

Research on the Impact of Digital Economy on the Transfer of Corporate Income Tax between Provinces in China

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Abstract. In recent years, there has been continuous progress in information and communication technology, digital economy in China has been developing rapidly and gradually becoming the backbone of high-quality economic growth. In promoting economic development, the digital economy also has a profound impact on the distribution of tax revenue among different regions in China. This article is based on panel data from 30 provinces in China from 2013 to 2019. By constructing digital economy indicators and measuring the digital economy index, it empirically analyzes the impact of the digital economy on inter provincial corporate income tax revenue and tax transfer in China. The research results show that the digital economy has significantly promoted the growth of corporate income tax revenue between regions in China, but it has also promoted tax transfer between provinces. Further research finds that the digital economy effectively promotes corporate income tax inflow in the eastern region and tax outflow in the other three regions.

Keywords: Digital economy, Corporate income tax, Tax revenue, Tax transfer

1 Introduction

Based on the China Digital Economy Development Research Report 2023, in 2022, China's digital economy continued to grow, the proportion of GDP has reached 41.5%, and the digital economy has continued to play the role of "stabilizer" and "accelerator", creating income for traditional industries and bringing additional benefits to emerging industries. However, with the transformation of traditional business models and consumption methods, it is difficult for traditional tax systems to keep up with the development of the digital economy. In addition, the digital gap among provinces has led to uneven growth in corporate income tax revenue between regions, widening the tax gap between regions. From existing literature, Liang Xiaoqin (2020) used the Digital Inclusive Finance Index and local tax data to calculate the impact of digital inclusive finance on tax revenue, pointing out that digital inclusive finance promotes tax growth by expanding coverage and increasing digitalization^[1]. The digital economy growth has a significant role in promoting local government tax revenues, but the development of the digital economy has exacerbated the tax revenue gap between regions to a certain extent^[2] (Gu Cheng, 2022). Chen Xin and Liu Shengwang (2023) examined the impact of the digital economy on the distribution pattern of corporate income tax among regions based on panel data of provincial manufacturing enterprises in China from 2008 to 2019. They

confirmed that the development of the digital economy has benefited the distribution of corporate income tax in a few regions, while the majority have suffered^[3]. From the perspective of tax competition, Obert and Werner (2019) found that for the digital economy, regions with more tax advantages often attract more digital enterprises, leading to tax disparities^[4]. Argilés-Bosch (2021) started from the perspective of enterprises and demonstrated through empirical research that e-commerce companies are more likely to avoid taxes than traditional companies, thereby affecting tax and profit regional distribution^[5]. Tyutyuryukov (2021) explores the role of innovations of the digital economy in the tax system, reflecting the institutional impact of the development of the digital economy on the tax system. The system of tax distribution in the development of the digital economy should be more focused on fairness^[6].

2 Theoretical Analysis and Research Hypotheses

In the background of the digital economy, the wide application of the Internet and big data makes it more possible for enterprises to operate across regions. This change in business mode helps increase the sales volume of enterprises, thus expanding the tax base of corporate income tax, and promotes the growth of regional corporate income tax revenue. The flourishing of the digital economy can not only drive the increase of economic output, but also promote the optimization of economic structure and fully tap into the potential of economic development. As a result, high-quality economic development can be achieved, tax sources can be effectively conserved, and tax bases can be expanded. Even under the current policy of tax reduction and fee reduction, the portion of tax reduction caused by tax rate reduction will be offset by the expansion of tax bases and the increase of tax sources. Overall, the government's tax and fiscal revenue can achieve growth at a higher level. Based on the above analysis, this article proposes the following assumptions regarding the impact of the digital economy on regional tax revenue:

Assumption 1: Growth of the digital economy favors local corporate income taxes.

Due to the siphon effect of digital industry agglomeration, the higher the level of digital economic development in a region, the easier it is for production factors such as technology, talent, and capital from other regions to flow into the local area, thereby bringing adverse effects on tax revenue in other regions. According to the corporate income tax regulations of the head office and branch offices, if a company operates across regions, it should be shared among the head office and branch offices in a certain proportion, which makes the tax revenue more biased towards the location of the head office. At the same time, the location of the head office is generally in an area with a higher level of economic development, and the uneven development of the digital economy deepens this unfair situation. Based on the above analysis, this article proposes the following assumptions regarding the impact of the digital economy on regional tax transfer:

Assumption 2: The growth of the digital economy can facilitate the transfer of corporate income tax between regions.

