

Study on the Impact of Digital Economy Development on Residents' Service Consumption

Ge Zhang

2517253350@qq.com

Harbin University of Commerce, Harbin, China

Abstract: Based on 2014–2022 provincial panel data, the article carries out an empirical investigation on how the development of digital economy in China affects residents' service consumption from two perspectives: overall impact and consumption categories differences. The empirical analysis shows that the conclusion is robust, and the growth of the digital economy significantly promotes service consumption. Among the various types of service consumption, healthcare consumption is most affected by the development of digital economy, followed by transportation and communication consumption, education, culture and entertainment consumption. Therefore, China should keep fostering the superior growth of the digital economy in order to encourage the enhancement of citizens' service consumption.

Keywords: digital economy; service consumption; consumption structure; heterogeneity

1 Introduction

Consumption is the main impetus for the development of economy and society, and the Communist Party's Twentieth National Congress (CPC) report specifically stated: "efforts will be made to expand domestic demand, improve the system and mechanism to promote consumption, and strengthen consumption's basic function in the development of economy"^[1]. Empowered by digitalization, consumption has broken through the single and lagging characteristics, and the booming growth of the digital economy not only meets the diversified consumption needs, but also accelerates the transformation and upgrading of Chinese service industry. The service industry, as the tertiary industry, has the highest digital economy penetration rate, which has reached 44.7% in 2022. Digital Modernisation of Service Sector will also help accelerate expanding and activating domestic demand service consumption. Based on this background, exploring the role of the digital economy on the residents' service consumption mechanism has a important theoretical value and practical significance.

2 Literature review

Research on Digital Economy's Influence on Service Consumption. Jiao Shuaitao and Sun Qiubi (2021) use the mediation effect model, in order to explore the mechanism of the digital economy on residents' consumption upgrading in terms of enhancing the capacity of residents to deal with risks, to alleviate existing liquidity constraints and to improve the convenience of the network and use the spatial Durbin model to study its spatial spillover effects. Hu Runzhe

(2022)through empirical research discusses the influence of digital economy on rural residents' service consumption from the perspectives of overall impact and heterogeneous impact, and found that it has a significant positive impact on rural residents' service consumption and has the greatest impact on the middle consumption level. Li Hao (2022)shows that the digital economy has not only promoted the increase of the consumption expenditure of the local residents, but also had a significant positive impact on the consumption expenditure of the local residents, and it is found that the digital economy also helps to reduce the difference in service consumption between city and countryside. Yi Xingjian (2023) studied the economic effects and influence mechanism of the digital economy on residents' household service consumption from a micro perspective, and empirical results found that the promotion effect is more significant for regions with high digital innovation factor levels and high digital infrastructure, as well as for households with low financial literacy and low educational attainment.

3 Theoretical analysis and research hypotheses

3.1 Analysis of the mechanism of the role of the digital economy on the level of consumption of residential services

The Keynesian theory of absolute consumption holds that income is the determinant of consumption. The increase in the level of residents' income could also promote the development of service consumption and the upgrading of residents' consumption structure. Digital economy could realize the development of service consumption by increasing residents' income. In the first respect, along with the digital economy development, new industries and business models continue to emerge, the social environment for entrepreneurship and employment has improved significantly, information technology reduces the cost of searching for jobs, and improves the matching efficiency of the laborers' job selection; in the second, digital technology enhances the level of productivity, improves the efficiency of production and operation, and increases the rate of return on human capital, which in turn brings great economic benefits to the laborers and increased wage income of residents. From Engel's law we can see, as the level of residents' income rises, the proportion of subsistence consumption such as food will gradually decline, and the proportion of residents' service consumption will increase.

