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Internet Affects Income Inequality of Residents: An Empirical Analysis Based on CFPS Data

Dan Wu[1,2], Yidan Liu[3,a,*], Lu He[4]

[1]*School of Economics and Management, Hainan Normal University, Haikou, China*
[2]*Hainan Provincial Key Laboratory of Ecological Civilization and Integrated Land-sea Development, Haikou, China*
[3]*School of Public Administration, Zhongnan University of Economics and Law, Wuhan, China*
[4]*School of Economics and Management, Hainan Normal University, Haikou, China*
[a] *zlly_23@163.com*
**Corresponding author*

Abstract: *Based on individual relative deprivation theory and using data from the China Family Panel Studies (CFPS)2018, we examine the impact of Internet use on residents' income inequality from a micro-individual perspective. The conclusion is that Internet use reduces residents' income inequality, and the results stay robust after endogeneity. Further research finds that Internet access produces a more significant suppression of income inequality for the medium-education and rural household group of residents compared to the low-education and high-education groups. The analysis of the impact mechanism shows that the Internet can impact individual income inequality by influencing residents' personal risk preferences and education levels. Therefore, we suggest improving the Internet infrastructure, accelerating the penetration and integration of the Internet with various industries, and promoting healthy economic development with the income gap reduction effect of the Internet.*

Keywords: *Internet; Income Inequality; Income Distribution; Income Deprivation*

1. Introduction

China's economy is developing rapidly. The income level of residents has been dramatically improved, the middle-income group has expanded significantly, and the gap between urban and rural regional development and the living standard of residents has narrowed significantly. However, income inequality is still severe, mainly because it is difficult to track information on ultra-high-income groups, which makes the inequality of income distribution in China underestimates [1][2]. The session also put forward the vision of basically achieving socialist modernization by 2035, which includes "making more obvious and substantial progress towards common prosperity for all the people."

With the outbreak of the COVID-19 pandemic, various industries are facing unprecedented challenges. Information technology represented by the Internet has laid a solid foundation for the flourishing of new industries. Chinese premier's government work report in 2020 stated clearly that new industries such as online services and e-commerce had played an essential role in fighting against the COVID-19 pandemic. In addition, the report indicated the necessity to introduce supportive policies to comprehensively promote the "Internet+" and create new advantages in the digital economy. Along with the rapid development of China's economy, the Internet is gradually penetrating all areas of society, fundamentally changing human economic activities and lifestyles. The data show that from 2009 to March 2020, the size of China's Internet users surged from 384 million to 904 million, and the Internet penetration rate increased from 28.9% to 64.5%. As information technology, the emergence and development of the Internet are changing global production, management, marketing models, and people's behavior and lifestyle, which affects the income distribution of residents.

In fact, among the existing studies on the Internet and income inequality, relevant discussions on how the Internet affects income inequality have been conducted mainly at the macro level but have not reached a unanimous conclusion. Researchers who advocate that the Internet can diminish the degree of income inequality argue that the application and popularity of the Internet and the increasing size of Internet users provide opportunities to narrow the income gap among Chinese residents [3][4]. Opponents argue that the Internet triggers a skill premium in the labor market, thereby increasing income inequality [5][6], and this Internet dividend in economically developed regions is more distinct

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[7][8]. Therefore, what impact the Internet will ultimately have on income inequality needs to be supported by careful empirical analysis. Previous studies have mainly used the Gini coefficient, regression decomposition, Theil index, and multidimensional poverty index to measure income inequality. However, these group indicators mainly focus on group income inequality and lack attention on individual income inequality of residents. Therefore, this paper introduced the individual relative deprivation index, including individual deprivation, and summed income deprivation. Individual income relative deprivation reflects individual deprivation, while the Gini coefficient reflects summed income deprivation. Traditional measures of income inequality such as the Gini coefficient and the Theil index cannot affirm how large the gap between individuals is.

In contrast, individual-level income inequality measures can compare each respondent individual with other individuals in the reference group who earn more and thus obtain their income deprivation status. It can overcome the disadvantage that the Gini coefficient does not satisfy the sum function and decomposition. After decomposition, there will be a so-called residual term, which reflects the overlap in the income distribution of various population groups. We explore how the Internet affects population income inequality at the micro-individual level to measure population income inequality.The contributions of this paper mainly include: Firstly, using the Kakwani income deprivation index to provide descriptive statistics on the current situation of income inequality at the individual level of urban and rural residents in China, and to analyze the microscopic mechanism effected by the Internet; Secondly, confirming the key to improve the situation of income inequality among residents lies in promoting the improvement of the education level of low-and middle- income people, guiding residents to use Internet finance in a convenient, efficient and safe way, promoting deep integration of the Internet with various industries, and enhancing social mobility.

