality development replaces high-speed development as the next goal for China's economic development. Meanwhile, the development of the digital economy has brought disruptive changes to social development, altering the way people produce, consume, exchange and distribute in their lives. As the marketisation of factor markets lags behind the product markets, the development of digital technology at the production end has brought about huge changes in the industrial structure, forcing changes in the factor price formation mechanism, and the conflict between the two is directly manifested at the macroeconomic level in the imbalance of the industrial structure, the distortion of factor prices and the mismatch between the development of the digital economy.

Zou, Fu-Liang and Li, Xiao-Jie (2012) argue that the current assessment of land value and price determination lacks a scientific basis, and that the compensation mechanism for land acquisition does not match the marginal productivity and scarcity of land resources, leading to serious land price distortion [1]. Mao Fengfu and Qiu Wenlong (2013) argue that land price distortions stem from the divergence between the twin goals of fiscal growth and economic development, with fiscal concessions becoming the main means of attracting investment under the constraints of the external land regime; while the tax sharing system and 'land finance' force local governments to have an incentive to raise. The combination of these two factors has led to a serious problem of land prices. The combination of these two factors has led to serious land price distortions [2]. Huang (2015) argues that land price distortions have a significant effect on investment by both foreign and private enterprises, but not by state-owned enterprises, mainly because different types of ownership face different external financing constraints, which can lead to over-investment and overcapacity. Using panel data from 30 provinces to study the impact of land price distortions on income distribution [3], Wei, Q. T. and Zhao, R. K. (2018) argue that land price distortions suppress local consumption demand but raise consumption levels in neighbouring regions; they widen the consumption gap between urban and rural residents and inhibit the rise of average social consumption levels [4]. Wang Yi and Wang Haohan (2019) argue that land price distortion affects the rationalization level of industrial structure, especially for the central and western regions, and to a lesser extent for the eastern regions [5].

Therefore, in the context of the rapid development of the digital economy, this paper hopes to propose a model of the circulation, turnover and reproduction of digital capital based on the participation of the data factor as a core factor in the production process, and on this basis, the market price fluctuations of other factors of production, such as labour, capital and land, will be examined using econometric models and empirical methods to study how technological progress affects factor market price distortions, which It helps to understand the future direction of China's economic transformation, industrial structure upgrading and regional economic development, provides a basis for how to resolve the contradiction of insufficient and unbalanced development through technological progress, and makes policy recommendations for the rapid development of China's digital economy, industrial integration and harmonious social development.

## 2 Methods

The issue of accounting for the digital economy has been one of the core issues in the field of digital economy. The construction of the index system of digital economy needs to accurately extract the core features that can represent the level of information technology application and construct a digital economy index based on specific weights to measure the level of development of information technology and digital economy in the region.

We extract the core characteristics exhibited in the application of information technology in the economic field and give different weights to construct a digital economy development index applicable to different cities: The application of information technology is based on a highly skilled labor force, which masters computer knowledge and develops software and hardware for economic activities, therefore, the number of computer services and software in each city should be used as an important indicator, replaced by $y_1$; The development of digital economy is based on the transmission and use of data, people complete information exchange and commodity consumption through the Internet Therefore, the number of Internet broadband access users reflects the application base of information technology in the city and is replaced by $y_2$. With the popularity of smartphones and the rise of mobile Internet, more and more IT usage scenarios are shifting from computers to cell phones and other mobile terminals. Therefore, the number of mobile users reflects the population base as well as the development level of mobile Internet in the city, and is replaced by $y_3$. The application of information technology cannot be separated from the development of Internet business, and the telecommunication business revenue of a city covers the development level of the local Internet industry; the higher the telecommunication business revenue, the more active the digital economy of that city is replaced by $y_4$. The application of information technology substantially improves the efficiency of the financial market, so financial inclusion plays a more important role in the digital economy and is replaced by $y_5$. After extracting the above five core indicators, we refer to zhangxueling [6] and Liu jun [7]'s methods construct the indicator system of digital economy measurement to measure the level of information technology application and the degree of development of digital economy ($DEI$) of the whole city in the following way, the formula is shown as follows.

