The Impact of Internet-Using on Household Consumption—An Empirical Study Based on Multiple Linear Regression

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Abstract. Purpose-this paper is to study the impact of Internet-using on household consumption expenditure. **Methodology**-based on the data of Chinese General Social Survey in 2017, this study uses Stata16 software and multiple linear regression to test hypothesis. **Findings**-the results show that Internet-using significantly increases the total household expenditure, and has a significant positive impact on subsistence and development consumption. In terms of consumption structure, the regression coefficient of Internet-using on expenditure in food, clothing, leisure and entertainment, transportation and communication are positive and significant, while the coefficient is negative and not significant on housing, education, and health expenditures. The empirical results show that Internet-using is helpful to promote the household consumption.

Keywords: Multiple Linear Regression · Ordinary Least Square model · Internet-using · Household consumption expenditure

1 Introduction

Classical economics regards investment, export and consumption as the troika of economic growth. Against the background of the weak world economy and the limited role of investment and export, promoting the economic development has begun to shift from investment-oriented to consumption-oriented [1], consumption has become the largest driving factor of economic growth. It not only fully taps the internal circulation potential in total volume, but also stimulate the consumption potential the quality of goods and services [2]. Consumption upgrading is a regular trend in the development of consumers' consumption, and also an important starting point to realize the "double cycle". Therefore, how to stimulate consumption, expand domestic demand, and make the domestic consumption market achieve orderly self-circulation has become an important topic for discussion from all walks of life.

The digital economy based on the Internet and big data has developed rapidly, which lead to the development of e-commerce and Internet finance. Enabled the vigorous development of various new service industries and promoted residents' consumption. Based on this, the study intends to use Stata16 and OLS multiple linear regression model to explore whether Internet-using can affect household expenditure?

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2 Literature Review and Research Hypothesis

"Internet +" has accelerated the speed of information circulation and dissemination, changed the consumption patterns, the household consumption shows a trend of high quality, diversification and personalization [3]. By using Internet, consumers can obtain massive product information, choose the right products. Besides, they can find products beyond the cognitive range, and recommended products or services according to their consumption information or browsing records, which greatly convenient consumers' life and provides a strong attraction for releasing the consumption demand of consumers [4]. On the other hand, the Internet can help consumers enter fields with high professional barriers to obtain relevant information, promote people to make consumption decisions [5]. In the traditional consumption mode, such as education, medical treatment and other highly professional industries, consumers need to be present to enjoy services. However, the emergence of "Internet+" has enabled the people to enjoy services without leaving home, which has improved consumers' willingness to consume.

The impact of the Internet on household consumption is also reflected in payment, warehousing, logistics, supervision and other aspects [6]. In terms of mobile payment, because of its ease of use and convenience, it has changed the traditional consumption mode, saved consumers' time cost, and improved consumers' willingness to consume [7]. In warehousing and logistics, Internet-using can achieve rapid matching of storage, improve the efficiency of the original storage ecosystem, and enable consumers to get better products. Finally, by adding Internet technology to the regulatory process, all stakeholders can track product information at any time, ensure product quality and safety, monitor the "false price" behavior of merchants in real time, and protect the legitimate rights and interests of consumers.

3 Data and Methods

The data used in this study comes from the Chinese General Social Survey 2017 (CGSS 2017). The survey includes 12,582 valid samples. The data particularly suits the analytical needs of this study because it contains detailed questions on Internet-using, household expenditures and so on.

The key dependent variable, household consumption expenditure, is measured by the "the total expenditure of your family last year (2016)". Family expenditures mainly include food, clothing, housing, daily necessities, transportation and communication, leisure and entertainment, education, health and other expenses. Household total expenditure is the sum of these expenditure items. According to the studies of Wang and Zhan, subsistence consumption consists of food, clothing and housing, as well as development consumption consists of daily necessities, transportation and communication, leisure and entertainment, education, health and so on [8]. The paper takes the log value of these expenditure items. The key independent variable, Internet-using, is measured by the questionnaire "your use of Internet in the past year". According to the research purpose, we use the binary variables to measure Internet-using, Specifically, never using the Internet is assigned value of 0, rarely, sometimes, often and frequently using the Internet are assigned value of 1.