The existing literature has conducted a large number of studies on the crucial influences on income inequality. The main emphasis of our research mainly focuses on differences in the level of financial development [9][10], different government policies [11-13], education differences [14-16], demographic changes [17][18], human capital gaps [19][20], and social security differences [21][22], while some studies have also focused on the impact of the Internet on the distribution of workers' income.

First, scholars have argued that the use of the Internet contributed to the increase in the income level of residents. That impact on the income of different groups is heterogeneous [23-26]. Some scholars have also found that the development of the Internet has increased factor mobility between urban and rural areas, which in turn has increased the income level of farmers and promoted rural economic development [27] [28]. Second, scholars have also conducted relevant studies on the Internet and income distribution aspects. On the one hand, scholars have argued that the Internet can lead to severe inequalities in distributing information and knowledge resources through the "digital divide." Widening the gap between the rich and the poor [29][30] and that groups with higher incomes and higher levels of education are also more likely to access and use Internet services [31]. At the same time, other scholars have also found that economically developed regions, such as the southeast coastal cities, are the primary beneficiaries of the Internet dividend [8]. On the other hand, some scholars have argued that the widespread use of the Internet increases the likelihood of access to information for low-income and low social status groups, such as those with low education levels, by lowering the cost of information access. This increases the returns to their labor and ultimately narrows the income gap, and achieves upward class mobility [32]. Other scholars have found that the use of the Internet ultimately allows rural residents to raise their income brackets and income levels, thereby narrowing the income gap between urban and rural residents [3]. In addition, Bauer argued that the Internet, together with other multifaceted factors such as technology, economics, and politics, affect the reduction or increase of income inequality depending on the degree of action [33].

From the existing studies, although many scholars have focused on the impact of the Internet on income distribution, very few studies conducted in-depth research and analysis on how the Internet affects income inequality of the population from the perspective of micro-individuals. In exploring how the Internet affects resident income inequality, it is difficult to see the different effects on micro-individual income inequality if group indicators use the Gini coefficient and the Theil index. Therefore, this paper examines the relationship between Internet use and residential income inequality based on an individual relative deprivation perspective, using the 2018 CFPS. The process of empirical analysis in this paper is

1) To verify the significant negative relationship between Internet use and residential income inequality with robustness tests and endogenous treatment;

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2) To provide evidence that the impact of Internet use on residential income inequality is heterogeneous across educational groups;

3) To analyze the channels affecting the relationship between Internet use and residential income inequality, including risk preference effects and investment in human capital.

2. Materials and Methods

2.1. Data Sources and Sample

This paper uses data from the national survey data of the China Family Panel Studies (CFPS) in 2018. This database is a national, large-scale, multidisciplinary social tracking survey data organized and implemented by the China Social Science Survey Center of Peking University. The CFPS questionnaire includes three levels: village (residence) questionnaire, household questionnaire, and individual questionnaire, and the data involved in this paper come from the individual questionnaire and household questionnaire. We finally retained 2071 samples, of which 1408 were urban samples and 663 were rural samples.

2.2. Model

This paper aims to explore the effect of Internet use on individual income inequality of the population within the perspective of individual relative deprivation. Since the Kakwani relative deprivation index measure of residential income inequality takes values in the range [0, 1], representing the degree of deprivation from mild to severe, the restricted Tobit regression model is the appropriate measure for the econometric analysis, as shown in the following model:

$$RD_i=\alpha_0+\alpha_1 Interne_{ti}+\alpha_2 X_i+\varepsilon_i \quad (1)$$

RDi is the explanatory variable, representing individual income inequality among residents (calculated from the Kakwani index); the Internet is the key explanatory variable, representing individual Internet use among residents; Xi denotes the control variable, and ε i is the residual term.

