# Digital Finance, Entrepreneurial Vitality and Vulnerability to Poverty

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*Abstract*: In the context of promoting common prosperity in China, it is particularly important to prevent large-scale poverty returns and consolidate the achievements of poverty alleviation. Based on the CHFS micro survey data, this paper constructs the household poverty vulnerability index and empirically tests the moderating effect of entrepreneurial vitality on the inhibition of household poverty vulnerability by digital finance. The results show that: digital finance can significantly inhibit household vulnerability to poverty, and the effect of coverage breadth is more prominent. Second, entrepreneurial vitality can strengthen the inhibitory effect of digital finance on household poverty vulnerability, and the strengthening effect on coverage breadth is more obvious. Third, there is significant heterogeneity in the moderating effect of entrepreneurial vitality on digital finance inhibiting household vulnerability to poverty, and the moderating effect is more significant in the eastern and central regions with better digital infrastructure. This study provides empirical evidence for evaluating the poverty reduction effect of digital finance and entrepreneurial vitality and also provides policy references for promoting the construction of common prosperity.

*Keywords*: Digital Finance; Poverty Vulnerability; Entrepreneurial Vitality

## 1. Introduction

The report of the 20th National Congress of the Communist Party of China put the realization of common prosperity in a more prominent position, and avoiding returning to poverty is the core factor to achieving common prosperity, so it is very important to reasonably predict the probability of families returning to poverty in the future. Therefore, this paper considers the family's vulnerability to poverty as the main research object. Due to the disadvantages of traditional financial institutions in carrying out inclusive finance, such as "dislike the poor and love the rich" and "seek profit", their poverty reduction effect is not ideal. However, digital finance based on network technology can greatly improve the coverage breadth and depth of inclusive finance with low cost of financing constraints, thus reducing the access threshold. Previous studies have confirmed that digital finance can indeed improve income distribution(Song, 2017). However, from the perspective of ability poverty, "increasing income" may not be able to reduce poverty in the real sense. Other studies argue that the "digital divide" will restrict the effect of digital finance on poverty reduction(Qiu et al., 2016; He, Zhang, & Wan, 2020). Under the trend of "mass entrepreneurship and innovation", the impact of entrepreneurial activities on the increase of jobs and the improvement of human capital level will not change the poverty reduction mechanism of digital finance.

Based on this, this paper focuses on whether digital finance can reduce the vulnerability of households to poverty, and what kind of moderating effect regional entrepreneurial vitality plays. The existing research mainly explores the factors leading to household poverty vulnerability from the micro perspective but lacks a discussion on the action mechanism of digital finance as a macroeconomic form of household poverty vulnerability, especially ignores how the synergy between regional entrepreneurial vitality and digital finance can help alleviate household poverty vulnerability. Therefore, the research content of this paper is as follows: firstly, provincial digital finance is matched with the data at the household level to explore the overall impact of digital finance on household poverty vulnerability. Secondly, entrepreneurial vitality is an important driving force for regional economic development, and this paper further explores the synergistic effect of digital finance and entrepreneurial vitality on household poverty vulnerability. Finally, this paper further studies the heterogeneity of the interaction between digital finance and entrepreneurial vitality in different regions and different

digital infrastructure levels.

# 2. Literature Review and Hypotheses

To study the poverty reduction effect of digital finance, the first step is to determine the indicators to measure poverty. Most of the existing literature analyzes poverty from the following three types of indicators: first, poverty incidence is calculated from the perspective of income or consumption(Zhou, Liao, & Zhang, 2021; Chen et al., 2021). In 2015, the World Bank defined the international extreme poverty line as $1.9 per capita daily consumption, $3.2 for developing countries, and $5.5 for developed countries. Second, a multidimensional poverty indicator is constructed from the dimensions of education, health, insurance, income, and employment(He, Zhang, & Wan, 2020; Guo & Zhou, 2016). The third is the poverty vulnerability indicator. A household's vulnerability to poverty refers to the probability that the household will fall into poverty in the future(Chaudhuri, J, & A, 2002). Compared with the previous two static indicators, vulnerability to poverty is more forward-looking and dynamic(Peng & Xu, 2021). Although China's poverty alleviation work has achieved great success, as China's economic development enters the new normal, families will face many risk events such as industrial structure adjustment, labor market changes, birth, aging, illness, and death(Zhang & Yin, 2018). Even if the families have been lifted out of poverty, they may still fall into the poverty trap in the future. Therefore, how to effectively prevent families from falling into poverty in the future has become an urgent problem to be solved.