Considering that household expenditures are also affected by other factors in addition to Internet-using, we add some control variables referring to previous studies [9, 10]. The control variables consist of individual and family level, such as gender, age, education, marital status, health condition, social security, family income, family population, minor children, family house property, private car. In addition, we were introduced into the regional virtual variables.

Multiple linear regression is an equation established according to the relationship between a dependent variable and multiple independent variables. It can be applied to statistical analysis in many fields. Multiple linear regression model is expressed as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots \beta_k X_k + \varepsilon$$

By using Stata16 and survey data to carry out regression analysis on variables can obtain the parameter estimates of independent variables.

To investigate the impact of Internet-using on household consumption expenditure, this study constructs OLS regression model and uses Stata16 to estimate the impact effect. The specific model is as follows:

$$\text{Consumption} = \alpha_1 + \beta_1 Internet + \beta_2 Controls + \varepsilon_1$$

In model, consumption is total household expenditure and major categories. Internet is Internet-using. Controls including gender, age, education, marital status, health condition, social security, family income, family population, minor children, family house property, private car, region. α is constant, β, γ, δ are variable regression coefficients, ε is the error item.

4 Empirical Analysis

4.1 Benchmark Regression

We use the Stata16 and multiple linear regression model to analyze the effect of Internet-using on household expenditure. In Table 1, model (1) and (2) show that Internet-using positively and significantly affects the total household expenditure. After adding the control variables, the regression coefficient is still significant. It indicates that the use of Internet increases the household expenditure. In terms of control variables, most variables except gender, age, and social security will affect household expenditure.

In Table 1, models (3) and (4) report that the impact of Internet-using on family subsistence consumption and development consumption. The results show that Internet-using has a significant positive impact on both subsistence consumption and developmental consumption. By comparing of the regression coefficient of model (3) and (4), the results indicate that Internet-using has a greater impact on subsistence consumption. The main reason is that Internet provides more convenience for residents to purchase food, clothing and other products through online channels. Meanwhile, Internet-using also has a significant impact on development consumption. It shows that the use of Internet has improved the consumption level of residents in leisure, entertainment and so on, as well as promote the consumption upgrading of residents.

Table 1. Results of the impact of Internet-using on household consumption expenditure

Variable	Total household expenditure		Subsistence consumption	Development consumption
	(1)	(2)	(3)	(4)
Internet-using	1.01581*** (0.037)	0.212*** (0.043)	0.262*** (0.046)	0.189*** (0.055)
Gender		0.003 (0.031)	-0.002 (0.032)	-0.030 (0.039)
Age		-0.001 (0.001)	0.000 (0.001)	-0.003* (0.002)
Education		0.078*** (0.013)	0.069*** (0.013)	0.096*** (0.016)
Marital status		0.110** (0.038)	0.133** (0.041)	0.116* (0.049)
Health condition		-0.055** (0.016)	0.039* (0.017)	-0.149*** (0.021)
Social security		0.132 (0.074)	0.113 (0.078)	0.117 (0.095)
Total household income		0.449*** (0.017)	0.502*** (0.018)	0.412*** (0.021)
Family population		0.046*** (0.007)	0.042*** (0.008)	0.05*** (0.009)
Minor children		0.073** (0.023)	0.058* (0.025)	0.097** (0.029)
House properties		0.054* (0.023)	0.004 (0.025)	0.096** (0.030)
Private car		0.281*** (0.038)	0.070 (0.040)	0.560*** (0.048)
Region		-0.084*** (0.015)	-0.110*** (0.016)	-0.061** (0.019)
Constant	9.713*** (0.028)	5.083*** (0.206)	3.584*** (0.218)	4.726*** (0.264)
R^2	0.181	0.482	0.474	0.379

