The Effects of Internet-Using on Farmer Employment Choice and Income Differentiation:
An Empirical Study Based on the CGSS2017

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Abstract: The purpose of this paper is to study the impact of Internet-using on farmers income differentiation. Based on the data of Chinese General Social Survey in 2017, this study uses Ordinary Least Square multiple regression and Stata16 software to analyze model and data. By comparing the income levels of farmers who use the Internet and those who do not use the Internet, this paper indicates that Internet-using affects income differentiation by influencing farmers employment choices. The Internet-using can help farmers choose more suitable jobs by information and communication technologies so that increasing their income. In addition, in the further segmentation of non-agricultural employment, this paper studies the impact of the Internet, and finds that Internet using has a positive impact on entrepreneurial employment, but a negative impact on migrant employment. The empirical results show that Internet using is helpful to promote the income differentiation of farmers.

1 INTRODUCTION

It is an important task in the new era to improve farmers lives, mobilize their enthusiasm for production and achieve common prosperity. With the continuous improvement of rural Internet infrastructure construction, Internet technology has become an important carrier of farmers' production and life. Farmers can not only find job opportunities and conduct interviews on the Internet, but also engage in agricultural e-commerce. According to the 50th Statistical Report on the Development of Internet in China, as of June 2022, the number of Internet users in China is 1051 million, and the Internet penetration rate is 74.4%, including 293 million in rural areas, and the Internet penetration rate is 58.8%.[1] The continuous expansion of the Internet industry derived from the Internet has significantly increased the income of some residents

living in rural areas, but at the same time, it has also exacerbated the income gap between different farmers. By using Internet, some farmers obtain the information about employment, agricultural product marketing, land circulation and find suitable jobs, realizing the effective allocation of rural resources. However, the others can't effectively use the Internet to increase their income, which are limited by Internet access conditions, their own age, education and other factors. Based on this, this study uses OLS multiple regression and Stata16 software to explore whether Internet using aggravates the income differentiation of farmers and how Internet use leads to income differentiation of farmers by influencing their employment choices.

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[1] Data source: The China Internet Information Center. The 50th Statistical Report on the Development of the Internet in China, http: / / www.cnnic.net.cn/n4/2022/0914/c88-10226.html.

2 LITERATURE REVIEW AND HYPOTHESES

2.1 Internet Using and Farmer Income Differentiation

With the continuous improvement of broadband and other network infrastructure, the accessibility of Internet using has been greatly improved in rural residents (Luo and Liu, 2022), Internet technology has become an important factor in farmers production and life. In Solo's economic growth model, the production factors are mainly divided into capital (K) and labor (L). Internet technology is added to the model as "technology development level (A)"(Zhu et al, 2022). In the rural economy, the use of Internet technology can not only help the farmer to quickly capture the trading information of agriculture, reduce transaction costs due to information asymmetry, and improve income opportunities. At the same time, it can effectively improve the information access efficiency of the rural labor market, reduce the cost of finding jobs (Ma et al, 2022), and improve the opportunities for rural surplus labor to engage in non-agricultural employment, thereby increasing income. However, for some people who are not good at using Internet technology, or even do not use Internet technology, they have lost many opportunities and ways to improve their income because the less information (Liu and Han, 2018), and have limited access to Internet technology premiums (Zhang, 2022), so the income gap between them and farmers who use Internet technology is more growing. Based on this, the first hypothesis is proposed. H1: Internet using aggravates the income differentiation of farmers.

2.2 The Role of Employment Choice

The employment choice is closely related to the income differentiation of farmers. For agriculture farmers, they can timely obtain agricultural information by using Internet, such as land circulation and agricultural products trading, and improve agricultural production efficiency. In addition, "Internet plus" products, such as Internet finance, can accelerate the digital transformation of rural industries and reduce information transaction costs, thus promote financial support for industrial development (Li et al, 2021). For non-agricultural farmers, the Internet is not only a tool that can improve productivity, but also an important means to expand social capital (Ma and Ning, 2017). By

using Internet, they can obtain tremendous labor market information, broaden the scope of employment and increase employment opportunities. For some entrepreneurial farmers, the rural e-commerce industry provides a platform for them to start their own businesses, which benefits are greater than employment (Song and He, 2021). Whether for agricultural farmers, non-agricultural farmers or entrepreneurial farmers, the use of Internet is not significantly beneficial. Farmers of different ages, educational backgrounds and family backgrounds have different Internet using skills and information identification capabilities. Farmers who with higher education and are good at using Internet technology often choose a suitable job; farmers who with low educational background and are not good at using Internet technology cannot choose useful information or even indulge in Internet games, thus aggravating the income gap of farmers. Based on this, the second hypothesis is proposed. H2: Internet using aggravates the income differentiation of farmers by influencing their employment choices.