Most of the existing studies agree that finance can reduce the vulnerability of households to poverty. Using the village-level financial inclusion index, Zhang and Yin (2018)found that financial inclusion can improve the risk response ability of farmers, thus reducing poverty vulnerability caused by excessive consumption. In terms of the impact of digital finance on household poverty vulnerability, Peng and Xu(2021) found that digital finance can reduce the poverty vulnerability of farmers from two levels alleviating financial constraints and information asymmetry. Zhang and Han(2021) believe that digital finance mainly mitigates the risk impact through the diversified allocation of household assets, the improvement of financial knowledge level, and the improvement of trust mechanism.

The Chinese financial environment has undergone great changes due to the development of digital finance. As a combination of the Internet and finance, on the one hand, digital finance has the property of finance, which can reduce the search cost of both sides of the transaction, and ordinary residents can learn about various financial products only through mobile phones. This is beneficial to increase the investment and financing channels of residents and realize the risk diversification and risk transfer of households, thus affecting the poverty of households(Cui & Sun, 2012). On the other hand, digital finance is also inclusive. From the perspective of geographical constraints, the emergence and popularization of Internet technology can break the geographical constraints, break through the restrictions of traditional financial physical outlets, alleviate the exclusion effect of traditional finance on remote areas, and improve the financial availability of low-income areas and people. From the perspective of credit discrimination, digital finance especially alleviates the financing constraints of small and medium-sized enterprises(Xie et al., 2018). Small and medium-sized enterprises provide jobs for the majority of family members. The stable and healthy development of these enterprises is related to the stable income source of the family, which in turn affects the poverty vulnerability of the family. Based on the above analysis, the following hypotheses are put forward:

Hypothesis 1: Digital finance helps to reduce household vulnerability to poverty and presents a significant "digital dividend".

Digital finance and entrepreneurial vitality have a synergistic effect on household vulnerability to poverty, which mainly exists in the following mechanisms: first, the poverty reduction effect of digital finance will be weakened due to the existence of the "digital divide", and the high requirement of new technology on human capital level is the main reason for the "digital divide". Through self-employment and "learning by doing" mode, entrepreneurial activities can force entrepreneurs to expand into new fields, learn new skills, and promote the overall improvement of social human capital level, thus eliminating the inhibitory effect of the "digital divide" on poverty reduction by digital finance(Zhan & Li, 2022). Secondly, entrepreneurial activities can promote the birth of more micro, small, and medium-sized enterprises. By fostering and supporting high-quality entrepreneurial enterprises, regional governments can provide more adequate job options for families in the region and reduce the possibility of future unemployment risk for family members. Thirdly, entrepreneurial activities can promote the accumulation of human capital, accelerate the emergence of new enterprises and industries, and promote market competition and resource integration(Su & Zhou, 2021). Through the improvement of

resource allocation efficiency and economies of scale, regions can achieve effective resource conservation and high-quality economic growth. Digital finance can help the achievements of regional development "sink" so that the poor groups in the region can benefit from the trickle-down effect of economic growth.

Hypothesis 2: Digital finance and regional entrepreneurial vitality play a positive role in moderating the weakening of household vulnerability to poverty through benign interaction and synergy.

# 3. Research Design

## 3.1 Data source

The following data were combined in the article matching. (1) China Household Finance Survey (CHFS) data from China Household Finance Survey and Research Center of Southwestern University of Finance and Economics are selected from the 2019 Household Tracking Survey. (2) China Digital Inclusive Finance Index (2011-2020) released by the Institute of Digital Finance of Peking University. Since CHFS surveys the household situation in the previous year and considers the endogenous impact, the sample of a digital inclusive financial index in 2017 is selected with a lag of one period(Yang, Wang, & Deng, 2020). (3) The control variables at the provincial level are from China Statistical Yearbook in 2018.

