



A Study on the Relationship between Internet Development and Urbanization Process

Zihan Cui¹, Zhaoqi Peng^{1,*}

Department of Labor Economics, BJTU Beijing, China

czhmao@163.com¹, zhqpeng@bjtu.edu.cn^{1,*}

Abstract. With the continuous development of China's economy, the process of urbanization is accelerating. And the Internet, as an emerging technology developing rapidly, has penetrated into all aspects of economic development, and has an inescapable effect on the construction of urbanization. Therefore, by combing through the relevant literature and collecting relevant data, this paper forms the consideration index of Internet development by downscaling the data of four aspects: Internet and cell phone penetration rate, employment of related employees, and output, and urbanization is measured by urban population change, and the correlation between Internet development and urbanization is analyzed by using OLS regression, and the results show that Internet development has a significant positive impact on urbanization. To ensure the reliability of the research results, this paper also conducted a heterogeneous results analysis by geographic area and found that the conclusions still hold. This study has a certain reference value for the government to promote urbanization through Internet development.

Keywords: Internet; Urbanization; OLS

1 Introduction

After years of development since its introduction into China in the 1990s, the Internet has made an unmistakable impact on the country's development. According to the 50th China Internet Development Statistics Report released on August 31, 2022, as of June 2022, the size of China's Internet users was 1.051 billion and the Internet penetration rate reached 74.4%. Although the overall development of the Internet in China is not long, but the speed of penetration is fast and in a short time become the world's largest group of Internet users. With the steady upward trend of the development of the Internet, urbanization in China is also developing. According to the report, the urbanization rate in China has reached 51.27% in 2022. The process of urbanization continues to advance with the continuous development of China's economy, and the Internet is an important thrust of economic development, so this paper will study whether there is a promoting relationship between Internet development and urbanization through empirical analysis.

2 Empirical study

2.1 Data sources

In this paper, the Internet development index data, GDP, and urban employment panel data of each province data in China from 2011-2016 were selected from the official website of the National Bureau of Statistics and the China Urban Statistical Yearbook.

2.2 Variable interpretation

Explanatory variables: The development of the Internet can bring about the movement of population, especially promoting the movement and aggregation of rural population to urban population groups, and the population indicator is a more important measure of the urbanization process, so the ratio of urban population to total population is used as the explanatory variable.

Explanatory variables: The specific data elements corresponding to the indicators are: the number of Internet broadband access users per 100 people, the number of employees on the computer service and software industry to the number of employees in urban units, the total amount of telecommunication services per capita, and the number of cell phone users per 100 people. Through the method of principal component analysis, the data of the above four indicators are standardized and then downscaled to obtain the measure of Internet development level, which is recorded as Internet.

Control variables: The urban employment rate, which is expressed as urban employment population over urban population, and is denoted as Job; the level of economic development, which is expressed as GDP, and is taken as logarithm in the analysis of data, and is denoted as lnGDP.

As shown in Table 1, the constructed indicators, indicator attributes and construction process for China's Internet development level and urbanization and control variables are presented.

Table 1. variable setting and meaning

Variable property	Variable name	Variable meaning
Explained variable	Urban	The process of urbanization in China
Explanatory variable	Internet	Internet development
Control variable	Job	Urban employment rate
	lnGDP	Economic development level

2.3 Model Construction

To test the above research hypotheses, the following basic model is first constructed for the direct transmission mechanism and the relationship between Internet development and the urbanization process is examined using least squares regression methods.

$$Urban_{i,t} = \alpha_0 + \alpha_1 Internet_{i,t} + \alpha_2 Z_{i,t} + \epsilon_{i,t} \tag{1}$$

In equation (1), the $Urban_{i,t}$ is the urbanization level of city i in period t , the $Internet_{i,t}$ is the Internet development indicator of city i in period t , and the vector Z represents a series of control variables. $\epsilon_{i,t}$ denotes the random disturbance term.

Among them, the Internet indicators representing the development of the Internet are obtained by four aspects of the finger after dimensionality reduction, as follows.

$$Internet_{i,t} = \alpha_1 IPI_{i,t} + \alpha_2 WPI_{i,t} + \alpha_3 TSi_{i,t} + \alpha_4 TPI_{i,t} + \epsilon_{i,t} \tag{2}$$

In equation (2), the $Internet_{i,t}$ is the level of Internet development in city i in period t , and $IPI_{i,t}$ is the Internet penetration rate of city i in period t , and $WPI_{i,t}$ denotes the relevant employees in city i in period t , and $TS_{i,t}$ denotes the relevant output of city i in period t , and $TPI_{i,t}$ denotes the cell phone penetration rate of city i in period t , and $\epsilon_{i,t}$ denotes the random disturbance term.

3 Analysis of empirical results

3.1 Descriptive statistics.

Table 2 shows the results of descriptive statistical analysis of the main variables in this paper.

Table 2. descriptive statistics

Variable name	Obs	Mean	Std.	Min	Max
Urban	186	0.549	0.136	0.222	0.897
Internet	186	2.5	1.487	0.419	9.806
Job	186	0.967	0.007	0.955	0.988
lnGDP	186	9.529	0.988	6.416	11.316

3.2 Empirical regression results.

Table 3. preliminary regression analysis

	Urban
Internet	0.067*** (0.005)
_cons	0.382*** (0.013)

N	186.000
R ²	0.534

Note: The values in parentheses are the corresponding robust standard errors of clustering; ***, ** and * indicate significant at the 1%, 5%, and 10% levels, respectively.

First, a simple regression analysis was performed on provincial panel data for 2011-2016, and the results are shown in Table 2.