2.3. Variable

Dependent variable: Individual income inequality of residents. Referring to the literature on individual income deprivation by Ren and Yang, we choose the Kakwani relative deprivation index to measure the issue of the choice of income inequality measure, where a higher index indicates a deeper degree of individual deprivation [20] [21]. The reasons include: first, the index satisfies dimensionless, regularity, and transfer invariability compared to other indicates; and second, the index overcomes the shortcomings of the Gini coefficient, which can not be additive and decomposable. Let Y represent a group with a sample size of n. The individual income of individuals in the group is ranked in ascending order to obtain the overall income of the whole group as Y=(y1,y2,...yn). The following equation can express the specific measure of the Kakwani index.

$$RD(y, y_i) = \frac{1}{n\mu_Y}\sum_{j=i+1}^{n}(y_j - y_i) = \gamma_{y_i}^{+}[(\mu_{y_i}^{+} - y_i)/\mu_Y] \quad (2)$$

In the above equation, μ_{yi} is the mean income of all samples surveyed in group Y, $\mu_{y_i}^{+}$ is the mean income of samples in group Y with income above yi , and $\gamma_{y_i}^{+}$ is a percentage of the number of samples in group Y with income above yi in the total sample size.

There is income inequality between urban and rural areas and the phenomenon of urban-rural dichotomy in China. In Table 1, the average value of the national income inequality index is 0.43, among which the average value of the income inequality index of the rural sample household residents reaches 0.46. The average value of the urban sample residents' income inequality is 0.407, which is at a strong level of income deprivation overall. The rural residents' income inequality sample is mainly distributed in the interval of (0.4,0.6], accounting for 30.92%, while the urban sample distributed on (0.2,0.4], accounting for 32.95%. This data shows that in China, the income inequality of rural residents is relatively higher than that of urban residents.

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Table 1: Distribution of the "income deprivation index" for urban and rural residents.

Areas	Index	[0,0.2] Mild deprivation	(0.2,0.4] Certain deprivation	(0.4,0.6] Strong deprivation	(0.6,0.8] Severe deprivation	(0.8,1] Extreme deprivation	SUM
Total sample	Number of samples	804	709	332	140	86	2071
	Percentage	38.82	34.23	16.03	6.76	4.15	100
Rural areas	Number of samples	92	180	205	128	58	663
	Percentage	13.88	27.15	30.92	19.31	8.75	100
Urban areas	Number of samples	334	464	314	213	83	1408
	Percentage	23.72	32.95	22.3	15.13	5.89	100

[1] Calculated by the authors based on CFPS2018 data.

In Table 2, there are variable description and descriptive statistics. Independent variables: Individual Internet use. Whether or not to use the Internet is a binary dummy variable, with a value of "1" for Internet use and "0" for no Internet use; Internet use intensity is measured by the amount of time spent. The intensity of Internet use is measured by the amount of time spent online, and the corresponding question in the questionnaire is "How many hours per week do you spend online in your spare time?" In the quantitative analysis, we convert the units of this variable to minutes and logarithm.

Table 2: Variable description and descriptive statistics.

Variable type	Variable name	Variable description	Mean	SD
explanatory variables	Internet use	Use=1, No use=0	0.46	0.49
	Online time	Logarithm of Internet usage time (minutes)	6.34	0.99
Individual-level variables	Age	Actual age of head of household	38.64	10.3
	Gender	Female=0, Male=1	0.54	0.49
	Education	Illiteracy / semi-illiteracy=1, primary school=2, middle school=3, high school=4, junior college=5,undergraduate=6, postgraduates=7, doctoral gradutes=8	3.46	1.19
	Registry	Rural areas=0, Urban areas=1	0.39	0.48
	Marital status	Unmarried/widowhood=0, married=1	0.80	0.39
	Health status	Unhealthy=1, General healthy=2, Relatively healthy=3, Healthy=4, Very healthy=5	3.19	1.02
	party members or not	No=0, Yes=1	0.01	0.11
Household-level variables	household size	household population size	4.49	2.03
	private business or not	No=0, Yes=1	0.23	0.42
	the number of houses owned.	Number of real estate	1.25	0.59
Other variables	pension insurance or not	No=0, Yes=1	0.93	0.23
	medical insurance or not	No=0, Yes=1	0.38	0.48
	financial products	Number of types of financial products	0.15	0.36
	Frequency of Internet learning	Never=0,Once a few months=1, Once/twice/2-3 times a month=2, 1-4 times a week =3, nearly every day=4	1.72	1.64
	Frequency of Internet work	Never=0,Once a few months=1, Once/twice/2-3 times a month=2, 1-4 times a week =3, nearly every day=4	2.04	1.84
	Frequency of Internet social use	Never=0,Once a few months=1, Once/twice/2-3 times a month=2, 1-4 times a week =3, nearly every day=4	3.46	1.07
	Frequency of Internet entertainment	Never=0,Once a few months=1, Once/twice/2-3 times a month=2, 1-4 times a week =3, nearly every day=4	3.16	1.18
	Frequency of Internet business use	Never=0,Once a few months=1, Once/twice/2-3 times a month=2, 1-4 times a week =3, nearly every day=4	2.03	1.37