## 3.2 Variable selection

## 3.2.1 Explained variable

Household vulnerability to poverty(VEP).Under the assumption that the logarithm of per capita annual consumption follows the normal distribution, the three-stage feasible generalized least squares method is used to estimate the probability of household poverty in the future. In the first step, the per capita consumption equation is estimated, and the obtained residuals are estimated by OLS. This step is shown in equations (1) and (2).

$$\ln C_i = \alpha_0 + \alpha_1 X_i + e_i \tag{1}$$

$$\hat{e}_i^2 = \beta_i X_i + \varepsilon_i \tag{2}$$

In Formula (1), $C_i$ represents the per capita annual consumption expenditure of the household, and $X_i$ represents the household head characteristic variable, the household characteristic variable, and the provincial dummy variable (Table 1). In the second step, the fitted values calculated in the first step are used to construct weights for weighted regression, and then the expectation of the per capita annual consumption expenditure in the next period and the expectation of the variance of the per capita annual consumption expenditure in the next period is estimated.

$$E(\ln(C_{i,t+1}) \mid X_{i,t}) = X_{i,t}\hat{\alpha}_{FGLS} \tag{3}$$

$$E(\ln(C_{i,t+1}) \mid X_{i,t}) = X_{i,t}\hat{\alpha}_{FGLS} \tag{4}$$

$$Var(\ln(C_{i,t+1}) \mid X_{i,t}) = X_{i,t}\hat{\beta}_{FGLS} \tag{5}$$

Thirdly, assuming that the per capita annual consumption expenditure of the next period follows the normal distribution, the poverty line ($\ln poor$) is selected to calculate the probability value of the household falling into poverty in the future. As for the poverty line, the average daily consumption of $3.2 set by the World Bank is selected as the standard, and 2011 is taken as the base period, which is adjusted to the level of 2018 through purchasing power parity exchange rate and CPI.

$$V\hat{U}l_{i,t} = Prob(\ln(C_{i,t+1}) \le \ln poor) = \phi\left[\left(\ln poor - X_{i,t}\hat{\alpha}_{FGLS}\right) / \sqrt{X_{i,t}\hat{\beta}_{FGLS}}\right] \tag{6}$$

Finally, the 29% probability value converted by period is used as the vulnerability line.

## 3.2.2 Core explanatory variable

Digital inclusive financial Index (Index). The Digital inclusive financial index of Peking University is used to measure the

development level of local digital finance, which is further subdivided into Breadth of coverage (Breadth), Depth of use (Depth), and degree of digitalization (Digital). The index compilation is based on Alipay's user transaction data, which has high credibility and accuracy and reflects the development status and changing trend of digital inclusive finance in China(Guo et al., 2020; Huang & Huang, 2018). To alleviate the endogeneity problem, the provincial digital inclusive financial index lagged by one period is selected and divided by 100 to facilitate the reporting of the estimation results(Zhou & He, 2020; Xu & Wang, 2022). The index is further subdivided into Breadth of coverage (Breadth), Depth of use (Depth), and digitalization (Digital).

### 3.2.3 Moderating variable

Entrepreneurial dynamism (Entrep). Referring to the practice of Zhanyong, it is expressed by the ratio of the number of private enterprises and self-employed workers to the total resident population in the region at the end of the year.

### 3.2.4 Control variables

The vulnerability of households to poverty at the micro level is affected by multiple factors such as their own situation and regional environment(Shen & Li, 2022). Concerning previous literature, the control variables were divided into three categories: household head, household, and regional characteristics (Table 1). The variables of household head included educational years (edu), age (age), age squared (age2), gender (gender), marital status (married), health status (health), and work status (work). The family characteristic variables include family size (size), the proportion of family medical insurance (med), the proportion of family endowment insurance (endow), family assets (asset), family debt (debt), and family income (income). At the regional level, we control the scale of traditional financial development (finance), which is expressed by the ratio of the financial industry's added value to the current year's GDP(Xu & Feng, 2022).

