The Impact of Digital Economy on Household Consumption in Western China

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Abstract

The rapid development of the digital economy changes people's lifestyles and consumption habits, and the wide application of digital technology provides residents with more convenient and personalized consumption choices. This paper selects the development data of the digital economy in western China from 2017 to 2022, calculates the comprehensive index of digital economy development level in western China through the entropy weight method, and discusses the characteristics of digital economy development in western China. Then, it constructs an econometric model and conducts a benchmark regression model to analyze the impact of digital economy development on residents' consumption level in western China. The impact of consumption structure. The paper also analyzes the heterogeneity of urban and rural areas, aiming to explore the extent of the impact of the development of digital economy on the consumption of urban and rural residents in western China, and puts forward relevant measures to improve the consumption structure of residents through digital economy.

Keywords

Digital economy, resident consumption, consumption structure.

1. Introduction

Don Tapscott proposed the digital economy in 1996 in The Digital Economy. The digital economy has ushered in a new era of global communication, production, trade and investment. It becomes the main form of our country's economic development. In 2014, the OECD proposed that the digital economy is an ecosystem driven by digital technology and undergoing continuous digital transformation in the economic and social fields, including at least big data, Internet of Things, artificial intelligence and blockchain. The development of China's digital economy entered a period of rapid growth in 2017-2018, with a year-on-year growth of nearly 21% in 2018. In 2020, the digital economy will grow by nearly 10%, ranking first in the world. In 2023, the scale of China's digital economy will reach 53.9 trillion yuan, accounting for 42.8% of GDP, and the contribution rate of digital economy growth to GDP growth will reach 66.45%[1].

There is a close relationship between the digital economy and residents' consumption. The digital economy is becoming a key variable and an important focus to drive consumption upgrading. In the process of rapid development of the digital economy, great changes have taken place in consumer behavior. The digital economy has given birth to new consumption patterns, and consumers pay more attention to the individuation, customization, and diversification of goods and services. The digital economy has enriched residents' consumption scenarios, such as smart supermarkets, smart restaurants, and other new retail and intelligent service terminals, to meet the diversified and high-quality needs of consumers. Technological change has promoted the deep integration of the primary, secondary and tertiary industries, and spawned a variety of new consumption scenarios such as online consumption, digital consumption, live broadcast consumption, experience consumption, and social consumption so

that consumers can more easily obtain the goods or services they need. The digital economy has improved the consumption environment of residents, transforming from traditional cash payment to portable electronic payment, and the payment methods are more convenient and diversified.

Therefore, this paper studies the impact of digital economy on residents' consumption. This paper takes the western region of China as the research object, studies the development status and level of digital economy in the western region, and explores the impact of digital economy on residents' consumption level and consumption structure. Specifically, this paper selects the data of western China from 2017 to 2022, selects indicators from infrastructure, digital industrialization, industrial digitalization, talent base, development environment and other dimensions to build the digital economy evaluation index system in western China, and calculates the comprehensive index of digital economy development level in western China through entropy weight method. The measured results are brought into the econometric model for benchmark regression model, and on this basis, urban and rural heterogeneity analysis, endogeneity test and robustness test are carried out to specifically analyze the impact of the development of digital economy on the consumption structure of residents in western China.

2. Theoretical and Research Status

2.1. Measurement of Digital Economy and Development Level of Digital Economy

Kling&Lamb(1999) argues that the digital economy focuses on those goods or services that are developed, produced, sold, or provided that are heavily dependent on digital technologies [2]. Bukht R&Heeks (2017) defines digital economy as the economic output that comes entirely or mainly from digital technologies and business models based on digital goods or services [3]. He Xiaoyin (2013) defined digital economy as a new economic form based on knowledge and catalyzed by digital technology in the fields of manufacturing, management and circulation in digital form [4]. In the Statistical Classification of Digital Economy and Its Core Industries (2021) issued by the National Bureau of Statistics of China 2021, digital economy refers to a series of economic activities that take data resources as key production factors, modern information networks as an important carrier, and the effective use of information and communication technologies as an important driving force for efficiency improvement and economic structure optimization. By sorting out the definition, this paper finds that the characteristics of a digital economy are data information as production factors, modern information technology and network communication as means to improve the efficiency of the real economy and promote the optimization of economic structure and high-quality development.

