# Research on the Multidimensional Poverty Reduction Effects of Digital Inclusive Finance in China

**Liang Ting**

Xidian University, School of Economics and Management, Taibai South Road, No.2, Xi'an, Shaanxi, China

**Abstract:** *This paper empirically analyzes the poverty alleviation effects of digital inclusive finance on the three dimensions of income, education and medical care by constructing a corresponding panel model. The research results show that the poverty reduction effect of digital inclusive finance in the income and medical dimensions shows the effect of first suppression and then promotion. The poverty reduction effect of the income dimension is far greater than that of the medical dimension; the education dimension has always been shown to be positive effect. Therefore, we propose to vigorously promote the coordinated integration of digital inclusive finance development and poverty alleviation strategy.*

**Keywords:** Digital financial inclusion; Multidimensional poverty; Poverty reduction effect

## 1. Introduction

In recent years, China has made decisive progress in poverty reduction. According to documents, the poor population has shrunk from 98.99 million in 2012 to 5.51 million in 2019, and the poverty incidence rate has dropped from 10.2% to 0.6%. The effect of poverty reduction has been remarkable. Even so, Multidimensional poverty is still difficult to solve. For a long time, financial development and poverty alleviation have been inextricably linked. Digital inclusive finance and poverty alleviation have similar target groups, and it provides a new direction for poverty alleviation. Therefore, this article aims to discuss the role of digital financial inclusion in poverty alleviation of different dimensions, and having a small contribution to china's fight against poverty and further promoting the rural revitalization strategy.

## 2. Research Overview and Mechanism Analysis

### 2.1 Literature review

In recent years, scholars have paid a lot of attention to issues in the field of poverty reduction in inclusive finance. Most of scholars have used panel data to analysis the relationship between the two, the result is that there is a nonlinear relationship and threshold for poverty reduction in inclusive finance by direct and indirect effects. Currently, most of the existing literature uses a single income indicator to measure poverty, and few discuss the relationship between poverty reduction and digital inclusive finance from a multi-dimensional perspective. Digital financial inclusion has the advantages of "low cost, high efficiency, and complete risk control system". Therefore, can digital financial inclusion effectively alleviate poverty? And what are the characteristics of this poverty reduction effect in different dimensions of poverty? This is a practical problem with great theoretical value that is worthy of in-depth discussion. Therefore, this paper uses panel data to empirically analyze the impact of digital inclusive finance development on multi-dimensional poverty alleviation based on income poverty, education poverty, and medical poverty in china.

### 2.2 Mechanism Analysis

The ways of digital financial inclusion to alleviate poverty can be divided into direct and indirect effects, as shown in Figure 1.
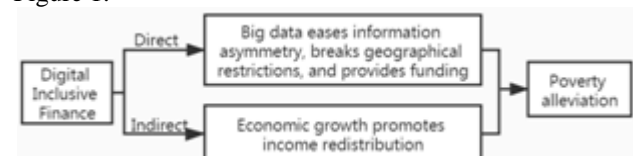


**Figure 1:** The mechanism of DIFto reduce poverty

On the one hand, the use of big data relieves the information asymmetry between financial institutions and poor groups, and reduces the credit threshold for low-income groups. Mobile payment expands the scope of financial services and breaks geographical restrictions. Finally, farmers can get more credit funds to earn more income by the way of digital inclusive finance. On the other hand, digital inclusive financial indirectly alleviates rural poverty by promoting regional economic levels. Economic growth has increased employment opportunities and promoted the redistribution of regional income, thereby increasing the income level of the poor and achieving the goal of alleviating income poverty.

## 3. Variable selection and empirical analysis

### 3.1 Variable selection

Explained variable have 3 dimensions, including consumption level of rural residents to represent income poverty as CL, the ratio of the number of faculty members to the number of students to represent education poverty as EDU, number of rural technical personnel per 10,000 people to represent medical poverty as MED. Core explanatory variables is digital inclusive finance index as DIFI that the research team of Peking University Digital Finance Research Center released in April 2019, including the three dimensions

of Internet financial services coverage, depth of use and digital support services. Control variable have Per capita GDP, the urbanization rate of each province as UR, fiscal expenditure on agriculture as FE1, fiscal education expenditure as FE2, and fiscal health expenditure as FE3.