Control variables: this paper is mainly consistent with the existing literature in that the selection of

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control variables mainly includes individual-level and household-level components. The control variables at the individual level mainly include age, gender, education, household characteristics, marital status, health status, and whether or not they are party members. The control variables at the household level mainly include household size, whether or not there is a private business and the number of houses owned.

Other variables: in the quantitative analysis of this paper, we add two variables, whether or not to participate in pension insurance and medical insurance, to test the robustness of the results of the econometric analysis; whether or not to own financial products and the level of education are introduced to analyze the mechanism of the impact of the Internet on the income inequality of residents; We introduce five variables of Internet learning, Internet work, Internet social use, Internet entertainment, and Internet business use to analyze how the different types of Internet use affect individual income inequality of the population respectively.

3. Results

3.1. The Impact of Internet Use on Individual Income Inequality of the Population

Table 3 reports the results of local Tobit regressions on the effect of Internet use on individual income inequality of the population. Columns 1,2,3 of Table 3 examine the effect of the presence or absence of Internet use on individual resident inequality, with column 2 adding individual-level control variables to column 1 and column 3 adding individual- and household-level control variables to column 1. Columns 4,5,6 of Table 3 examine the effect of Internet use intensity on individual inequality among residents, with column 5 adding individual-level control variables to column 4 and column 6 adding individual- and household-level control variables to column 4. Column 7 analyzes the effects of Internet use or not and Internet intensity on individual inequality among residents. The results show that regardless of the choice of control variables, Internet access plays a vital role in reducing the income gap among residents. Compared to residents without Internet access, the income inequality index for residents with Internet access diminishes by an average of 0.038 units for each unit increase in residents with Internet access. Both time spent online significantly affect individual resident inequality, with the income inequality index weakening by an average of 0.011 units for every 1 unit increase in time spent online.

The regression results of the control variables show that the factors of education level, household registration, marriage, household size, private enterprise, and the number of houses all significantly affect the income inequality of the country's residents. Specifically, the level of education suppresses income inequality among residents, a result that confirms the role of human capital endowment in influencing the income gap among residents. The level of income inequality is lower for non-farm households. It is easy to see that the household registration system and the urban-rural division still impact income inequality. The degree of income inequality is lower for residents with marital status "married (with a spouse)" than for those with marital status "widowed or divorced." The household capital endowments of household size, private business, and housing stock all have a dampening effect on income inequality, i.e., essential factors affecting income inequality also include household capital endowments. The regression results on these control variables are generally consistent with existing studies.

Table 3: The impact of Internet use on individual income inequality among Chinese residents: restricted Tobit regression results.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Internet use	-0.081*** (0.010)	-0.037*** (0.011)	-0.038*** (0.011)				-0.038*** (0.011)
Online time				-0.019*** (0.005)	-0.011* (0.005)	-0.011* (0.005)	-0.011* (0.005)
Individual-level variables	NO	Yes	Yes	NO	Yes	Yes	Yes
Household-level variables	NO	NO	Yes	NO	NO	Yes	Yes
Province	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2071	2071	2071	2071	2071	2071	2071

*P<0.1, **P<0.05, ***P<0.01, Standard error in parentheses

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3.2. Robustness Tests

In this paper, we use methods such as adding variables to the original model and replacing the model to test the robustness of the results. Robustness tests were conducted using a restricted Tobit model, a robust OLS model, and an ordered Logistic model, respectively, and the results are shown in Table 4. The data results show that columns 1,4,7 of Table 4 are tested by adding the two control variables of whether one with health insurance and one with pension insurance, to the original model. Columns 2,5,8 are a robust OLS regression of all the variables in the original model. Columns 3,6,9 are Specifically done by transforming the explanatory variables and classifying the individual income deprivation index of the population according to intervals (see Table 1). By assigning it from slight to extreme deprivation, five levels are assigned a 1-5 and subsequently estimated using the Ordered probit model. Columns 1,2,3 report the results on the effect of Internet use on income inequality, columns 4,5,6 report the results on the effect of time spent online on income inequality, and columns 7,8,9 report the effect of whether or not to go online and time spent online on income inequality by putting them in one model for estimation. The finding that Internet use suppresses residential income inequality still holds from the empirical results reported in Table 4.