At present, the academic community mainly evaluates the development level of digital economy comprehensively through the index system. Chen Yanbin et al. (2019) used the automation and intelligence of production tasks to measure the level of digital economy [5]. Prettner (2019) introduced smart capital into the production function to reflect the development level and technological strength of a country or region in the digital economy [6]. Sun Zao and Hou Yulin (2019) constructed a digital comprehensive evaluation index system, selected panel data from 30 provinces and cities in China from 2001 to 2015, and used the principal factor analysis method to evaluate the level of industrial intelligence [7]. Liu Liang et al. (2020) established an intelligent evaluation index system, and determined the weight distribution of each index with the entropy weight method from three aspects of intelligent basis, intelligent technology and intelligent results, to achieve an objective assessment of the development level of digital economy in different regions [8]. Li Jie and Wang Qinmei (2023) adopted the comprehensive weighted TOPSIS method to conduct a quantitative assessment of the development degree of the digital economy in China's mainland, and explored the characteristics of the spatio-

temporal evolution of the digital economy with the help of kernel density estimation, Dagum Gini coefficient and spatial autocorrelation analysis techniques. In the White Paper of China Digital Economy Development Index 2021 released by the China Institute of Electronic Information Industry Development, five dimensions of digital infrastructure, data value, digital industrialization, industrial digitalization and digital governance are used to scientifically measure the level of China's digital economy.

2.2. Consumer Consumption Structure

Lin Baipeng (1987) defined the consumption structure from the narrow sense and the broad sense, arguing that the narrow sense of consumption structure refers to the proportion of residents' consumption of various consumption materials, while the broad sense of consumption structure refers to the sum of the relationships established among various factors in the process of people's life consumption [10]. Therefore, this paper divides the consumption structure into subsistence consumption, including food, tobacco, alcohol, clothing, and living, which is the most basic consumption necessary for People's Daily life. The second type of consumption refers to the consumption that people will improve their quality of life in addition to buying basic daily necessities after their income level increases. This type of consumption is called developmental consumption, including education services, health care consumption, transportation and communication consumption. The third type of consumption is hedonic consumption, which refers to cultural entertainment, luxury goods, tourism and other consumption behaviors to meet spiritual needs.

2.3. Research on the Impact of Digital Economy Development on Consumption

Digital economy has promoted the transformation of production, promoted the virtuous cycle and upgrading between production and consumption, changed residents' consumption habits and behavior decisions, and reshaped the circulation mode of residents' consumption information. Therefore, it has an impact on consumers' psychological expectations, consumption demand, consumption level, consumption structure and consumption upgrading path. Kim et al.(2002) pointed out that the development of digital economy has brought about the emergence of digital transactions, which have a huge impact on people's consumption habits [11]. Li Yi and Jiang Qingsong (2023) found that the development of digital economy can effectively promote the growth of urban residents' consumption, and this effect also presents a positive spatial spillover feature, that is, it also has a positive impact on the surrounding areas. With the continuous progress of digital technology and the improvement of digital economic infrastructure construction, the role of digital economy in promoting urban residents' consumption will continue to be enhanced [12]. Gao Zhenjuan et al. (2021) found that the digital economy enables the transformation of consumption mode from traditional offline to new online, thus promoting the transition of residents' consumption level from low-end to high-end [13]. Zhan Yunqiu et al. (2023) combined the digital economy index at the provincial level of China and the micro-data of the China Household Finance Survey (CHFS), and concluded that the digital economy has a significant boost to the total household consumption and the hedonic consumption part, and there is a significant poverty benefit effect. Through literature review, this paper finds that the impact of digital economy on consumption is concentrated on the impact on residents' consumption level, consumption upgrade and consumption gap, while there are few studies on residents' consumption structure. In addition, the research focuses on the national level or developed areas, and there are few studies on the western region. However, compared with the consumption level of residents, the consumption structure of residents can not only reflect the consumption preferences of residents in a specific region, but also reflect the quality of life of residents and the overall appearance of regional economic development to a certain extent. Therefore, this paper studies the impact of the development of digital economy on the consumption structure of residents in western China.

3. Measurement of the Development Level of Digital Economy in Western China

Western China includes Shaanxi Province, Sichuan Province, Guizhou Province, Chongqing Municipality, Yunnan Province, Tibet Autonomous Region, Qinghai Province, Gansu Province, Ningxia Hui Autonomous Region, Guangxi Zhuang Autonomous Region, Xinjiang Uygur Autonomous Region and Inner Mongolia Autonomous Region.