3 DATA AND METHODS

We use the OLS model and Stata16 software to estimate the impact of Internet using on income differentiation. The specific model is as follows:

$$Income = \alpha_1 + \beta_1 Internet + \beta_2 Controls + \varepsilon_1 \quad (1)$$

Secondly, in order to test the meditation effect of employment choice, this paper refers to the meditation test method of Wen et al (2004), and on the basis of formula (1), are further added (2) and (3) to build the meditation effect model:

$$Employment = \alpha_2 + \gamma_1 Internet + \gamma_2 Controls + \varepsilon_2 \quad (2)$$

$$Income = \alpha_3 + \delta_1 Internet + \delta_2 Employment + \delta_3 Controls + \varepsilon_3 \quad (3)$$

Above (1) ~ (3), controls including gender, age, education, health, political status, marital status, social security, family size, region, α is constant, β、γ、δ are variable regression coefficients, ε is the error item.

Table 1: Descriptive statistics of the variable.

Variable name	Variable assignment	Mean	Standard deviation
Annual gross income	Personal total income for last year (2016) (log value)	4.207	0.539
Annual labor income	Occupational / labor income for last year (2016) (log value)	4.219	0.531
Internet using	Whether to use the Internet (ever used =1, not used =0)	0.580	0.494
Employment choices	Non-agriculture employment =1, farming or unemployed =0	0.480	0.500
Employment types	Entrepreneurial =1, migrant =2, other =0	1.825	0.380
gender	Male =1, female =0	0.530	0.499
age	Actual age (using 2017 minus birth year)	45.950	12.255
Education level	No education =1, primary school =2, middle school =3, high school=4, junior college or above =5	0.550	1.407
Health condition	Very unhealthy =1, compared unhealthy =2, generally =3, compared healthy =4, very healthy =5	3.530	1.106
Political status	Communist Party member =1, non-Communist Party member =0	0.910	0.283
Married	Married =1, unmarried, divorced, or widowed =0	0.830	0.372
Social security	The following insurance conditions add: endowment insurance or medical insurance, participation =1, not participation =0	1.750	0.752
Family size	Number of family members	3.090	1.559
Region	Region: East =1, central =2, west =3, northeast =4	2.210	1.018

We use the Chinese General Social Survey 2017 (CGSS 2017) data to investigate the possible impact of income differentiation on internet using. The survey adopts multi-stage stratified probability sampling design, consisting of 28 provinces regions nationwide. The CGSS data particularly suits the analytical needs of this study because it includes variables on income, working and so on. According to the research needs, we retained the household registration status of "agricultural registration and residence household registration (formerly agricultural registration)" and the age of 18 to 65 samples; while excluding in the current school stage, obtained through the entrance to non-agricultural registration and related variable information seriously missing samples, leaving in 4527 samples.

Income differentiation, the key dependent variable, is measured by annual total income and annual labor income. Individual annual income is measured by "individual total income of the whole year last year (2016)", and annual labor income is measured by "individual occupational/labor income of the whole year last year (2016)". In order to prevent the results due by the heteroscedastic problem (Ma et al, 2022), the paper takes the log value of income. The key independent variable, internet using, is measured by the questionnaire "Your use of Internet in the past year" According to the existing research, we use the binary variables to measure the Internet using.[2] The mediation variable is employment choice, which is divided into three forms: non-agricultural employment, farming and unemployed. According to the item of "your current work experience", engaged in non-agricultural employment is assigned value of 1, and the farming or unemployed individuals is 0. In addition, non-agricultural employment is further divided into two forms: employer or self-employment and employee. Usually, the former is considered as entrepreneurial employment, while the latter is considered as migrant employment.

Considering that farmers employment choice and income differentiation are also affected by other factors, we add some control variables referring to previous studies (Zhu et al, 2022; He et al, 2022), including gender, age, education level, health condition, political status, married, social security, family size and other variables. In addition, considering the possible differentiation in Internet using among farmers in different regions, we were introduced into the regional virtual variables, divided into eastern, central, western and northeast regions. Specific description of each variable and the descriptive statistical results are shown in Table 1.