$$DEI = 0.1896 \times y_1 + 0.0865 \times y_2 + 0.0358 \times y_3 + 0.0166 \times y_4 + 0.6716 \times y_5$$

## 3 Empirical model and data

This paper sets the price of industrial land (POL) as the core explanatory variable, and constructs three multiple regression equations for the growth rate and the degree of distortion. Since the traditional production function does not use land as the main core variable to explain economic growth, there is a lack of measurement of land price distortion in academia. However, there are problems with the above approach, mainly in the improper selection of the reference system for price distortion. Due to the difference in the properties of residential and commercial land, the market price is generally

overestimated in relation to its value. Therefore, this paper makes the following improvements on the basis of existing research: considering the regional differences in land prices, the price growth rate of industrial land is taken as the main measure in the calculation; at the same time, considering that the price reference system should be chosen in line with the actual level of economic development, the GDP growth rate is chosen as the reference system. Therefore, the price distortion of industrial land POL_GDP is set as the ratio of land price growth rate to GDP growth rate.

We extracts Gross National Product (GDP), Number of Enterprises Above Scale (NOE) and Total Factor Productivity (FTP) as control variables and constructs the equation as follows.

$$POL_{it} = \beta_0 + \beta_1 DEI_{it} + \beta_2 GDP_{it} + \beta_3 TFP_{it} + \beta_4 NOE_{it} + \varepsilon_{it}$$

$$POL\_GRW_{it} = \beta_0 + \beta_1 DEI_{it} + \beta_2 GDP_{it} + \beta_3 TFP_{it} + \beta_4 NOE_{it} + \varepsilon_{it}$$

$$POL\_GDP_{it} = \beta_0 + \beta_1 DEI_{it} + \beta_2 TFP_{it} + \beta_3 NOE_{it} + \varepsilon_{it}$$

In this paper, in the regression model, POL data is sourced from the China Land Price Monitoring Network, which counts the auction prices of industrial land in 39 first-tier and second-tier cities from 2011-2019. The basic data for calculating the digital economic development index is taken from the city yearbooks released by each prefecture-level city, the GDP and the number of enterprises above the scale in the control variables are also taken from the city yearbooks, and total factor productivity is calculated from the variables extracted from the yearbooks.

## 4 Results

This paper uses stata17.0 software to conduct a regression analysis of the above short panel data using a fixed effects model, and the empirical results are as follows.

Table 1 of the regression results shows that the digital economy index positively contributes to industrial land auction prices, with the coefficients remaining relatively significant after adding control variables with individual fixed effects. This implies that as the development of the digital economy raises the social level, it gradually raises the final transfer price of industrial land prices.

**Table 1.** The impact of the digital economy on land auction prices (from the author)

| | POL | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| DEI | 0.005*** | 0.005*** | 0.005*** | 0.005*** |
| | (4.27) | (4.08) | (4.48) | (4.27) |
| GDP | 0.004 | 0.004 | 0.004 | 0.004 |
| | (0.64) | (0.65) | (0.60) | (0.61) |
| TFP | | -1.088 | | -0.743 |
| | | (-0.03) | | (-0.02) |
| NOE | | | -0.002 | -0.002 |
| | | | (-0.06) | (-0.06) |

| | | | | |
|---|---|---|---|---|
| _cons | 629.146*** | 630.983*** | 637.191** | 637.995** |
| | (14.25) | (6.52) | (3.69) | (3.13) |
| Fixed effect | Yes | Yes | Yes | Yes |
| N | 312 | 312 | 311 | 311 |
| Adj. R2 | 0.14 | 0.14 | 0.15 | 0.15 |

Note: t-statistics in parentheses, *, **, *** denote 10%, 5%, 1% significance levels respectively, same as in the table below.

The regression results in Table 2 shows that the growth rate of land price auctions tends to decrease significantly as the digital economy index increases. This is because the impact of land on output increases decreases as the digital economy grows and the use of digital technology makes telecommuting possible, thus reducing the actual demand for land by manufacturers and affecting the rate of land price increases.