The measurement indicators and methods of the digital economy in the academic circle cannot be unified. This paper selects 13 three-level indicators from the three dimensions of infrastructure, digital industrialization and digital application to build the evaluation index system of the digital economy in the western region. As shown in Table 1.

Table 1. Index system of digital economy development level

Primary index	Secondary index	Three-level index	Index attribute
Development level of digital economy	Digital information and communication infrastructure	Optical cable line length	+
		Number of Domains	+
		Number of websites	+
		Mobile phone exchange capacity	+
		Internet penetration	+
		The number of broadband Internet connections	+
	Digital industrialization	The proportion of employees in information transmission, software and information technology service enterprises in the total number of employees	+
		Number of legal persons in information transmission, software and information technology services	+
		Total volume of telecommunication service	+
		Express traffic	+
	Digital application	Number of businesses with e-commerce transactions	+
		E-commerce purchases	+
		E-commerce sales	+

The period of selected indicators in this paper is 2017-2022. The figures come from the National Bureau of Statistics, provincial statistical Yearbook, China Internet Development State Statistical Report, China E-commerce Report, China Information Yearbook, China Information Industry Development Statistical Yearbook, etc. The entropy weight TOPSIS method is used to measure the development level of digital economy in western China. The entropy weight method can fully reflect the information difference between each index, and TOPSIS ranking method is used to approximate the ideal solution to revise the ranking. Because the indicators come from different levels, the dimensions and orders of magnitude of the index value are obviously different. First, the indicators are standardized.

$$x_{ij} = \frac{x_{ij} - minx_{ij}}{maxx_{ij} - minx_{ij}}$$

Secondly, the entropy weight method is used to calculate the basic weight. The matrix Uijt is constructed based on the standardized data, and the proportion of the ith object in the jth indicator in the t year is calculated.

$$C_{ijt} = \frac{U_{ijt}}{\sum_{t=1}^{T}\sum_{i=1}^{I}(f_{ijt})}, \text{t=1,2...T;i=1,2...,I}$$

Then a matrix is constructed to calculate information entropy Xj and variation degree Bj;

$$X_j = -In(I.T)\sum_{t=1}^{T}\sum_{i=1}^{I} C_{ijt} lnC_{ijt}$$

B_j=1-x_j

Calculate the weight value of the entropy weight method:

$$E_j = \frac{B_j}{\sum_{j=1}^{n} B_j}, j = 1,2 \dots, n$$

Secondly, TOPSIS method is adopted to improve the data and calculate the improved value. First calculate the weighted normalization matrix Sij:

$$S_{ij} = A_{ijt}.E_j$$

Calculate each index and the optimal ideal solution, the worst ideal solution $O\ j$+and Oj-Euclidean distance, Oj+and Oj-respectively expressed in standardization of the weighted matrix of the maximum and the minimum:

$$0_i^+ = \sqrt{\sum_{i=1}^{n}(0_j^+ - S_{ji})}^{\ 2}$$

$$0_i^- = \sqrt{\sum_{i=1}^{n}(0_j^- - S_{ji})}^{\ 2}$$

Calculation of comprehensive valuation:

$$G_i = \frac{0_i^-}{0_i^+ + 0_i^-}$$

The results of digital economy level in western China from 2017 to 2022 are shown in Table 2. In general, from 2017 to 2022, the development of digital economy in western China continued to grow, only in 2021, due to the epidemic, there was a brief decline, the average index increased from 12.24 to 13.22. The higher level of digital economy development is Sichuan Province, Shaanxi Province, Chongqing City. Sichuan Province's digital economy development level has been higher than the average, Sichuan province has continuously strengthened digital infrastructure construction, digital industrialization development, improve digital efficiency and digital governance service level, digital trade scale reached 167.01 billion yuan. The relatively slow development of digital economy is Tibet, Qinghai province. This is due to the complex terrain, bad climate, and greater difficulty in implementing policies in these two provinces, which restricts the development of the digital economy.