### 3.2 Model setting and analysis

This paper draws on related research, and sets the panel model as follows:

$$Y_{i,t}=\beta_1 DFI+\beta_2 DFI^2+\beta_3 GDP+\beta_4 UR+\beta_5 FE+\varepsilon_{i,t}+\mu_i \quad (1)$$

In the above formula, i represents 31 provinces in china, i=1,2…31; t represents the year, $\mu_i$ is the individual effect, $\varepsilon_{i,t}$ are random disturbance terms, $\beta_0$, $\beta_1$, $\beta_2$, $\beta_3$, $\beta_4$, $\beta_5$ represent the estimated coefficient of the each explanation respectivelyvariable. When Y stands for CL, EDU, MED (All are Positive indicator), the models represent the mitigation effects of income poverty , education poverty, and medical poverty. In order to ensure the applicability of the model, the data is processed logarithmically. This analysis uses Eviews8.0.

**Table 1:** Model results for the income dimension

| VARIABLE | (1) FE | (2) FE | (3) FE | (4) FE | (5) FE |
|---|---|---|---|---|---|
| LNDIF | 0.265909 *** (22.267) | -0.906920 *** (-9.2537) | -0.684798 *** (-7.2370) | -0.692128 *** (-7.3477) | -0.592001 *** (-5.7056) |
| LNDFI^2 | | 0.134746 *** (12.0081) | 0.094610 *** (7.8512) | 0.095312 *** (7.9498) | 0.080234 *** (5.8461) |
| LNGDP | | | 0.760098 *** (5.8852) | 0.637805 *** (4.2342) | 0.619598 *** (4.1687) |
| LNUR | | | | 0.444761 (1.5529) | 0.399063 (1.4104) |
| LNFE1 | | | | | 0.139217 ** (2.1570) |
| Constant term | 7.723648 *** (134.76) | 10.19078 *** (48.7325) | 1.956209 (1.3860) | 3.563131 (2.0436) | 2.779728 (1.5834) |
| R-Squared | 0.957902 | 0.980706 | 0.985000 | 0.985295 | 0.985949 |
| Adjusted R-Squared | 0.947292 | 0.975645 | 0.980909 | 0.981129 | 0.981686 |
| Chi-sq | 86.560713 | 103.799415 | 18.235519 | 14.743743 | 17.609559 |
| Prob. | 0.0000 | 0.0000 | 0.0004 | 0.0053 | 0.0035 |

Note: The numbers in parentheses are the estimated t-values of each explanatory variable coefficient; ***, **, * indicate significance at the significance level of 1%, 5%, and 10% respectively, the same below.

Table 1 shows, The P values of Hausman test are all less than 0.01, so the fixed effects model is selected for analysis. There is positively correlated at a significance level of 1% between DIF and CL in model 1, indicating that the overall development of digital inclusive finance can effectively alleviate rural income poverty. The results after adding LNDFI's quadratic term show that digital inclusive finance has a U-shaped trajectory in alleviating income poverty. Before reaching a certain threshold, the development of digital inclusive finance has a restraining effect on alleviating income poverty, but when it exceeds this the threshold, digital inclusive finance has a significant acceleration effect on income poverty. Among the control variables, the coefficient of GDP is significantly positive at the level of 1%, indicating that economic growth drives the increase of residents' income level, promotes consumption and thereby alleviates rural income poverty; the coefficient of fiscal expenditure for

agriculture is significantly positive at the level of 5%. It shows that increasing the government's expenditure on supporting agriculture can have a positive effect on rural income poverty, but the impact of urbanization rate is not significant.