### 3.3 Model setting

To explore the impact of digital inclusive finance on reducing household vulnerability to poverty, the following benchmark model is constructed:

$$\Pr(VEP_i = 1 \mid Index_{i,t-1}, Z_i) = \alpha_0 + \alpha_1 Index_{i,t-1} + \alpha_2 Z_i + \mu_i \qquad (7)$$

Where represents the poverty vulnerability of the household, $Index_{i,t-1}$ represents the digital inclusive financial index lagged by one period, $Z_i$ represents a set of control variables, and $\mu_i$ represents the random disturbance term.

In addition, to explore the interaction effect of digital inclusive finance and entrepreneurial vitality on household poverty vulnerability, the interaction term ( $Index_{i,t-1} \times Entrep_i$ ) is added based on Formula (7) to obtain the new model as follows:

$$\Pr(VEP_i = 1 \mid Index_{i,t-1}, Z_i) = \beta_0 + \beta_1 Index_{i,t-1} + \beta_2 Entrep_i + \beta_3 Index_{i,t-1} \times Entrep_i + \beta_4 Z_i + \varepsilon_i \qquad (8)$$

Table 1. Descriptive statistics of variables

| Variables | N | Mean | SD | Min | Max |
|---|---|---|---|---|---|
| VEP | 27156 | 0.0100 | 0.101 | 0 | 1 |
| Index | 27156 | 2.748 | 0.222 | 2.402 | 3.366 |
| Breadth | 27156 | 2.483 | 0.237 | 2.157 | 3.161 |
| Depth | 27156 | 2.983 | 0.341 | 2.404 | 3.960 |
| Digital | 27156 | 3.196 | 0.0850 | 3.014 | 3.401 |
| edu | 27156 | 8.937 | 3.918 | 0 | 22 |
| gender | 27156 | 0.795 | 0.404 | 0 | 1 |
| age | 27156 | 54.86 | 12.76 | 18 | 101 |
| age2 | 27156 | 3172 | 1397 | 324 | 10201 |
| married | 27156 | 0.879 | 0.326 | 0 | 1 |
| health | 27156 | 0.795 | 0.404 | 0 | 1 |
| work | 27156 | 0.736 | 0.441 | 0 | 1 |
| size | 27156 | 3.295 | 1.568 | 1 | 15 |
| med | 27156 | 0.916 | 0.221 | 0 | 1 |
| endow | 27156 | 0.732 | 0.354 | 0 | 1.500 |
| lndebt | 27156 | 4.272 | 5.418 | 0 | 17.52 |
| lnasset | 27156 | 12.74 | 1.649 | 0.693 | 21.46 |
| lnincome | 27156 | 10.03 | 3.562 | 15.52 | 16.31 |
| finance | 27156 | 0.0760 | 0.0280 | 0.0500 | 0.180 |

Note: Primary school, middle school, high school, junior college, bachelor's degree, master's degree, and doctor's degree are assigned values of 6, 9, 12, 15, 16, 1,9, and 22 respectively; Male, married, healthy and employed were all assigned a value of 1; The logarithm of household assets, household liabilities, and household income is taken to avoid heteroscedasticity to a certain extent. In the treatment, if the value is 0, then 1 is added to take the logarithm.

# 4. Analysis of Empirical Results

## 4.1 Benchmark regression

Table 2. Digital finance and household vulnerability to poverty

| Variables | (1) | (2) |
|---|---|---|
| Index | 1.367 * * * | 3.446 * * * |
|  | (0.14) | (0.42) |
|  |  | (0.07) |
| lnincome |  | 0.140 * * * |
|  |  | (0.01) |
| Constant | 1.356 * * * | 9.523 * * * |
|  | (0.38) | (1.94) |
| Observations | 27156 | 27156 |
| Control variables | Control | Control |
| Pseudo R-squared | 0.0332 | 0.767 |

Note: ***, **, and * represent significance levels at 1%, 5%, and 10%, respectively, with robust labeling errors in parentheses. The following table is the same.

Table 2 reports the regression results of the probit model. Column (1) reports the regression results with only the core explanatory variables added to the model. Based on Column (1), Column (2), and Column (3) successively add the control variables of household

head characteristics, family characteristics, and regional characteristics. By comprehensively comparing the regression results of columns (1), (2), and (3), whether control variables are added or not, digital finance has a significantly negative impact on the vulnerability of the household to poverty, which initially proves Hypothesis 1.