According to Marx's theory of consumption, production and consumption complement each other, and production not only determines the object, mode, quality and level of consumption, but also creates impetus for consumption. Digital economy can promote consumer consumption by promoting the upgrading of industrial structure. On the one hand, informatization and Internet technology have improved the allocation efficiency of production factors, constantly giving rise to new forms and modes of production, and the integration of traditional production methods and information technology can promote continuous innovation, thus promoting the optimization and upgrading of the entire industry^[13]; on the other hand, the sharing mode of the digital economy has realized the precise matching of traditional services, improved the specialization and precision of traditional services, and changed the previous The contradiction between the excess supply of low-end and insufficient supply of high-end has been changed, making it possible to satisfy the diversified and

personalized needs of consumers. The degree of self-realization of consumers is deepening, and consumers' desire for material needs such as food and clothing is gradually declining, replaced by spiritual needs. In summary, hypothesis 1 is proposed:

Hypothesis 1: The development of digital economy has a positive effect on the increase in the level of residential services consumption.

3.2 The digital economy's impact on residential services consumption in a heterogeneous environment

With the rapid development of digital economy in recent years, residents' consumption is also developing towards diversification and intelligence, due to the heterogeneity of residents in the category of service consumption. Service consumption, as opposed to physical consumption, is the sum of all consumption expenditures of residents used to pay for non-physical services provided by society^[8]. In terms of consumption categories, service consumption mainly includes transportation and communication, education, culture and entertainment, and healthcare consumption^[4]. Different categories of consumption expenditures correspond to different consumption characteristics, and the diversified consumption characteristics possessed by digitalization help stimulate consumers' consumption vitality, change residents' consumption concepts, and choose different consumption categories. In summary, hypothesis 2 is proposed:

Hypothesis 2: The influence of the digital economy on the increase of service consumption level by the population is characterized by sub-consumption category heterogeneity.

4 Research design

4.1 Variable selection

(1) Explained variable: level of residents' service consumption (LnService). National Bureau of Statistics of China divides residents' consumption expenditure into eight categories, of which the service consumption expenditure refers to transportation and communication, education, culture and entertainment and healthcare consumption expenditure. Therefore, this paper selects the logarithmic value of the total service consumption expenditure per capita to measure the level of service consumption^[12].

(2) Core explanatory variable: the level of digital economy development (Dig). This paper mainly measures the digital economy from the seven dimensions of the number of Internet broadband access ports and cell phone subscribers, the business revenue of information transmission computer services and software, e-commerce sales, the digital financial inclusion index, the revenue of express delivery business, the Internet penetration rate^[6]. With the help of the principal component analysis, the indicators are standardized for the deviations and then the dimensionality reduction process is carried out, and the KMO test is carried out first, the results show that the value of the KMO statistic is 0.716, and the correlation between the variables is strong, which is suitable for factor analysis^[1]. The eigenvalue and variance contribution rate are obtained through data analysis, and there are two eigenvalues greater than 1, but the cumulative contribution rate is 79%, so three principal components are extracted, and the cumulative contribution rate reaches 91.9%, and the integrated calculation obtains the

comprehensive score of the digital economy as an indicator for measuring the degree of digital economy development, as shown in Table 1.

Table 1. Results of principal component factor analysis.

(math.) factor	eigenvalue (math.)	variance contribution	Cumulative variance contribution
F1	4.40667	0.6295	0.6295
F2	1.13491	0.1621	0.7917
F3	0.89425	0.1278	0.9194

(3) Control variable: Resident income level (LnIncome). In this paper, real disposable income per person is used. Upgrading of industrial structure (LnIs)^[3]. Proportion of the added value of the tertiary industry to the added value of the secondary industry. Urbanization level (LnUrb). Measured by the proportion of urban population to total population. Juvenile population dependency ratio (LnChild). As measured by the share of the population aged 0-14 years in the population aged 15-64 years. Older population dependency ratio (LnOld). Expressed as the share of population aged 65+ in the population aged 15-64. Transportation Capacity Level (LnRoad). The proportion of regional highway mileage to the total population at the end of the year.

The results of the descriptive statistics of the variables are shown in Table 2.

Table 2. Descriptive statistics of variables.