Table 4: Robustness test results.

Variables	(1) Restricted Tobit	(2) Robust OLS	(3) Ordered probit	(4) Restricted Tobit	(5) Robust OLS	(6) Ordered probit	(7) Restricted Tobit	(8) Robust OLS	(9) Ordered probit
Internet use	-0.039***	-0.038***	-0.202***				-0.038***	-0.038**	-0.199***
	(0.011)	(0.011)	(0.058)				(0.011)	(0.011)	(0.058)
Online time				-0.012*	-0.011*	-0.065*	-0.011*	-0.011*	-0.063*
				(0.005)	(0.005)	(0.026)	(0.005)	(0.005)	(0.026)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2071	2071	2071	2071	2071	2071	2071	2071	2071

3.3. The Problem of Endogeneity

This paper chooses the number of Internet users per capita in 2017 and the sub-provincial Internet penetration rate in 2016 as instrumental variables. The results are as follow in table 5. Because the sub-provincial Internet penetration rate data in 2017 is missing. There is also a time lag in the Internet penetration rate on the residents' use of the Internet itself, so this paper considers the provincial Internet penetration rate data in 2016 is equally representative.

Table 5: Endogenous treatment.

Variables	**(1)Internet use**		**(2)Online time**	
	First stage	**Second stage**	**First stage**	**Second stage**
Internet use		-1.131***		-0.955*
		(0.262)		(0.400)
sub-provincial Internet penetration rate	0.235***		0.437*	
	(0.869)		(0.194)	
the number of Internet users per capita	0.618***		0.007	
	(0.247)		(0.503)	
R^2	0.26		0.088	

*P<0.1, **P<0.05, ***P<0.01, Standard error in parentheses

Since the restricted Tobit model is challenging to regress directly using the instrumental variables approach, we treat the index of individual income deprivation of the population as a base variable and regress it using the linear two-stage least squares method. We find that the coefficient of the presence or absence of Internet use on income deprivation of the population in the second stage is significantly -1.131. Its absolute value is greater than the results obtained directly using the OLS method. Similarly, the impact of the intensity of Internet use on income deprivation of the population was analyzed using such tests, and we find the coefficient of Internet use on income deprivation of the population is significantly -0.955 in the second stage. Thus, Internet use reduces the level of individual income

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deprivation of the population, ensuring the reliability of the measurement results and confirming the findings of this paper.

3.4. Heterogeneity Analysis of Different Educated Groups

Since individual residents' exposure and use of the Internet are influenced by their level of education, this paper uses the residents' level of education as a basis for classification into three categories: low, medium, and high education level, to further analyze the differences in the impact of the Internet on income inequality for different educated groups.

Table 6: Estimation results of different educated groups.

	(1) Low level	(2) Medium level	(3) High level	(4) Low level	(5) Medium level	(6) High level	(7) Low level	(8) Medium level	(9) High level
Internet use	-0.038	-0.031*	-0.046				-0.038	-0.029*	-0.047
	-0.026	-0.013	-0.024				-0.026	-0.013	-0.025
Online time				-0.004	-0.016*	-0.007	-0.004	-0.015*	-0.008
				-0.009	-0.007	-0.011	-0.009	-0.007	-0.011
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2071	2071	2071	2071	2071	2071	2071	2071	2071

All Columns 1,2,3 of Table 6 report the effect of whether or not to go online on their income inequality in the context of different levels of education. Columns 4,5,6 columns report the effect of time spent online on their income inequality in the context of different levels of education. The last three columns report the effect of whether or not to go online and time spent online on their income inequality in the context of different levels of education for different groups of people. Education levels are classified as follows: primary school and below are classified in the low education level group, secondary school (middle and high school) in the medium education level group, and tertiary education and above in the high education level group. The reported results show that Internet use and intensity of time spent online significantly affect income inequality for this group in the medium education level group. In contrast, the effect is not significant for both the high and low education level groups.