The regression results show that the explanatory variables pass the 1% significance level and the coefficient is positive indicating a positive relationship between Internet play in that and urbanization development. The regression coefficient of the explanatory variable Internet development indicates that every 1% increase in the level of Internet development will correspondingly promote 0.067% of urbanization, indicating that Internet development plays a positive role in urbanization.

3.3 Comparative static analysis of estimation results

In order to strengthen the authenticity and credibility of the simple regression, this paper adds the control variables for regression estimation again, and the estimation results are shown in Table 4.

Table 4. static analysis of comparison results

	(1) Urban	(2) Urban	(3) Urban
Internet	0.067*** (0.005)	0.080*** (0.005)	0.074*** (0.005)
Job		-6.446*** (1.092)	-5.604*** (1.064)
lnGDP			0.027*** (0.006)
_cons	0.382*** (0.013)	6.581*** (1.051)	5.524*** (1.036)
N	186	186	186
R ²	0.534	0.608	0.643

Note: The values in parentheses are the corresponding robust standard errors of clustering; ***, ** and * indicate significant at the 1%, 5%, and 10% levels, respectively.

From the table, it can be found that the sign of the regression coefficients of the explanatory variables after adding the control variables does not change and remains positive compared to the simple regression coefficients in the above table, which indicates that there is a positive relationship between Internet development and urbanization development. The comparative static analysis shows that the analysis of the empirical results in this paper has a strong credibility.

3.4 Analysis of regression results by geographic region

Since the level of economic development and the level of Internet development in China are not balanced between regions and there are large disparities, the national analysis is not representative of the actual situation in each region, so this paper conducted panel regressions for the East, Central and West regions respectively to study the impact of Internet development in different regions on their urbanization. The results of the regressions for East, Central, and West respectively are shown in Table 5.

Table 5. Sub-regional panel regression results

Variable	(1)	(2)	(3)
	Eastern	Central	Western
	Urban	Urban	Urban
Internet	0.268** (0.103)	3.319*** (0.460)	1.852*** (0.275)
Job	-11.837 (24.432)	-285.377 (168.688)	34.846 (37.836)
lnGDP	0.178 (0.174)	5.181** (2.004)	0.276 (0.180)
N	126	126	126
R ²	0.082	0.904	0.554

Note: The values in parentheses are the corresponding robust standard errors of clustering; ***, ** and * indicate significant at the 1%, 5%, and 10% levels, respectively.

According to the regression results, we can see that the Internet development indicators of different regions all pass the test at the 1% confidence level and have a positive promotion effect on the urbanization process. Through the analysis, we can find that the regression coefficients of the central and western regions are higher than the national average, so the Internet has a more obvious role in promoting urbanization in the central and western regions.

4 Conclusions

4.1 Improve urban and rural Internet infrastructure construction

First, it is necessary to comprehensively promote the investment of the "Broadband China" special action, especially to the remote mountainous areas and rural areas for the laying of transmission cables, signal towers and other facilities, and strive to achieve full coverage of wireless networks and mobile signals. Second, after improving the construction of Internet infrastructure, operators can also be encouraged to launch preferential packages through preferential policies or provide preferential subsidies for broadband usage to lower the cost of Internet usage and reduce the economic burden of Internet access for residents, so as to increase residents' willingness to use the Internet, improve the usage rate of the Internet and promote its development. Third, the government should strictly regulate the Internet sector by encouraging companies to

participate fairly in the construction, operation and maintenance of Internet broadband, while also taking punitive measures to avoid operators from inflating prices in the pricing process and creating a burden for residents.

4.2 Popularize Internet knowledge education

First, vigorously develop the basic education business in rural areas. The education level of residents will affect their acceptance and learning speed of the Internet. The government can provide financial support to purchase modern teaching equipment such as computers and projectors for rural schools to provide a foundation of facilities for further informatization of rural education. At the same time, the teaching content should be updated to include theoretical and practical courses on computer use and Internet usage in the basic curriculum to cultivate information literacy and enhance students' understanding and application of the Internet. Second, for the current situation that rural grassroots cadres are less aware of Internet use, governments at all levels can jointly conduct Internet knowledge popularization courses with cadre schools and relevant enterprises to enable grassroots cadres to form Internet thinking and improve Internet use skills.

References

1. Cheng M.W., Zhang J.P.. Internet development and consumption gap between urban and rural residents in the context of the new era [J]. *Quantitative Economic and Technical Economics Research*, 2019, 36(07):22-41.
2. Deng Shan, Tang Xia, Peng Le Yue. Research on the relationship between Internet development and urbanization process [J]. *Modern Business*, 2015(24):45-46.
3. Feng Hu, Zhang Xuan. Regional differences in Internet development and policy governance in China [J]. *Journal of University of Science and Technology Beijing (Social Science Edition)*, 2011, 27(03):150-157.
4. Liu Yaobin, Zhang Yunfan, Yu Qun. Evaluation of the effect of Internet on the quality of regional urbanization in China [J]. *Journal of Wuhan University (Engineering Edition)*, 2017, 50(02):290-295.
5. Lv Zhaohe, Zhai Deng. Study on the intertemporal spatial effects of Internet technology on population migration--an analysis based on provincial panel data [J]. *China Population Science*, 2018(03):26-38+126.
6. Gong Linxi. Analysis of Urbanization Trends in the New Internet Economy [P]. 2022 International Conference on Social Sciences and Humanities and Arts (SSHA 2022),2022.
7. Zhong Shunbin, Xin Chongchong, Shen Huafu, Chen Xiaohua. Effects of land urbanization and internet penetration on environmental sustainability: a cross-regional study of China. [J]. *Environmental science and pollution research international*, 2021, 28(47).

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