Note: *** $P < 0.001$, ** $P < 0.01$, * $P < 0.05$

This study further discusses the impact of Internet-using on different categories of consumption. In Table 2, regression results show that Internet-using increased food expenditure of household by 2.16%, clothing by 3.90%, daily necessities by 2.79%, transportation and communication by 1.73%, leisure and entertainment by 5.07%. These results explain that the use of Internet broadens the residents' consumption channels, especially the development of online shopping and mobile payment. And it has a

Table 2. The regression results of Internet using on the eight categories of consumption

Var	Food	Clothes	House	DN	TC	LE	E	Health
IU	0.22^{***} (0.04)	0.39^{***} (0.05)	−0.15 (0.16)	0.28^{***} (0.06)	0.17^{*} (0.07)	0.51^{***} (0.11)	−0.01 (0.10)	−0.02 (0.07)
Con	control	control	control	Control	control	control	control	control
Cons	3.43^{***} (0.20)	1.68^{***} (0.24)	4.46^{***} (0.80)	2.00^{***} (0.28)	2.18^{***} (0.35)	−0.58 (0.53)	4.79^{***} (0.49)	5.59^{***} (0.34)
R^2	0.43	0.52	0.14	0.41	0.45	0.40	0.13	0.10

Note: IU = Internet using, DN = Daily Necessities, TC = Transportation and Communication, LE = Leisure and Entertainment, E = Education; *** P < 0.001, ** P < 0.01, * P < 0.05

certain impact on residents' consumption expenditure in different aspects, as well as could further optimize the consumption structure. However, the regression coefficient on expenditure in housing, education, and health was negative and not significant.

4.2 Robustness Test

To ensure the robustness of estimated results, we replace variables and use subsamples to test. Firstly, we divide the subsample by age and select a youth subsample for regression analysis. In Table 3, model (3) shows that the regression coefficient was still significantly positive in the subsample. It indicates that Internet-using significantly increased the total household expenditure. Secondly, we use mobile payment and information source as the replacement variable. In Table 3, models (1) and (2) show that mobile payment and Internet as the main source of information significantly increase the total household expenditure. As an important aspect of Internet using, mobile payment provides more convenient for residents' consumption, expands the consumer channels and release the residents' consumption potential. At the same time, the use of Internet to

Table 3. Effects of replacement variables on household expenditure

Variable	Total household expenditure		
	(1)	(2)	(3)
Internet-using			0.211***(0.046)
Mobile payment	0.160**(0.0471)		
Information sources		0.161***(0.043)	
Control variable	Control	control	control
Content	5.024***(0.208)	5.062***(0.209)	5.032***(0.239)
R^2	0.481	0.477	0.465

Note: *** P < 0.001, ** P < 0.01, * P < 0.05

obtain information could bring more consumer choice to increase the household consumption expenditure. Thus, the above results have proved that the impact effect of Internet using on household expenditure is robust.

5 Conclusion

This paper uses Stata16 software and multiple linear regression basing on CGSS2017 data to analyze the impact of Internet-using on household consumption expenditure. The results show that Internet-using has significantly increased the total household expenditure, and has a significant positive impact on both survival and development consumption. In terms of consumption structure, Internet-using has increased food expenditure by 2.16%, clothing by 3.90%, transportation and communication by 1.73%, leisure and entertainment by 5.07%, but the regression coefficient is negative and not significant on housing, education and health expenditure. In terms of robustness test, the Internet as the main source of information and mobile payment have significantly affected total household expenditure. Meanwhile, the effect is still significant in the youth subsample. This shows that the use of Internet and the development of mobile payment have broadened consumption channels and improved people's quality of life.

Based on the results, the enlightenment is as follows. Firstly, we should further develop big data, artificial intelligence and other technologies to enable consumers to interact with producers, so as to stimulate residents to generate new consumption demand and release consumption potential. Secondly, with the help of new media platforms such as Tiktok and Weibo, the government should spread the concept of rational and healthy consumption, guide residents to consume on demand, and provide sustainable motive power for domestic demand.

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