Variable category	variant	observed value	average value	(statistics) standard deviation	minimum value	maximum values
explanatory variable	LnService	240	8.701	0.316	7.964	9.551
Core explanatory variables	Dig	240	5.158	0.748	2.132	6.755
	LnIncome	240	10.15	0.366	9.408	11.26
	LnIs	240	1.371	0.723	0.666	5.297
control variable	LnUrb	240	0.615	0.111	0.402	0.893
	LnChild	240	0.234	0.0631	0.120	0.372
	LnOld	240	0.162	0.0403	0.0922	0.267
	LnRoad	240	0.404	0.254	0.0519	1.450

4.2 Data sources

This paper selects panel data from 30 provinces in China from 2014 to 2022 as research samples. Due to the lack of large amounts of data in Tibet, Hong Kong, Macao and Taiwan, the data has been deleted.

4.3 Modeling

To explore the effect of the digital economy on consumption of residential services, the econometric model (1) is constructed.

$$\text{LnService}_{it} = \alpha_0 + \alpha_1 \text{Dig}_{it} + \alpha_n \text{Xn}_{it} + \gamma_i + ft_t + \varepsilon_{it} \quad (1)$$

where α_0 is the constant term, α_1 and α_n are the regression coefficients of the core explanatory variables and control variables, X_{it} indicates the control variables in the econometric model, i indicates the province, t indicates the year, γ_i indicates the individual fixed effects, f_t denotes the time fixed effects, and ε_{it} denotes the random disturbance term.

5 Empirical analysis

5.1 Analysis of baseline regression results

Before the baseline regression, it is necessary to judge the use of random effects or fixed effects with the help of Hausman test. Columns (1)-(4) of Table 3 show the empirical results of adding control variables respectively. The Hausmann test result is 1% significance level to reject the original hypothesis, which means that it is more appropriate to use the fixed effect model in the model estimation for processing and analysis, so the empirical evidence of this paper are analyzed with column (2) as the benchmark.

Table 3. Results of the baseline regression estimation analysis.

	LnService FE(1)	LnService FE(2)	LnService RE(3)	LnService RE(4)
Dig	0.331*** (0.010)	0.112*** (0.023)	0.330*** (0.010)	0.122*** (0.017)
LnIncome		0.711*** (0.223)		0.683*** (0.086)
LnIs		0.050* (0.028)		0.006* (0.019)
LnUrb		1.651*** (0.477)		0.118* (0.277)
LnChild		-1.478*** (0.410)		-0.740*** (0.236)
LnOld		0.302** (0.328)		0.410** (0.261)
LnRoad		0.227 (0.171)		0.288 (0.054)
individual fixed	yes	yes	no	no
time fixed	yes	yes	no	no
constant term	8.317*** (0.053)	0.591*** (2.224)	6.996*** (0.063)	1.197*** (0.664)
N	240	240	240	240
R ²	0.975	0.980	0.576	0.904

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

According to Table 3, the estimation result of column (2) shows that the regression coefficient of the impact of digital economy development on residents' service consumption is 0.112, which is significant at 1% level, indicating that the digital economy can significantly promote the increase in the level of residents' service consumption^[2], Hypothesis 1 holds. About control variables, the coefficients of residents' income level、urbanization level、industrial structure

upgrading and transportation capacity level are positive. The correlation coefficient of the child dependency ratio is negative, which may be due to the fact that with the increasing cost of education, residents are less willing to have children, but at the same time pay more educational resources for their children, thus leading to a situation where the child dependency ratio decreases but the consumption of services rises^[9]. However, the old-age dependency ratio has a positive effect, because the degree of aging in China is now deepening, older people paying more attention to their physical health, increasing their consumption of related health care for the elderly and for recreational and health-care services^[5].

5.2 Analysis of robustness test results

In order to further verify the reliability of the previous empirical results, this paper conducts the following two robustness tests: first, selecting a new explanatory variables and relaxing the evaluation criteria of service consumption. Because living goods and services and other goods and services also include a part of service consumption expenditures, so these two kinds of consumption expenditures are included in the service consumption for measurement, and this time the explanatory variables are represented by LnService2. Secondly, the regression estimation model is replaced and the Tobit model is applied for regression estimation^[10]. As shown in Table 4, in the robustness test, the sign and significance level of the regression coefficients of the core explanatory variables and control variables are unchanged compared with the baseline regression results, and at the same time, the regression coefficients of the variables do not change much, which further confirms the reliability of the previous empirical results.