Table 2. Evaluation results of digital economy development level in western China

Province	2017	2018	2019	2020	2021	2022
Inner Mongolia	11.67	11.92	12.18	12.69	12.83	12.96
Shan Xi	14.15	14.87	15.12	15.39	15.01	15.93
Si Chuan	15.35	15.68	15.79	15.83	15.60	15.98
Gui Zhou	12.27	12.79	12.83	12.90	13.07	13.69
Chong Qing	14.79	14.86	14.92	15.14	14.96	15.41
Yun Nan	12.39	12.51	12.68	13.04	12.85	13.25
Tibet Autonomous	10.01	10.09	10.11	10.15	10.10	10.18
Qing Hai	10.03	10.01	10.16	10.18	10.13	10.24
Gan Su	11.12	11.68	12.07	12.15	12.06	12.45
Ning Xia	10.12	10.19	11.26	11.31	11.29	11.42
Guang Xi	12.59	12.89	13.39	13.80	13.71	14.42
Xin Jiang	12.17	12.68	13.88	13.04	13.01	13.14
Mean value	12.24	12.50	12.87	12.97	12.88	13.22

4. Analysis of Residents' Consumption Status

As can be seen from the data in Table 3, per capita consumption expenditure in western China shows a trend of fluctuating growth from 2017 to 2022. Sichuan Province, Chongqing Municipality, Yunnan Province, Guizhou Province and the Tibet Autonomous Region saw faster growth.

This paper also analyzes the characteristics of the consumption structure of residents in western China. First of all, as shown in Figure 1, the proportion of subsistence consumption in western China in 2017 is 57.5%, and the proportion of subsistence consumption in 2022 is 58.5%. From 2017 to 2019, the proportion of life consumption gradually decreased, but from 2020 to 2022, the proportion of survival consumption showed a slow growth trend. The proportion of subsistence consumption expenditure in western China is more than 50%, indicating that subsistence consumption is the main consumption type of residents in western China, that is to say, the consumption of residents to meet the needs of normal life is mostly. As shown in Figure 2. From 2017 to 2019, the proportion of development-oriented consumption of residents in western China increased from 20.9% to 22%. However, in 2020, the proportion dropped to 20.4%, and in 2021 and 2022, development consumption showed an increasing trend, accounting for 21%. It can be seen that the development consumption of residents in western China is relatively low, but it shows a growing trend. This paper analyzes the proportion of hedonic development consumption of residents in western China. From 2017 to 2018, the proportion of hedonic consumption of all residents in western China increased

rapidly, but began to show a slow decline in 2019, indicating that after the epidemic, hedonic consumption in western China is insufficient, and residents' consumption in improving quality of life has gradually decreased.

Table 3. Human settlements consumption expenditure in western China

Province	2017	2018	2019	2020	2021	2022
Inner Mongolia	1.93	1.98	2.14	2	2.28	2.21
Shan Xi	1.49	1.62	1.75	1.74	1.93	1.98
Si Chuan	1.62	1.77	1.93	1.98	2.15	2.23
Gui Zhou	1.3	1.38	1.48	1.49	1.8	1.79
Chong Qing	1.79	1.92	2.08	2.17	2.46	2.54
Yun Nan	1.27	1.42	1.58	1.68	1.89	1.9
Tibet Autonomous	1.11	1.19	1.31	1.36	1.57	1.59
Qing Hai	1.55	1.66	1.75	1.83	1.9	1.73
Gan Su	1.31	1.46	1.59	1.62	1.75	1.75
Ning Xia	1.57	1.64	1.81	1.78	2	1.91
Guang Xi	1.36	1.51	1.61	1.61	1.8	1.81
Xin Jiang	1.51	1.62	1.74	1.65	1.9	1.79