**Table 2:** Model results for the educational dimension

| Variable | (6) RE | (7) RE | (8) RE | (9) RE | (10) RE |
|---|---|---|---|---|---|
| LNDIF | 0.061504 *** (12.7696) | 0.011203 (0.1925) | 0.054537 *** (4.2235) | 0.048341 *** （5.3932） | 0.060457 *** (5.6193) |
| LNDFI^2 | | 0.005779 (0.8671) | | | |
| LNGDP | | | 0.041624 (0.5817) | | |
| LNUR | | | | 0.269853* （1.7356） | 0.371111 ** (2.2922) |
| LNFE2^2 | | | | | -0.006169 ** (-1.9839) |
| Constant term | -2.920550 *** (-126.3388) | -2.814739 *** (-22.6623) | -3.331243 *** (-4.7160) | -2.68546 *** （-19.5479） | -2.42971 *** (-12.9782) |
| R-Squared | 0.948637 | 0.948952 | 0.948780 | 0.949875 | 0.951454 |
| Adjusted R-Squared | 0.935692 | 0.935562 | 0.935345 | 0.936728 | 0.938214 |
| Chi-sq. | 0.808124 | 1.063538 | 7.124644 | 2.927790 | 1.921046 |
| Prob. | 0.3687 | 0.5876 | 0.0284 | 0.2313 | 0.5890 |

Table 2 shows, The P values of Hausman test were all greater than 0.01, so random effects model was used for analysis. The formula (6) shows that at the 1% significance level, the level of digital inclusive finance is positively correlated with the alleviation of education poverty. In formula (7), after adding the quadratic term of LNDFI, the variable is not significant, so the effect of educational dimension is different from the income and has a significant positive promotion effect. The development of digital inclusive finance is helpful to alleviate education poverty. Among the control variables, the level of urbanization has a positive effect on education poverty alleviation at the significant level of 10%, indicating that urbanization can promote education poverty alleviation; the quadratic coefficient of fiscal education expenditure is negative, indicating that fiscal expenditure reduces education poverty and shows an inverted U-shaped trajectory, indicating that appropriate education fiscal expenditures are conducive to alleviating education poverty, but education poverty will not continue to decrease after crossing a certain threshold, and GDP does not significantly reduce education poverty.

**Table 3:** Model results for the medical dimension

| Variable | (11) FE | (12) FE | (13) FE | (14) FE | (15) FE |
|---|---|---|---|---|---|
| LNDIF | 0.094121 *** (12.9247) | -0.249595 *** (-3.02256) | -0.040984 (-0.5329) | | |
| LNDFI^2 | | 0.039489 *** (4.1768) | 0.001795 (0.1833) | | |
| LNGDP | | | 0.713859 *** (6.8003) | 0.339129 *** (4.7740) | 0.423568 *** (4.2886) |
| LNUR | | | | 0.854568 *** （3.8429） | 0.935995 *** (4.1666) |
| LNFE3 | | | | | -0.311497 ** (-2.1636) |
| LNFE3^2 | | | | | 0.023132* (1.9312) |
| 常数项 | 3.188746 *** | 3.911778 *** | -3.821887 *** | 0.566550 （0.6383） | 0.717830 (0.6854) |

| Variable | (11) FE | (12) FE | (13) FE | (14) FE | (15) FE |
|---|---|---|---|---|---|
| | (91.2313) | (22.2016) | (-3.3316) | | |
| R-Squared | 0.964802 | 0.969206 | 0. 977720 | 0.979623 | 0.980413 |
| Adjusted R-Squared | 0.955931 | 0.961128 | 0.971644 | 0.974278 | 0.974863 |
| Chi-sq. | 16.072287 | 31.509845 | 11.745591 | 9.994890 | 17.259456 |
| Prob. | 0.0001 | 0.0000 | 0.0083 | 0.0068 | 0.0017 |

Table 3 shows that the P values of Hausman test are all less than 0.01, so the fixed effects model is used for analysis. When formula (11) does not introduce other variables, digital inclusive finance have a positive effect to medical poverty alleviation and digital inclusive finance can alleviate medical poverty to a certain extent. Formula (12) introduces its quadratic term, and it presents a similar result to the income poverty alleviation effect, indicating that digital inclusive finance also has a threshold for alleviating medical poverty. After the threshold is crossed, it has an accelerated effect on the alleviation of medical poverty. After adding other control variables, the LNDFI and its quadratic terms are not significant. After the digital inclusive finance variable is deleted in formula (15), the model has a higher fit. It shows that the mitigation effect of digital inclusive finance on medical poverty is far smaller than the driving effect of economic growth, urbanization and fiscal medical expenditures, both of which can promote the alleviation of medical poverty; the poverty reduction effect of fiscal medical expenditures is similar, showing the effect of first restraining and then promoting. Before reaching a certain value, fiscal medical expenditure shows an inhibitory effect on the reduction of medical poverty. After this certain value, fiscal medical expenditure can significantly alleviate poverty in the medical dimension.