**Table 2.** The impact of digital economy development on land price growth rates (from the author)

| | POL_GRW | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| DEI | -0.000* | -0.000** | -0.000* | -0.000* |
| | (-1.89) | (-2.04) | (-1.80) | (-1.92) |
| GDP | -0.000*** | -0.000*** | -0.000*** | -0.000*** |
| | (-3.99) | (-4.01) | (-3.90) | (-3.89) |
| TFP | | -0.012 | | -0.010 |
| | | (-1.00) | | (-0.88) |
| NOE | | | -0.000 | -0.000 |
| | | | (-1.56) | (-1.53) |
| _cons | 0.060*** | 0.080*** | 0.122** | 0.135** |
| | (3.98) | (2.95) | (2.65) | (2.68) |
| Fixed effect | Yes | Yes | Yes | Yes |
| N | 312 | 312 | 311 | 311 |
| Adj. R2 | 0.14 | 0.14 | 0.15 | 0.15 |

The regression results in Table 3 show that the growth of the digital economy is inversely related to the degree of distortion in land prices, and the results remain significant after the inclusion of control variables. The regression results show that as the digital economy grows, the extent to which land price growth lags behind GDP growth deepens. The main reason for this is that the new ecological economic form is becoming less dependent on the output growth of land.

**Table 3.** The impact of digital economy growth rates on land price distortions (from the author)

| | POL_GRW | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| DEI_GRO | -0.496*** | -0.470*** | -0.503*** | -0.478*** |
| | (-3.05) | (-3.05) | (-2.82) | (-2.84) |

| | | | | |
|---|---|---|---|---|
| TFP | | -0.258 | | -0.271 |
| | | (-1.48) | | (-1.42) |
| NOE | | | 0.000 | 0.000 |
| | | | (0.32) | (0.41) |
| _cons | 0.701*** | 1.116*** | 0.348 | 0.678 |
| | (50.32) | (3.87) | (0.32) | (0.69) |
| Fixed effect | Yes | Yes | Yes | Yes |
| N | 312 | 312 | 311 | 311 |
| Adj. R2 | -0.00 | -0.00 | -0.00 | -0.00 |

## 5 Conclusions

In the context of the strategy of strengthening the country through science and technology, the digital economy has become increasingly important in the national economy and has had a profound impact on the way the economy grows. With the application of digital technology, the production methods of enterprises have also undergone fundamental changes, thus having an impact on the transaction prices of industrial land. Empirical research shows that the growth of the digital economy is still driving up the price of industrial land, but the rate of increase is gradually slowing down. At the same time, the increased growth rate of the digital economy can exacerbate land price distortions and increase the gap between land prices and GDP growth rates.

## References

1. Zou, FuLiang. & Li, XiaoJie (2012). An Investigation on Why the Land Prices Have Been Distorted in Course of Rural Area Land Expropriation—Positive Analysis in View of Institutional Economic. Journal of Jiangsu Administrative College (05), 55-60
2. Mao, FengFu & Qiu, Wenlong. (2013). Vertical decentralization, horizontal competition and land price distortion. Economic and Management Studies (12), 35-47.
3. Huang Jianbai Xu Zhen and Xu Shan(2015).Land Price Distortions, Enterprises's Property and Over-investment—An Empirical Research Based on the Data of Chinese Industrial Enterprises and Land Price of Cities in China. China Industrial Economics (3), 57-69.
4. Wei, ZhenTao & Zhao RenKang(2018).Land price distortion, income distribution and consumption in China. Modern Economic Research (11), 8-11
5. Wang Yi & Wang Hao Han (2019). Test of land element price distortion on the optimization and upgrading of industrial structure in China. Science-Technology and Man-agement (05), 11-19.
6. Zhang, Xueling & Jiao, Yuexia. (2017). A Preliminary Study of China's Digital Economy Development Index and Its Application. Zhejiang Social Science (04), 32-40.
7. Liu, Jun, Yang, Y. & Zhang, S. F.. (2020). Research on the measurement and drivers factors of China's digital economy. Shanghai Journal of Economics (06), 81-96.