The coefficients of other control variables are also in line with expectations: compared with females, when the household head is male, its risk preference will increase the household's vulnerability to poverty; The years of education and health status of the household head will affect the possibility of the household falling into poverty in the future, which reflects the importance of human capital accumulation. However, the larger the population size and the older the household head are, the more vulnerable to the risk shocks of diseases and accidents, and the higher the probability of falling into poverty. On the contrary, households with high assets, high income, and other physical capital accumulation have a stronger ability to resist risks and a lower probability of falling into poverty.

The digital inclusive financial index includes first-level dimensions such as coverage breadth, depth of use, and degree of digitalization. To explore how digital finance specifically affects household vulnerability to poverty, this paper introduces the three first-level dimensions into the model for regression analysis, and the results are shown in Table 3. The results are shown in Table 3. It is found that coverage breadth and depth of use have a significant effect on household vulnerability to poverty, both of which are negatively significant at the 1% significance level, and each 0.01 unit increase in the two will reduce the probability of household falling into poverty by 1.522% and 2.828%, respectively. This may be because when the coverage breadth and depth of use reach a certain level, ordinary residents are more likely to contact and use digital financial instruments, which in turn affects the vulnerability of households to poverty. The above conclusion further verifies Hypothesis 1.

Table 3. Digital finance and household poverty vulnerability in different dimensions

| Variables | (1) | (2) | (3) |
|---|---|---|---|
| Breadth | 1.522 * * * | | |
| | (0.33) | | |
| Depth | | 2.828 * * * | |
| | | (0.29) | |
| Digital | | | 0.007 |
| | | | (0.69) |
| Constant | 3.370 * * | 8.800 * * * | 0.403 |
| | (1.65) | (1.95) | (2.66) |
| Observations | 27156 | 27156 | 27156 |
| Control variables | Control | Control | Control |
| Pseudo R-squared | 0.752 | 0.785 | 0.746 |

## 4.2 Endogeneity test

Although the benchmark regression uses a one-period-lagged digital financial index, which is a provincial-level variable, to minimize the endogeneity problem caused by reverse causality, the regression results may still be affected by the problem of missing variables. Therefore, this paper further uses the two-stage instrumental variable method to verify the validity of the regression results. The spherical distance between the provincial capital city of the family and Hangzhou of Zhejiang Province is selected as the instrumental variable of digital finance (IV)(Zhang et al., 2020). Table 4 reports the regression results of two-stage instrumental variables. The results of Column (1) show that the instrumental variable has a significantly negative relationship with the digital financial index, and the first-stage F value is 5671.50, which strongly rejects the hypothesis of a weak instrumental variable. The Wald homogeneity test result is 14.83, indicating that the benchmark model does have endogeneity. After using instrumental variables, the coefficient of digital inclusive finance is still negative and significant, indicating that digital finance can significantly alleviate the vulnerability of households to poverty, which further corroborates Hypothesis 1.

Table 4. Test results of instrumental variable method

| Variables | (1) Index | (2) VEP |
|---|---|---|
| IV | 0.027 * * * | |
| | (202.98) | |
| Index | | 2.213 * * * |
| | | (3.93) |
| Constant | 2.671 * * * | 7.013 * * * |
| | (222.87) | (3.31) |
| Observations | 27156 | 27156 |
| Control variables | Control | Control |

## 4.3 Robustness test

To ensure the robustness of the empirical results, the following methods are adopted: first, the logit model is used to conduct regression demonstration on Hypothesis 1; The second is to change the explained variable and use the average daily consumption of 5.5 USD as the poverty line to calculate the household vulnerability to poverty. The third is to change the sample size and delete the sample data of municipalities and Zhejiang province to avoid the influence of location advantages of these regions. The fourth is to winsorize the samples by 1%. The robustness results are shown in Table 5. After a series of robustness tests, the results all support the research conclusion that digital finance can help alleviate household poverty vulnerability.