3 Research Design

3.1 Model Construction

This article applies a fixed effects model and constructs equations (1) and (2) respectively to study the impact of the digital economy on inter provincial corporate income tax revenue and tax transfer in China:

$$\ln\text{Cit}_{i,t} = \alpha_0 + \alpha_1\text{Dig}_{i,t} + \alpha_2\text{controls} + \lambda_i + \mu_t + \varepsilon_{i,t} \quad (1)$$

$$\text{Trans}_{i,t} = \beta_0 + \beta_1\text{Dig}_{i,t} + \beta_2\text{controls} + \lambda_i + \mu_t + \varepsilon_{i,t} \quad (2)$$

$\ln\text{Cit}_{i,t}$ represents the logarithm of corporate income tax revenue, $\text{Trans}_{i,t}$ represents the amount of corporate income tax transfer, $\text{Dig}_{i,t}$ is the digital economy development index, and controls is the control variable.

3.2 Variables and Data

3.2.1 Explained Variable.

Corporate income tax revenue (Cit). Due to the large difference between itself and its value, in order to avoid data volatility, it is logarithmically treated and recorded as $\ln\text{Cit}$.

Tax Transfer Amount (Trans): This article draws on the approach of Chen Xin (2020) [7] and assumes that the proportion of tax base in each province is the same as the proportion of its current year's GDP. This article uses the calculated tax revenue of each province minus the actual tax revenue of each province to measure the tax transfer amount of each province, and divides the tax transfer amount by 1000 to match the data such as the Digital Economy Development Index.

3.2.2 Explanatory Variable.

Digital Economy Development Index (Dig). Drawing on the digital economy development indicators constructed by Wang Jun^[8], as shown in Table 1, using entropy method to construct a digital economy index using 22 indicators.

Table 1. Digital Economy Development Index.

First level indicators	Second level indicators	Third level indicators
	Digital infrastructure	X1:Fiber optic cable line length X2:Mobile phone base station X3:Internet broadband access port X4:Number of domain names per thousand people X5:Number of Internet pages per capita X6:Number of IPV4 addresses per hundred people

Digital Economy Development Index	Digital industrialization	X7:Total telecommunications services X8:Income from Internet and related services X9:Software business revenue X10:Revenue from manufacturing of electronic information industry above designated size X11:Number of electronic information industry manufacturing enterprises above designated size X12:Number of legal entities in the information transmission, software, and information technology service industry
	Industrial digitization	X13:Number of Taobao villages X14:Number of websites owned by every hundred enterprises X15:Number of computers used per hundred people X16:The proportion of enterprises with e-commerce transaction activities X17:E-commerce sales revenue X18:Digital Inclusive Finance Index
	Digital innovation environment	X19:R&D expenses for industrial enterprises above designated size X20:Domestic patent application authorization volume X21:Software development personnel X22:Technology market transaction volume

3.2.3 Control Variable.

Regional economic development level (pgdp); Urbanization level (ubpp); Investment level (inv); Government intervention (gov); Marketization level.

4 Empirical Results and Analysis

4.1 Analysis of Benchmark Regression Results

Firstly, the regression results in Table 2 show that the development of the digital economy has a positive promoting effect on the overall inter provincial corporate income tax revenue in China. Column (1) shows the regression results without the addition of control variables, while column (2) shows the regression results with the addition of control variables. The regression coefficient with the addition of control variables is 0.794, and the significance level is 1%, which verifies hypothesis one mentioned earlier.

Furthermore, the regression results in Table 2 show that the development of the digital economy has a positive promoting effect on the overall transfer of corporate income tax between provinces in China. Column (3) shows the regression results without the addition of control variables, while column (4) shows the regression results with the addition of control variables. The coefficient of influence with the introduction of control variables is 0.614, with a significance level of 1%, which verifies hypothesis two mentioned earlier.

Table 2. Benchmark Regression Results.

	(1)lnCit	(2)lnCit	(3)Trans	(4)Trans
Dig	0.892*** (3.817)	0.794*** (2.734)	0.962*** (8.352)	0.614*** (5.365)
pgdp		0.060** (2.412)		0.015 (1.558)
ubpp		2.666*** (2.767)		-2.353*** (-6.192)
inv		-0.049 (-0.895)		-0.024 (-1.111)
gov		0.336 (0.719)		0.615*** (3.335)
market		0.016 (0.852)		0.031*** (4.114)
_cons	5.121*** (228.720)	3.216*** (5.062)	-0.054*** (-4.918)	0.848*** (3.384)
Fixed Province	Yes	Yes	Yes	Yes
Fixed time	Yes	Yes	Yes	Yes
N	210	210	210	210
R2	0.774	0.790	0.287	0.575
F	84.830	52.651	9.964	18.943

4.2 Robustness Analysis

Referring to Li Jianjun's (2013) approach ^[9], assuming that the corporate income tax revenue created by each province in the current year has the same proportion as the local operating surplus, recalculate the corporate income tax revenue that each province should receive. Subtract the recalculated taxable income from the actual tax revenue of the current year to calculate the tax transfer amount in a certain region, and use it as a replacement dependent variable for regression analysis.