For the low education group, their low level of human capital makes it difficult to access the Internet or use it for related activities. Some of this group has access to the Internet, as the CFPS data showing the proportion of the low-education group using the Internet at 19.8%. It is difficult for the use of the Internet to significantly impact this group of the low-education level group since the well-educated group is more likely to use the Internet for communication. In contrast, the uneducated group is prone to incorrect Internet use [34].

3.5. The Impact of Internet Use Types on Individual Income Inequality of Residents

Table 7: Estimation results of different types of Internet use.

Explanatory variables	(1)	(2)
	Income deprivation index	
Internet learning	-0.006	-0.006*
	(0.003)	(0.003)
Internet work	-0.010***	-0.010***
	(0.003)	(0.003)
Internet social use	-0.006	-0.006
	(0.004)	(0.004)
Internet entertainment	-0.013**	-0.013***
	(0.004)	(0.004)
Internet business use	-0.022***	-0.020***
	(0.004)	(0.004)
Individual-level variables	Yes	Yes
Household-level variables	No	Yes
Province	Yes	Yes
N	2071	2071

*P<0.1, **P<0.05, ***P<0.01, Standard error in parentheses

Table 7 shows the impact of different types of Internet use on income inequality among the population. Column 1 shows the effect of different types of Internet use on income inequality when

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controlling only for individual control variables, while column 2 adds household-level control variables to column 1. From the results shown in the two columns of the table, the use of the Internet for work, entertainment, and business activities can suppress residential income inequality, which has the most significant impact on Internet business, which affects suppressing residential income inequality 0.021 units. In contrast, the effect of suppressing residential income inequality from the use of the Internet for work and Internet for entertainment has an effect of 0.01 and 0.013 units.

3.6. Heterogeneity Analysis of Urban and Rural Residents

Estimation results for different resident household types show in table 8. Columns 1 and 2 demonstrate the impact of Internet use on income inequality for urban and rural household residents, respectively. Columns 3 and 4 demonstrate the impact of Internet use intensity on income inequality for urban and rural household residents, respectively. The results show that Internet access inhibits income inequality at the individual level for rural and urban household residents in China. Internet access produces a more significant suppression of income inequality for rural households than for urban households. Online time exhibits significant characteristics in suppressing income inequality at the individual level for residents of rural households in China but not for residents of urban households. Columns 5and 6 demonstrate the effects of whether or not and the time spent online on income inequality for different groups of people. From the results, it is clear that Internet access produces a more significant suppression of income inequality for residents of rural households. According to the 41st Statistical Report on the Development Status of the Internet in China, as of December 2017, Internet users purchasing Internet financial products in China has reached 129 million, an increase of 30.2% year-on-year. The Internet influences the investment preferences of individuals and households for financial assets by sharing and disseminating information, promoting communication and exchange. It increases the property income of residents, thereby reducing income inequality. It can be inferred that the impact of Internet use on the income of rural residents should be more significant.

Table 8: Estimation results for different resident household types.

	(1)	(2)	(3)	(4)	(5)	(6)
	Urban household residents	**Rural household residents**	**Urban household residents**	**Rural household residents**	**Urban household residents**	**Rural household residents**
Internet use	-0.037*	-0.04**			-0.036*	-0.039**
	(-0.016)	(-0.014)			(-0.016)	(-0.014)
Online time			-0.006	-0.015*	-0.005	-0.015*
			(-0.008)	(-0.006)	(-0.007)	(-0.006)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes	Yes	Yes
N	2071	2071	2071	2071	2071	2071

*P<0.1, **P<0.05, ***P<0.01, Standard error in parentheses

3.7. Discussion of Impact Mechanisms

Human capital helps to increase the income level of people. Workers with high human capital will receive higher income [3]. As an essential component of human capital, workers' level of education is a crucial factor affecting income disparity and intergenerational mobility [35]. Education further positively affects the income level of residents by enhancing their human capital [4] [36]. After analyzing the heterogeneity across educational groups, this paper finds that Internet use and online time significantly affect income inequality for the group of residents whose education level is medium education. This suggests that the Internet impacts income inequality of the population and that the level of education is one of the channels of action.