Table 5. Robustness test

| Variables | (1) logit | (2) $5.50 | (3) Sample | (4) Win |
|---|---|---|---|---|
| Index | 6.323 * * * | 3.429 * * * | 3.443 * * * | 2.659 * * * |
| | (0.81) | (0.14) | (0.45) | (0.39) |
| Constant | 16.916 * * * | 13.262 * * * | 9.457 * * * | 9.724 * * * |
| | (3.97) | (0.59) | (2.03) | (1.68) |
| Observations | 27156 | 27156 | 22944 | 27156 |
| Control variables | Control | Control | Control | Control |
| Pseudo R-squared | 0.762 | 0.730 | 0.760 | 0.734 |

# 5. Mechanism Analysis and Heterogeneity Analysis

## 5.1 Analysis of influence mechanism

This paper uses the method of adding interaction terms to the model to test the mechanism of digital finance affecting household poverty vulnerability from the perspective of regional entrepreneurial vitality. The results in Column (1) show that the coefficient of the interaction term between digital finance and entrepreneurial vitality is significantly negative, which is in the same direction as the coefficient of digital finance. This shows that the interaction between digital finance and entrepreneurial vitality can help alleviate the vulnerability of households to poverty. To further test Hypothesis 2, the interaction terms of coverage breadth, depth of use, and entrepreneurial vitality are added to the model respectively. As shown in Columns (2) and (3), the coefficient of the interaction term between coverage breadth and entrepreneurial vitality is significantly negative, and the coefficient of the interaction term between the depth of use and entrepreneurial vitality is also negative although the significance level is low. The above conclusion verifies Hypothesis 2.

Table 6.Regression results of influencing mechanism test

| Variables | (1) | (2) | (3) |
|---|---|---|---|
| Index | 3.646 * * * | | |

| | (1) | (2) | (3) |
|---|---|---|---|
| | (0.54) | | |
| Entrep | 0.936 | 4.927 * * * | 0.509 |
| | (1.01) | (1.10) | (1.03) |
| Index×Entrep | 27.033 * * * | | |
| | (5.48) | | |
| Breadth | | 0.859 * | |
| | | (0.50) | |
| Breadth×Entrep | | 46.646 * * * | |
| | | (6.14) | |
| Depth | | | 2.936 * * * |
| | | | (0.35) |
| Depth×Entrep | | | 3.012 |
| | | | (9.68) |
| Constant | 10.174 * * * | 2.802 | 9.064 * * * |
| | (2.24) | (2.01) | (2.05) |
| Observations | 27156 | 27156 | 27156 |
| Variable of control | Control | Control | Control |
| Pseudo R-squared | 0.773 | 0.783 | 0.785 |

## 5.2 Heterogeneity analysis

The above analysis shows that digital finance and the interaction between digital finance and entrepreneurial vitality can significantly alleviate household poverty vulnerability. However, there is an imbalance between the foundation of regional economic development, digital finance development, and entrepreneurial vitality in China. So, does the above poverty reduction effect exist for households in different regions? If so, are there differences in the poverty reduction effects? Table 7 reports the test results of sub-regional samples. According to the results of columns (1) and (3), digital finance has a significant inhibitory effect on household vulnerability to poverty in both central and eastern regions and western regions. It can be seen that the development of digital finance can break regional restrictions and promote inclusive economic growth. However, there is significant heterogeneity in the regression results of columns (2) and (3). The interaction coefficient in the central and eastern regions is significantly negative, which may benefit from the good resource endowment and economic foundation in this region, which lays a good foundation for the development of entrepreneurial activities. With the continuous inflow of a large number of high-quality talents, the development of digital finance and the level of entrepreneurship in this region have been further improved, which has a significant effect on alleviating the poverty of families. In contrast, the coefficient of the interaction term in the western region is not significant. The possible reasons are as follows: on the one hand, the economic development conditions and technological innovation capacity of the western region are insufficient, which cannot effectively support the development of entrepreneurial activities; On the other hand, the limited human resources in the western region limit the scale of entrepreneurial activities.