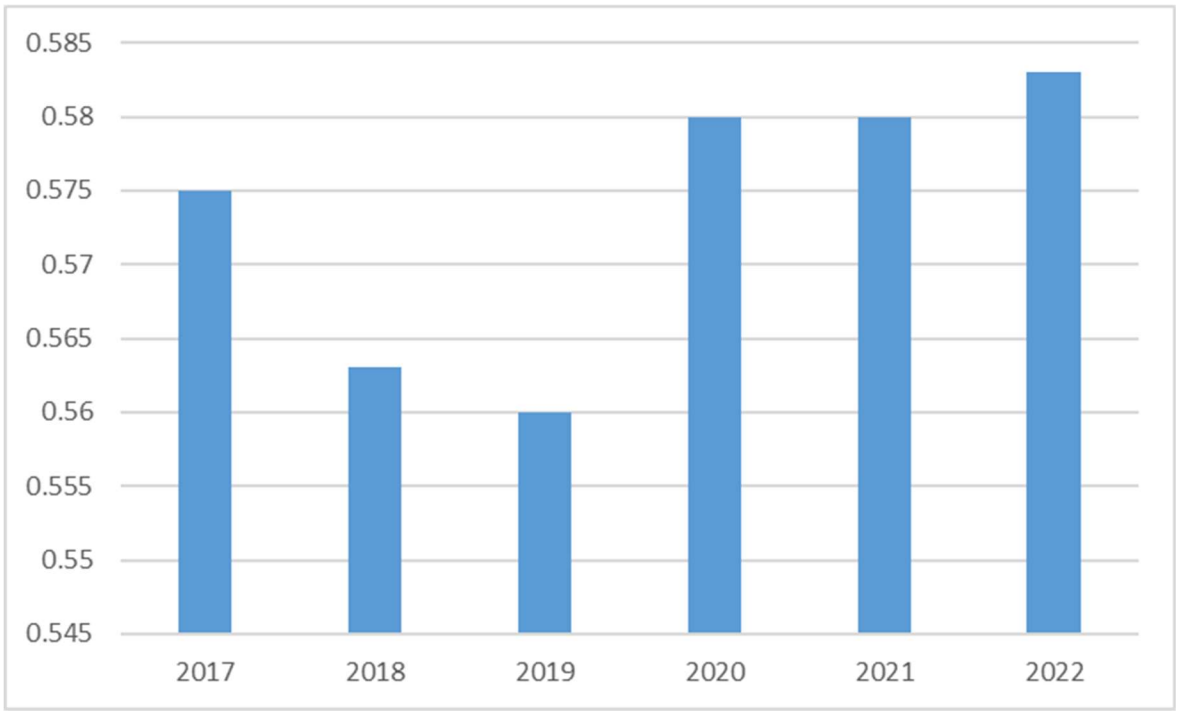

Figure 1. The proportion of subsistence consumption in western China from 2017 to 2022

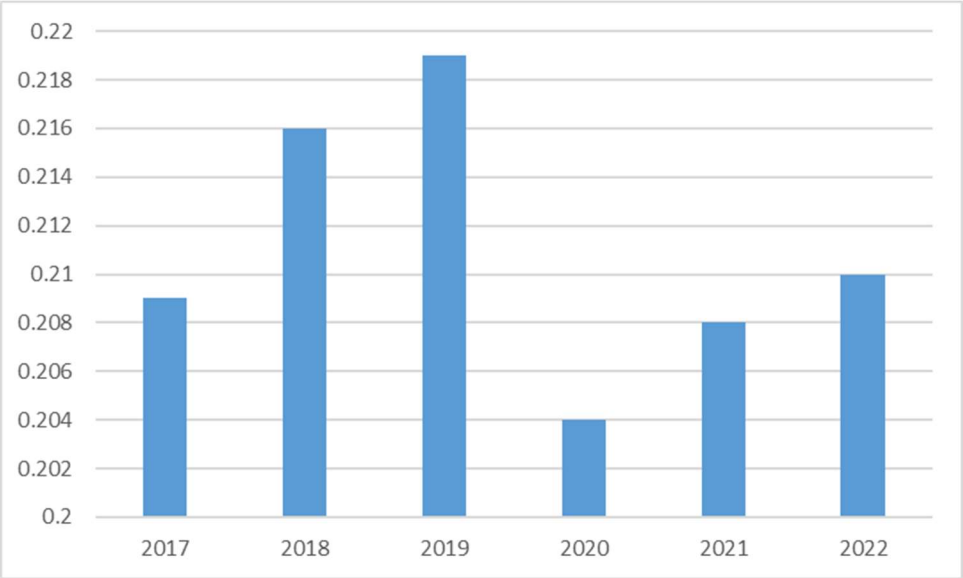

Figure 2. The proportion of development-oriented consumption of residents in western China from 2017 to 2022

5. Empirical Analysis of the Impact of Digital Economy Development on Residents' Consumption Structure

5.1. Building the Model

This paper draws on Tang Hongtao's method to build a regression model:

$$Stu_{it} = \beta_0 + \beta_1 DE_{it} + \beta_i \sum controls_{it} + \alpha_i + \theta_t + \varepsilon_{it}$$

Where, Stu represents the consumption structure of residents, i represents the 12 provincial regions,t represents the year,β0is the intercept term, DEit is the core explanatory variable, representing the comprehensive index of digital economic development level of province i in year t, ∑Controls is the set of selected control variables, including urb, income, CPI,pgdp,*tdr*,*ssl*.αi is the individual fixed effect, θt represents the year fixed effect.εit is a random interference term.