Table 4. Robustness test.

	LnService2 FE(5)	LnService2 FE(6)	LnService Tobit(7)	LnService Tobit(8)
Dig	0.118*** (0.019)	0.046*** (0.023)	0.321*** (0.018)	0.082*** (0.016)
LnIncome		0.760*** (0.240)		0.579*** (0.066)
LnIs		0.022* (0.030)		0.005* (0.011)
LnUrb		1.309*** (0.514)		0.442* (0.188)
LnChild		-0.131*** (0.379)		-0.543*** (0.150)
LnOld		0.204** (0.354)		0.114** (0.187)
LnRoad		0.231 (0.184)		0.267 (0.028)
individual fixed	yes	yes	yes	yes
time fixed	yes	yes	yes	yes
constant term (math.)	8.667*** (0.099)	0.328*** (2.397)	7.045*** (0.093)	2.120*** (0.505)
N	240	240	240	240
R ² /Pseudo R ²	0.972	0.976	1.620	4.525

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5.3 Analysis of the results of the heterogeneity test

In order to further explore the differences in the impact of the digital economy on different service consumption categories, the sample in this paper is divided into three categories: transportation and communication, education, culture and entertainment and healthcare. The following econometric model is constructed for the analysis of heterogeneity test of consumption categories, and the results are shown in Table 5.

$$\text{LnTC}_{it} = \beta_0 + \beta_1 \text{Dig}_{it} + \beta_n X_{it} + \gamma_i + f_t + \varepsilon_{it} \quad (2)$$

$$\text{LnECE}_{it} = \theta_0 + \theta_1 \text{Dig}_{it} + \theta_n X_{it} + \gamma_i + f_t + \varepsilon_{it} \quad (3)$$

$$\text{LnMC}_{it} = \lambda_0 + \lambda_1 \text{Dig}_{it} + \lambda_n X_{it} + \gamma_i + f_t + \varepsilon_{it} \quad (4)$$

In equations (2) to (4), β_0 , θ_0 and λ_0 are constant terms, β_1 , θ_1 and λ_1 all denote the regression coefficients of the core explanatory variables, β_n , θ_n and λ_n all denote the regression coefficients of the control variables, and the rest of parameters have the same meanings as those in equation (1).

Table 5. Heterogeneity test results by consumption category.

	LnTC FE(9)	LnECE FE(10)	LnMC FE(11)
Dig	0.082*** (0.030)	0.017*** (0.031)	0.088*** (0.027)
LnIncome	0.439 (0.322)	0.757** (0.328)	1.359*** (0.285)
LnIs	0.030 (0.041)	0.089** (0.042)	0.022 (0.036)
LnUrb	2.851*** (0.690)	2.126*** (0.703)	-0.749 (0.610)
LnChild	-0.182*** (0.508)	-0.069*** (0.518)	0.578* (0.449)
LnOld	0.508 (0.475)	0.481*** (0.484)	0.497*** (0.420)
LnRoad	0.339 (0.247)	0.221*** (0.252)	-0.146 (0.218)
individual fixed	yes	yes	yes
time fixed	yes	yes	yes
constant term (math.)	0.429*** (3.218)	2.302*** (3.279)	6.853*** (2.843)
N	240	240	240
R ²	0.963	0.955	0.975

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

As can be seen from Table 5, the development level of digital economy has a conspicuous impact on all three types of service consumption. Among them, the regression coefficients on transportation and communication consumption, education, culture and entertainment consumption and healthcare consumption are 0.082, 0.017 and 0.088 respectively, all of which are significant at the 1% level. It can be found that the level of development of the digital economy has different impacts on different service consumption categories^[7], and the impact

on health care consumption expenditure is higher than that on transportation and communication and education, culture and entertainment consumption expenditures, so hypothesis 2 holds.

6 Conclusions

First, digital economy development positively promotes the total service consumption of Chinese citizens, and the conclusion still holds under the robustness test. Second, the effect of digital economic development on service consumption has consumption category heterogeneity. From the perspective of consumption categories, digital economic development has the greatest impact on healthcare consumption.

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