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[2] "Never use the Internet" is assigned value of 0, as well as "few", "sometimes", "often" and "frequent" use the Internet are assigned value of 1.

4 EMPIRICAL RESULTS

4.1 Benchmark Regression

We use Stata16 software to analyze data and test model. In table 2, model (4) and (8) report the estimated results of the impact of Internet using on farmers income differentiation. The regression coefficient for the effect of Internet using on individual total income was 0.298, and the regression coefficient for the impact of labor income was 0.288. The regression results show that the Internet using has a positive impact on farmers income, and is significant at the statistical level of 1%, which shows that the use of Internet is helpful to improve farmers income. However, the differentiation in the effect of the two incomes is small. The reason for that the study sample is mainly the farmer labor force, and their total income mainly include the labor income. In addition, education level, health conditions and social security have a significant positive impact on farmers income. Which indicates that individuals have more opportunities and ways to obtain income and are more likely to increase their income with the higher education level, the better health and involved in social security. The coefficient of gender and married was also significantly positive, indicating that married individuals had higher income than unmarried, and male individuals earn more than females. However, the coefficient of the influence of age, political status, family size and regional differentiation on farmers income is negative. With the increase of age, the decrease of farmers income. Compared with the central and western regions, farmers in the eastern economically developed regions have more advantages in increasing income. The above empirical results test hypothesis 1.

4.2 The Meditation Effect of Employment Choice

The impact of Internet using on farmers income differentiation has been tested, so what mechanism does Internet using affect farmers income differentiation? In table 2, model (1) shows that Internet using has a significant positive impact on employment choice, indicating that Internet using can promote non-farm employment. Secondly, further add employment choice in Internet using impact on income model, in table 2, model (5) shows that the influence of the Internet using on the farmers income still has a significant positive impact (coefficient from 0.298 to 0.222), and the

employment choice has a significant positive impact on farmers income. According to the meditation effect of testing ways, employment choice plays a partial meditation role in the relationship between Internet using and farmers income differentiation, and the meditation effect is 7.61%.

In order to make a more comprehensive analysis, we divide the non-agricultural employment into entrepreneurial and migrant employment. In table2, model (2) and (3) show that Internet using has a positive impact on entrepreneurial and a negative effect on migrant employment. The possible reason is that entrepreneurial farmers have a higher demand for the Internet. With the development of agricultural technology and e-commerce, commodity production and sales need Internet. Thus Internet may encourage farmers to find more opportunities to entrepreneurship. On the contrary, migrant work has low demand for Internet so that inhibiting the choice of migrant employment. Secondly, in the table 2, model (6) and (7) show that the Internet using still has significant positive impact on income. And entrepreneurial has a significant positive impact on income but migrant employment has significant negative impact on income. Above, it can be seen that entrepreneurial and migrant employment play a meditation role in the relationship between Internet using and income differentiation.[3] The meditation effect is respectively 0.91% and 0.95%. Based on the above, hypothesis 2 supported.

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[3] In addition, the results with the annual labor income as the dependent variable are consistent with the above conclusions, and the specific results are not listed due to the extent limited.

Table 2: Mechanistic analysis of the impact of Internet using on farmers income differentiation.