5.2. Variable Description

The explained variable of this paper is the consumption structure (Stu), which is expressed by the consumption expenditure of residents in western China and the consumption expenditure of development/total consumption expenditure. Reflect the change of residents' consumption structure. The core explanatory variable of this paper is the level of digital economy development (DE), which is represented by the comprehensive index of digital economy development level. The control variable of this paper is urbanization level (urb), which is expressed by the ratio of urban population to regional permanent population at the end of the year. Urbanization can affect the consumption structure of residents by creating more jobs, improving the quality of employment and changing their consumption habits. Resident income: This paper uses per capita disposable income to measure resident income. The increase of residents' income may lead to the increase of consumption expenditure and further cause the change of residents' consumption structure. Consumer Price Index (CPI): The Consumer Price Index is the change in the price level of consumer goods and services related to people's lives. Level of Economic Development (pgdp):This article uses regional GDP per capita to measure

the level of economic development, that is, the ratio of the gross domestic product of each region to the total population of each region. Total dependency ratio (tdr):The ratio of the non-working age population to the working age population. The family's investment in raising the elderly and young will bring economic pressure to the family, so it will restrict residents' consumption expenditure. Therefore, this paper considers the constraints of population structure on residents' consumption. Social security level (ssl): measured by the proportion of social security and employment expenditures in local general fiscal expenditures. The more a local government spends on residents' social security and employment, the more it promotes residents' living standards and relives residents' living pressure, and the more it will improve residents' willingness to consume.

5.3. Data Sources

This paper takes the panel data of 12 provinces in western China from 2017 to 2022 as the research sample, and the data comes from China Statistical Yearbook, population census data, and China Science and Technology Statistical Yearbook. In this paper, the per capita consumption expenditure, per capita disposable income and the level of economic development are processed logarithmically.

5.4. Data Analysis

5.4.1. Regression Analysis

In this paper, the impact of digital economy on residents' consumption is analyzed by two-way fixed-effect regression through stata, and the results are shown in Table 4. From the perspective of residents' consumption level, the impact coefficient of digital economy on residents' consumption level is 0.451, and it is significant at 1% level, indicating that every increase of one unit value of digital economy development level, residents' consumption level increases by 0.451 percentage points. With the development of digital technology, data resources will be transformed into commodity production and service supply, and promote the improvement of residents' consumption level. The effect of urbanization on residents' consumption level is not significant, indicating that the improvement of urbanization level has no significant impact on the improvement of residents' consumption level. This may be due to the low level of urbanization in western China, so the promotion effect of urbanization development level on consumption cannot be reflected. The coefficient of per capita disposable income on residents' consumption level is significantly positive at 1% level, indicating that the increase of residents' income has a significant promoting effect on the improvement of residents' consumption level. The consumer price index (CPI) is significantly negative at 1% level. The higher the consumer price index, the lower the real income of the residents. The decrease of residents' real income will restrain residents' consumption expenditure. The influence coefficient of economic development level on residents' consumption level is significantly positive at 5% level, indicating that the higher the economic development level, the higher the residents' consumption level, and economic development has a promoting effect on consumption level. The total dependency ratio has no significant effect on residents' consumption level. The level of social security at 5% significantly affects the level of consumption, and the higher the level of social security, the higher the level of consumption. The improvement of the social security system can enhance the consumer confidence of residents and effectively increase the disposable income of residents. Medical insurance can reduce the burden of medical expenses of residents, and unemployment insurance can provide certain economic support when residents are unemployed, so that residents do not have to worry about the basic life security in the future, so that they can consume with confidence.

In terms of consumption structure, the influence coefficient of digital economy on residents' consumption level is 0.157, and it is significant at 1% level, indicating that with every increase

of one unit value of the digital economy development level, residents' consumption level will increase by 0.157 percentage points. With the development of the digital economy, the consumption content is more diversified, and the consumption behavior and consumption patterns have also changed. People continue to pursue creativity and innovation, pay more and more attention to spiritual needs, and pursue social communication, tourism, and new ways of fitness. It has promoted the change of residents' consumption structure. The digital economy can also reduce the cost of products and improve the quality, which also promotes the change in consumption structure. The impact of urbanization on residents' consumption structure is not significant. The coefficient of per capita disposable income on residents' consumption level is significantly positive at the 1% level, indicating that the increase of residents' income has a significant promoting effect on the improvement of residents' consumption structure. The increase in per capita disposable income means that people can increase consumption expenditure on tourism and education, and promote the growth of development and pleasure consumption. The consumer price index (CPI), the level of economic development and the ratio of total dependency have no significant impact on the consumption structure of residents. The level of social security is significantly positive at the 5% level, indicating that the level of social security will promote the change in residents' consumption structure. When the social security system is perfect, residents do not need to worry about the basic security of life, so residents will increase their consumption in development and enjoyment.