The development of finance will give the poor more access to financial services, thus increasing the efficiency of capital allocation to reduce income disparity [37][38]. The development of the Internet helps people to have more and better access to financial services. Different types of Internet use have different effects on individual income inequality of the population, among which Internet commerce has the most significant effect on curbing income inequality. By using the Internet for business

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activities, people change their value orientations and risk preferences, which in turn change the household capital of residents, and thus ultimately have a potential impact on income inequality. Under the influence of the role of individual risk preference mechanism, it affects the population's income inequality level. In the paper, the number of financial products owned by residents is mainly used as a proxy variable for risk preferences.

Table 9 demonstrates the mechanism analysis of the impact of Internet use on the income inequality of the population. The first four columns analyze how the presence or absence of Internet use affects the income inequality of residents; the last four columns analyze how the duration of Internet use affects the income inequality of residents. The results show that Internet use and online time impact residents' income inequality by affecting individuals' education levels and individual risk preferences.

Table 9: Mechanisms analysis of the impact of Internet use on income inequality.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Income deprivation index							
Internet use	-0.046***	-0.045***	-0.056***	-0.054***				
	(0.011)	(0.011)	(0.011)	(0.011)				
Online time					-0.013**	-0.014**	-0.014**	-0.015**
					(0.005)	(0.005)	(0.005)	(0.005)
Internet* Financial products	-0.114***	-0.105***			-0.120***	-0.110***		
	(0.015)	(0.014)			(0.014)	(0.014)		
Internet* Education			-0.042***	-0.043***			-0.050***	-0.050***
			(0.005)	(0.005)			(0.005)	(0.005)
Individual-level variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household-level variables	No	Yes	No	Yes	No	Yes	No	Yes
Province	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2071	2071	2071	2071	2071	2071	2071	2071

*P<0.1, **P<0.05, ***P<0.01, Standard error in parentheses

4. Discussion

The vigorous development of the Internet and the acceleration of its deep integration with various industries are continuously injecting vitality into China's economic development. Online medical care, distance education, and collaborative work have been widely used, playing a vital role in ensuring the regular operation of China's society, promoting the steady development of people's livelihoods, and meeting new challenges. The technological revolution has led to the rapid development of digital technology and its continuous and deep integration with industrial changes. As a new engine of innovation and development, the impact of Internet development on the changing income level of residents is increasing. This paper explores the impact of Internet use on residential income inequality at the micro-individual level based on the 2018 CFPS micro-data using the Kakwani Income Deprivation Index. The findings show that Internet use and the duration of Internet use can significantly reduce income inequality. This effect of the Internet on the income inequality of the population is mainly found in the secondary education class. The exploration of the mechanism suggests that the Internet can reduce the income inequality of the population by enhancing their risk appetite and human capital.

The promotion of 5G and full-fiber network work and the implementation of the rural revitalization strategy positively contribute to increasing residents' income and reducing the income gap. The research in this paper has the following policy implications. Firstly, continuing to improve Internet infrastructure, popularize Internet education and Internet-dependent economic activities, increase Internet usage and efficiency, and narrow the income gap between groups with different levels of education. Secondly, accelerating the penetration and integration of the Internet with various industries (such as education, pension, health, tourism) to promote the Internet to increase residents' income and employment opportunities. According to the differences in the educational level of China's resident groups, precise measures have been taken to increase the supply of digital resources and strengthen Internet skills training for low- and middle-income groups.

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Author Contributions

For research articles with several authors, a short paragraph specifying their individual contributions must be provided. The following statements should be used “Conceptualization, D.W., YD.L. and L.H.; methodology, D.W. and L.H.; software, D.W. and L.H.; validation, D.W., L.H. and YD.L.; formal analysis, YD.L. and L.H; investigation, D.W. and L.H.; resources, D.W. and YD.L.; data curation, D.W. and YD.L.; writing—original draft preparation, D.W. and L.H.; writing—review and editing, L.H. and YD.L.; visualization, D.W. and YD.L.; supervision, D.W. and YD.L.; project administration, L.H.; funding acquisition, D.W.; All authors have read and agreed to the published version of the manuscript.”

Data Availability Statement

Publicly available datasets were analyzed in this study. This data can be found here: [http://www.isss.pku.edu.cn/cfps/sjzx/gksj/index.htm].

Conflicts of Interest

“The authors declare no conflict of interest.”

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