Table 7. Results of regional heterogeneity test for families

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Variables | Middle East | Middle East | West | West |
| Index | 6.277 * * * | 4.563 * * * | 2.255 * * * | 1.779 |
| | (0.77) | (1.02) | (0.85) | (3.39) |
| Entrep | | 3.474 * * | | 2.082 |
| | | (1.51) | | (2.09) |
| Index×Entrep | | 25.632 * * * | | 23.809 |
| | | (7.50) | | (62.86) |

| | | | | |
|---|---|---|---|---|
| Constant | 18.264 * * * | 13.708 * * * | 6.878 * * | 5.603 |
| | (3.12) | (3.42) | (3.37) | (9.63) |
| Observations | 18982 | 18982 | 8174 | 8174 |
| Control variables | Control | Control | Control | Control |
| Pseudo R-squared | 0.792 | 0.798 | 0.787 | 0.787 |

In the era of the digital economy, digital infrastructure is an important guarantee for improving the high-quality development of the region. Given the different levels of digital infrastructure among provinces, it is necessary to sort out whether there are differences in the impact of digital finance and the interaction between digital finance and entrepreneurial vitality on household poverty vulnerability. Specifically, the number of local mobile phone base stations per 10,000 people is used to measure the degree of digital infrastructure improvement, and according to the median, the digital infrastructure is divided into a low-level group and a high-level group for the test. The results in Table 8 show that the impact of digital finance on household vulnerability to poverty is not significantly different between the two groups, while the interaction between digital finance and entrepreneurial vitality is not significant in the low-level group, but is significantly negative in the high-level group. The possible reason is that the improvement of digital infrastructure will significantly affect entrepreneurial vitality, and its influencing mechanism is the saving of entrepreneurial costs, the expansion of the entrepreneurial market, and the improvement of financing constraints(Wang & Chao, 2023).

Table 8.Results of feature heterogeneity test

| Variables | (1) Low level | (2) Low level | (3) High level | (4) High level |
|---|---|---|---|---|
| Index | 4.078 * * * | 5.007 * * * | 3.456 * * * | 2.218 * * |
| | (1.02) | (1.07) | (0.54) | (0.99) |
| Entrep | | 0.623 | | 4.572 * * |
| | | (2.17) | | (2.09) |
| Index×Entrep | | 18.202 | | 29.701 * * * |
| | | (16.33) | | (8.73) |
| Constant | 7.051 * * | 10.201 * * * | 11.185 * * * | 7.872 * * |
| | (3.49) | (3.94) | (2.45) | (3.36) |
| Observations | 12920 | 12920 | 14236 | 14236 |
| Control variables | Control | Control | Control | Control |
| Pseudo R-squared | 0.759 | 0.762 | 0.797 | 0.810 |

# 6. Research Conclusions and Policy Recommendations

Based on the data of the Peking University Digital Inclusive Finance Index and CHFS, this paper theoretically expounds and empirically tests the promoting effect and mechanism of digital finance development on household poverty vulnerability. The results show that the development of digital finance can significantly inhibit the probability of households falling into poverty, and the coverage breadth has the most prominent inhibitory effect. This conclusion is still valid after considering the endogeneity problem and the robustness test. Second, digital finance and regional entrepreneurial vitality have a synergistic effect on inhibiting household poverty. Third, the interaction between digital finance and regional entrepreneurial vitality is significantly heterogeneous, and this interaction is more significant in the eastern and central regions and provinces with better digital infrastructure.

On this basis, this paper proposes the following three countermeasures: first, accelerate the coverage of information infrastructure and digital financial services in China, especially in backward regions. By vigorously developing artificial intelligence, big data, and other advanced technologies, we can promote the digital development of traditional finance in the region, and make full use of the "digital dividend" role of digital finance in reducing household poverty and vulnerability. Second, regional governments should provide effective guidance on the flow and distribution of human resources, capital, and other factors to stimulate the vitality of innovation and entrepreneurship in the region. By guiding the improvement of regional entrepreneurial vitality, the local human capital level can be improved and the number of stable jobs can be increased. Third, in the prevention and control of relative poverty, regional

governments can introduce dynamic indicators of poverty vulnerability into them. Different poverty lines and vulnerability lines can be set to identify different poverty statuses of households, to formulate targeted assistance policies.

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