To sum up, the digital economy can effectively enhance the consumption level and improve the consumption structure of residents in western China, and make the consumption structure develop from surviving-type consumption to development-type consumption and pleasure-type consumption.

Table 4. Regression results of digital economy development on residents' consumption structure in western China

Variable	Consumption level	Consumption structure
DE	0.451***	0.157***
	(0.001)	(0.006)
urb	0.189	2.425
	(0.379)	(0.826)
Income	0.673***	0.261***
	(0.000)	(0.002)
cpi	-0.012***	-0.049
	(0.000)	(0.582)
pgdp	0.375**	0.483
	(0.012)	(0.274)
tdr	-0.253	-0.183
	(0.813)	(1.642)
Ssl	1.236**	0.372**
	(0.013)	(0.021)
N	96	96
adj. R^2	0.921	0.943

Note: ***, ** and * are significant at 1%, 5% and 10% levels respectively.The p values are in parentheses.

5.4.2. Heterogeneity Test

There is a dual structure of urban and rural economic development in western China, and there are great differences between urban and rural income levels and economic development.

Therefore, this paper separately explores the impact of the development of digital economy on the consumption structure of urban residents and rural residents in western China. As shown in Table 5. First of all, in terms of consumption level, the influence coefficient of the development level of digital economy on the level of urban consumption is 0.312, which is significant at 1% level, indicating that each increase of one unit value of the development level of digital economy will increase the per capita consumption expenditure of urban residents by 0.312 percentage points respectively. The influence coefficient of the development level of digital economy on residents' consumption level is 0.512, which is significant at 1% level, indicating that the per capita consumption expenditure in rural areas increases by 0.513 percentage points with each increase of one unit value of the development level of digital economy. Moreover, the development level of digital economy has a more significant role in promoting the level of rural consumption. Per capita disposable income at 5% significantly affects the level of urban consumption and rural consumption. CPI at 1% significantly affects the level of urban and rural consumption. At the 5% level ,Pgdp significantly affects the level of urban consumption and rural consumption. At the 1% level, the total dependency ratio significantly affects the urban consumption level, but has no effect on the rural consumption level. The level of social security at 5% significantly affects the level of urban consumption, and at 1% significantly affects the level of rural consumption.

Table 5. Regression results of digital economy development in western China on consumption structure of urban and rural residents

Variable	Urban consumption level	Urban consumption structure	Rural consumption level	Rural consumption structure
DE	0.312*** (0.000)	0.272*** (0.006)	0.513*** (0.000)	0.148*** (0.000)
urb	0.528 (0.231)	0.614*** (0.002)	0.134 (1.372)	0.084 (0.072)
Income	0.473** (0.012)	0.372** (0.046)	0.832** (0.023)	0.172** (0.014)
cpi	-0.068*** (0.000)	-0.029 (0.214)	-0.025*** (0.006)	-0.126 (0.921)
pgdp	0.254** (0.024)	0.483 (0.731)	0.218** (0.027)	-0.016 (0.461)
tdr	-0.172*** (0.000)	-0.024 (0.000)	-0.014 (0.827)	-0.137 (0.145)
Ssl	0.341** (0.038)	0.025** (0.011)	0.245*** (0.004)	0.153 (1.389)
N	96	96	96	96
adj. R^2	0.841	0.903	0.932	0.947

Note: ***, ** and * are significant at 1%, 5% and 10% levels respectively.The p values are in parentheses.

In terms of consumption structure, the development level of digital economy significantly affects the consumption structure of urban and rural areas at the 1% level, but the impact on the consumption structure of rural areas is lower than that of urban areas. This shows that the consumption expenditure of residents in urban areas is more spent on education, culture, entertainment, medical care and other aspects, that is, development and enjoyment of

consumption expenditure. Rural areas have a vast area, high terrain, and are mostly located in remote mountainous areas, resulting in imperfect infrastructure construction of digital economy, high logistics costs, and a relatively isolated living environment. Therefore, the role of digital economy development in improving the consumption structure in rural areas is lower than that in urban areas. In addition, the income level of human settlements under 5% significantly affects the consumption structure of urban and rural areas. This shows that increasing per capita income is an important measure to improve the consumption structure. Therefore, vigorously developing the digital economy, expanding local jobs and increasing local people's income can indirectly improve the consumption structure of residents in western China.