## 4. Conclusions and Suggestions

### 4.1 Conclusions

The above research results show that digital inclusive finance can promote the alleviation of multidimensional poverty to a certain extent, but different dimensions have different effects: in terms of income and medical dimension, the development of digital inclusive finance has a U-shaped curve in its mitigation effect. Before reaching a certain value, the development of digital inclusive finance has an inhibitory effect on poverty reduction. After this certain value, digital inclusive finance has a significant acceleration effect on poverty reduction. At the same time, the mitigation effect of digital inclusive finance on the income dimension is greater than the mitigation effect on the medical dimension; in the education dimension, digital inclusive finance has always been shown to promote the reduction of education poverty.

### 4.2 Suggestions

Based on the above research results, the following suggestions are made:

First, coordinate the development of digital inclusive finance and the strategy of poverty alleviation. digital inclusive finance can expand information collection channels and improve the efficiency of information collection by Relying on big data, thereby effectively solving the lack of rural financial rights caused by information asymmetry in rural areas. Therefore, the coordinated development of the two is not only conducive to the development of digital inclusive finance, but also the poor will also benefit from the development. This measure is based on the conditions of popularization of the Internet. Although the network coverage rate is relatively high at this stage, some poor areas have not yet enjoyed this convenience. Therefore, we should use this as a starting point for the development of inclusive finance. Can help poor people get rid of poverty.

Second, in the poverty alleviation policy, we should fully consider multi-dimensional poverty factors. At this stage, the causes of rural poverty are becoming more and more complex. A single income level can no longer accurately measure the degree of poverty. The government should pay attention to the causes of poverty and set up a poverty alleviation system in various dimensions, taking the rural revitalization strategy as an opportunity. The development of digital economy provides technical support to accurately identify poverty and eliminate blind areas of multi-dimensional poverty such as education and medical filed.

Finally, inclusive financial institutions can cooperate with the government to strengthen financial publicity and promotion, and regularly carry out financial activities in rural areas to further strengthen the endogenous motivation of farmers to increase income through entrepreneurship to get rid of poverty, and completely change their dependence on government relief to live. At the same time, the theme of the activity can be related to industrial policies or technical guidance on order to improve the blood-making capacity of poor households and completely solve the poverty problem.

## References

[1] Song Xiaoling. An Empirical Test of Digital Inclusive Finance Narrowing the Urban-Rural Income Gap [J]. Finance and Economics, 2017(06): 14-25.
[2] Luo Hehua, Luo Jiali. Research on the Impact of Inclusive Finance on Rural Poverty Reduction from a Multi-dimensional Perspective[J]. Contemporary Economic Management, 2019, 41(03): 80-88.
[3] Shao Hanhua, Wang Kaiyue. The Poverty Reduction Effect and Mechanism of Inclusive Finance——An Empirical Analysis Based on Cross-border Panel Data [J]. Research in Financial Economics, 2017, 32(06): 65-74.
[4] Research Group of Peking University Internet Finance Research Center. Peking University Digital Financial Inclusive Index (2011-2015) [R], 2016-7.
[5] Huang Dunping, Xu Xinhe, Fang Jian. Research on the Poverty Reduction Effect of China's Inclusive Finance on the Rural Poor Population[J]. Journal of Demography, 2019, 41(03): 52-62.

## Author profile

**Liang Ting** received bachelor's degree in managements in 2018 and began to study for master's degree in School of Economics and Management of Xidian University in the same year. Currently, she is a student of Graduate School of Finance, the main research direction is regional economic development.