variable	EC	EE	ME	Annual gross income				Annual labor income
	(1)	(3)	(5)	(4)	(2)	(4)	(6)	(8)
Internet using	0.234*** (0.016)	0.088** (0.028)	-0.106*** (0.029)	0.298*** (0.017)	0.222*** (0.016)	0.138*** (0.021)	0.138*** (0.021)	0.288*** (0.017)
EC					0.325*** (0.015)			
EE						0.104*** (0.016)		
ME							-0.090*** (0.016)	
Gender	0.090*** (0.013)	-0.003 (0.020)	0.013 (0.020)	0.199*** (0.013)	0.170*** (0.013)	0.144*** (0.015)	0.144*** (0.015)	0.214*** (0.013)
Age	0.008*** (0.001)	0.001 (0.001)	-0.002* (0.001)	-0.007*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	-0.008*** (0.001)
Education level	0.028*** (0.005)	-0.020** (0.006)	0.014* (0.006)	0.040*** (0.005)	0.031*** (0.005)	0.037*** (0.004)	0.036*** (0.004)	0.036*** (0.005)
Health condition	0.056*** (0.006)	-0.007 (0.011)	0.007 (0.011)	0.082*** (0.006)	0.063*** (0.006)	0.044*** (0.008)	0.044*** (0.008)	0.077*** (0.007)
Political status	-0.065* (0.023)	0.085** (0.030)	-0.062* (0.031)	-0.054* (0.024)	-0.033 (0.023)	-0.033 (0.023)	-0.029 (0.023)	-0.058* (0.025)
Married	0.025 (0.018)	0.118*** (0.028)	-0.114*** (0.029)	0.122*** (0.019)	0.114*** (0.018)	0.084*** (0.021)	0.086*** (0.021)	0.117*** (0.02)
Social security	0.004 (0.009)	0.016 (0.012)	-0.016 (0.012)	0.057*** (0.009)	0.056*** (0.008)	0.069*** (0.009)	0.069*** (0.009)	0.058*** (0.009)
Family size	-0.002 (0.004)	-0.001 (0.006)	-0.001 (0.007)	-0.014** (0.004)	-0.013** (0.004)	-0.015** (0.005)	-0.015** (0.005)	-0.018*** (0.004)
Region	-0.093*** (0.006)	0.045*** (0.01)	-0.056*** (0.010)	-0.086*** (0.007)	-0.056*** (0.006)	-0.080*** (0.007)	-0.080*** (0.007)	-0.085*** (0.007)
Constant	0.717*** (0.060)	-0.057 (0.088)	1.117*** (0.090)	4.029*** (0.062)	3.797*** (0.059)	4.270*** (0.066)	4.364*** (0.068)	4.110*** (0.064)
R^2	0.313	0.043	0.044	0.371	0.433	0.259	0.255	0.378

Note: EC=Employment Choice, EE= Entrepreneurial Employment, ME= Migrant Employment;
*** p <0.01, ** p <0.05, and * p <0.1

4.3 Robustness Test

To ensure the robustness of the estimated results, we replace variables to test. First, the regression takes the information source and Internet using frequency as independent variables. The information source is measured "Is the main source of information the Internet (including mobile Internet)", and Internet using frequency treated as 1-5. In table 3, models (1) and (2) show that the Internet as the main source of information significantly increases the farmers and Internet using frequency will increase the income.

Secondly, the logarithm of family annual income was used as the dependent variable. In table 3, model (5) shows that the coefficient of Internet using is still positive, that is, Internet using improves family annual income. In addition, select the youth subsample to analysis[4]. In table 3, models (3) and (4) show that Internet using improves the income level of young farmers. Thus, the above results have strong robustness.

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[4]According to the UN WHO age classification criteria in 2013, the sample who was under 44 years was defined as youth.

Table 3: Effect of the effect of table replacement variables on farmers income differentiation.

variable	Annual gross income				Family annual income
	(1)	(2)	(3)	(4)	(5)
Internet using			0.294***(0.032)		0.208*** (0.027)
Information sources	0.057**(0.023)				
Frequency of Internet using		0.092***(0.005)		0.085***(0.008)	
Control variable	Control	Control	Control	Control	Control
Content	4.463***(0.060)	3.901***(0.065)	3.979***(0.090)	3.833***(0.093)	4.651*** (0.099)
R^2	0.324	0.370	0.302	0.313	0.168

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

5 CONCLUSIONS

This paper uses OLS multiple regression and Stata16 software to analyze data in order to examine the Internet using impact on farmers income differentiation. The empirical results show that: Internet using promote the farmers income differentiation. By using the Internet, the income level of farmers significantly increased by 0.298 than not use the Internet. Second, Internet using promotes farmers non-agricultural employment to increase their income such as information and communication technologies, and employment choice plays a meditation role in the process. In the further subdivision of non-agricultural employment, Internet using positively affects entrepreneurial such as providing technical support for entrepreneurship, but has a negative impact on migrant employment.

Increasing farmers income is the focus of "agriculture, rural areas and farmers" in China and to achieve common prosperity. The popularization of the Internet has provided more opportunities to increase farmers income, but there are still a considerable number of farmers who cannot enjoy the digital dividend due to their own conditions. Therefore, the government should improve the construction and upgrading of rural network infrastructure, strengthen the information skills training of farmers, so that more low-income farmers can participate in the digital economy. Meanwhile, promoting non-agricultural employment is an important way to increase farmers income, narrow the gap between urban and rural areas, and accelerate the process of urbanization. We should promote the linkage between digital technology and the factor market, provide services for farmers to participate in non-agricultural employment through the Internet, and promote the continuous increase of farmers income.

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