5.4.3. Endogeneity Test

Digital economy and resident consumption have endogenous problems caused by two-way causation. In order to eliminate this effect, this paper takes the digital economy lag one period as an instrumental variable to estimate the model. On the one hand, the lag of digital economy is related to the current level, On the other hand, as a prefixed variable, the lag of digital economy is not related to the disturbance term of the current period, and the development level of digital economy in the current period will not affect the development level of digital economy in the previous period, so the lag term of digital economy meets the characteristics of exclusivity and correlation. Among them, the LM statistic significantly rejects the null hypothesis of "insufficient instrumental variable recognition", and the Wald F statistic is above the critical value at the 10% level of the weak recognition test. It can be seen that the impact coefficient of the development level of digital economy on the consumption level is 0.073, which is significant at 5% level. At the same time, the impact coefficient of the development level of the digital economy on the consumption structure is 0.236, which is significant at 1% level. The significance and direction of regression coefficient did not change significantly, indicating that the test is robust and reliable.

5.4.4. Robustness Test

Table 6. Stability test results

Variable	Consumption level	Consumption structure
DE	0.302***	0.126***
	(0.000)	(0.000)
urb	0.039	0.512
	(0.911)	(0.634)
Income	0.481**	0.362***
	(0.017)	(0.000)
cpi	-0.064**	-0.192
	(0.026)	(0.247)
pgdp	0.162***	0.075
	(0.001)	(0.423)
tdr	-0.438	-0.272
	(0.241)	(0.326)
Ssl	0.023**	0.069
	(0.032)	(0.167)
N	96	96
adj.R^2	0.892	0.933

Note: ***, ** and * are significant at 1%, 5% and 10% levels respectively.The p values are in parentheses.

In order to verify the accuracy of the model setting and conclusions, the core explanatory variable digital economy was indulated by 1%.Then the regression test was performed again.

The results are shown in Table 6. The influence coefficient of digital economy on residents' consumption level is 0. 302.Significant at the 1% level.The influence coefficient of digital economy on residents' consumption structure is 0.126, which is significant at 5% level.

It is consistent with the previous results, and verifies the reliability of the results.

6. Conclusion

As mentioned above, the consumption structure of residents in western China is being gradually optimized. The scale of per capita consumption expenditure of residents in the western region is constantly rising, and the proportion of consumption expenditure of enjoyment and development is constantly increasing, but the consumption expenditure of subsistence is relatively large, the consumption expenditure of development is relatively low, and the consumption power of enjoyment is insufficient. Through empirical research, this paper finds that the development of digital economy can improve the consumption level of residents in the western region and help to promote the upgrading of the consumption structure of residents in the western region. The western region has poor digital infrastructure, late development and slow growth, and the industrialization process and informatization development level in the western region lag behind. Therefore, the western region should increase the construction of 5G network, broadband network and other infrastructure, improve network coverage and quality, and provide a solid network foundation for the development of digital economy. In February 2022, the National Development and Reform Commission, the Cyberspace Administration of the CPC Central Committee and other departments jointly issued documents to launch the "East Count West Count" project. "Counting in the East and counting in the west" is to guide the intensive computing demand in the east to the west in an orderly manner, which opens up a new development path for the western region. Therefore, the western region should make use of the advantages of rich land and green electricity resources and low temperature compared with the eastern region, build data centers and computing power centers, further reduce data processing costs, provide strong computing power support for the digital economy, and form digital industrial clusters with international competitiveness. Through digital technology, traditional industries can be empowered, production efficiency and service quality can be improved, and traditional industries can be promoted to high-end, intelligent and green development. Promote the inclusive and equal development of digital infrastructure, pay particular attention to the digital construction in rural areas, let more residents participate in it, promote the consumption of agricultural products and cultural tourism through "Internet plus", promote the standardized development of e-commerce, live broadcast economy, online entertainment and other digital consumption, and use e-commerce platforms to expand product sales channels in the western region. Improve product awareness and market share. Use digital technology to optimize the consumption environment, improve the degree of consumption facilitation, such as building smart business circles, smart communities, etc., to optimize the consumption environment. Increase the popularity of mobile payment and e-commerce, improve the digital consumption ability of residents in western China, and promote the improvement of the consumption structure and consumption level of residents in western China.

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