According to the regression results of columns (1) and (2) in Table 3, both are significant at the 1% level. After introducing control variables, the regression coefficient is 0.862. Except for a slight difference between the regression coefficient and the benchmark regression result, the significance level remains unchanged, indicating that the benchmark regression model is reliable and robust.

Table 3. Robustness Analysis.

	(1)Trans1	(2)Trans1
Dig	1.049*** (8.212)	0.862*** (6.508)
Controls		Yes
_cons	-0.059*** (-4.836)	1.391*** (4.798)
Fixed Province	Yes	Yes
Fixed time	Yes	Yes
N	210	210
R2	0.280	0.533
F	9.633	16.006

4.3 Heterogeneity Analysis

Table 4 presents the regression results of the heterogeneity analysis. The growth of digital economy promotes tax inflow in the eastern region with a regression coefficient of 0.763, which is higher than the main regression result. The growth of the digital economy inhibits the inflow of tax revenue into three other regions, namely the existence of tax outflow phenomenon. Among them, the phenomenon of tax outflow in the central region is severe, which may be related to the large tax base in the central region, while the regression coefficient pertaining to the Northeast region is insignificant, potentially due to the limited sample size.

Table 4. Heterogeneity Analysis Regression Results.

	East	Central	West	Northeast
	Trans	Trans	Trans	Trans
Dig	0.763*** (4.462)	-3.300*** (-3.685)	-0.719*** (-3.889)	-2.362 (-1.144)
Controls	Yes	Yes	Yes	Yes
_cons	2.114*** (3.911)	-0.174 (-0.320)	-0.783*** (-4.811)	0.199 (0.158)
Fixed Province	Yes	Yes	Yes	Yes
Fixed time	Yes	Yes	Yes	Yes
N	70	42	77	21
R2	0.789	0.878	0.813	0.616
F	14.992	14.374	19.541	0.803

5 Conclusion and Recommendations

5.1 Conclusion

This article uses data on digital economy, corporate income tax revenue, and tax transfer in 30 provinces of China from 2013 to 2019 as samples to empirically analyze the direction and degree of the impact of the digital economy on inter provincial corporate income tax revenue and tax transfer in China. The results show that: (1) Overall, the growth of the digital economy has been a significant contributor to the increase in corporate income tax revenue, while also promoting the transfer of corporate income tax between provinces. After conducting a robustness test, the conclusion still holds. (2) The analysis of regional heterogeneity reveals that the eastern region serves as the primary recipient of tax inflows, and the progress of the digital economy has significantly facilitated the redirection of corporate income revenues towards this region, while there is a negative promoting effect on the other three regions, that is, it promotes the transfer of corporate income tax revenue in the corresponding regions.

5.2 Suggestion

As the tangible hand of the market, the state should play its macroeconomic regulatory role, narrow the gap in the digital economy between regions and ensuring the tax interests of those regions with less developed digital economies. The country should take locally tailored measures to provide suitable infrastructure for the growth of the digital economy in each

region, create a development environment that is in line with local characteristics, formulate appropriate enterprise incentives, talent introduction policies, and promote the balanced growth of the digital economy. Specifically, for the eastern region, it is necessary to increase the radiation effect of digital economy developed provinces, with Beijing, Shanghai, and Guangdong as the centers, spurring the development of their neighboring areas; For the central, western, and northeastern regions, where the construction of digital economy infrastructure is backward and the speed of economic development is slow, preferential policies should be utilized to support and increase relevant preferential measures that contribute to developing the digital economy. Continuously narrowing the digital gap between provinces through external coordination.

Improve the existing corporate income tax distribution mechanism and establish a more fair and stable tax distribution pattern. The existing enterprise income tax distribution system in China is more inclined to the place of production and the place where the headquarters are located. The way of relying on Internet consumption makes the enterprise income tax flow into the place of production more, and the summary tax payment system makes the headquarters and branches treat differently. Specifically, for headquarters and branch offices, adopting the same distribution basis, the inter regional distribution of corporate income tax should follow the principle of consistent contribution to GDP creation. The distribution methods of the three factors of consumption land based on wage income, total assets, and operating income of consumption land, as well as the four factors of consumption land based on the number of employees, wage income, total assets, and operating income of consumption land, will improve the linear distribution pattern of corporate income tax (Chen Xin, 2016) ^[10].

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