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Research on the Impact of Digital Finance on Non-farm Employment in Different Regions

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Abstract

Based on the Digital Inclusive Finance Index and data from the China Family Panel Studies (CFPS), this paper constructs a Probit model to empirically examine the impact of digital finance on non-farm employment. The research indicates that digital finance addresses the shortcomings of traditional finance, with its high entry barriers, and provides favorable conditions for the expansion of business operations and resident entrepreneurship, thereby facilitating non-farm employment opportunities for households and significantly promoting non-farm employment. The impact of digital finance on non-farm employment exhibits geographical heterogeneity, with a particularly significant positive effect on the central, western, and northeastern regions.

Keywords: Digital Finance; Non-Farm Employment; Probit.

Introduction

The employed population in China has been increasing year by year, but the unemployment rate remains relatively high in some regions, and the income gap is widening. Employment has always been a core concern of the central government, and resolving employment issues is crucially linked to addressing the growth of household income. The 20th Party Congress report emphasizes the necessity to strengthen policies prioritizing employment, establish a comprehensive public employment service system, and promote high-quality and full employment. Digital finance support is a crucial factor in promoting non-agricultural employment in households. On the one hand, financial institutions pursuing commercial sustainability find it challenging to assess the risks of small and micro-enterprises and individuals with low to moderate incomes. This precaution against "adverse selection" results in the exclusion of these financially vulnerable groups from financial services. On the other hand, even when financial institutions employing risk pricing provide services, the risk premiums charged are excessively high. As a result, financially vulnerable groups cannot afford the relatively small opportunity cost for financing profitable projects, leading to a cycle of cumulative causation that exacerbates income inequality. They are unemployed not because they lack opportunities but because they lack funding. However, the development of digital finance can significantly improve this situation by increasing the accessibility of funds. It becomes a crucial avenue for stabilizing employment, ensuring people's livelihoods, narrowing the gap, and optimizing resource allocation.

Due to the long-standing imbalance in China's economic structure, in economically underdeveloped regions, the financial system struggles to meet the financial needs of small and micro-enterprises, farmers, and low-income urban populations, leading to financial exclusion. With the continuous development of information technology and big data, the service scope of digital finance is expanding. Consequently, populations in some less developed areas can access more convenient financial services, effectively alleviating financial exclusion. The continuous application of digital technology and the internet shortens spatial distances, enabling financial services to spread to surrounding areas. This promotes financial development in these peripheral regions, leading to an increase in non-agricultural income levels for local households.

This paper, based on the 2019 China Household Finance Survey data, examines the impact and mechanisms of digital finance use on non-agricultural employment. It analyzes differences in individual and regional digital finance usage to explore the heterogeneity of the impact of digital finance on non-agricultural employment. This contributes to understanding the intrinsic advantages and inclusive value of digital inclusive finance in influencing non-agricultural employment in households. Compared to existing research, this paper's potential marginal contributions are: First, existing literature often measures digital finance usage behavior using a single indicator, such as the use of third-party payment platforms like Alipay and WeChat Pay, lacking diversified investigations. This paper attempts to diversify the measurement of digital finance usage and its intensity by examining three dimensions: the use of Internet financial products, credit cards, and third-party payment products. It systematically investigates the impact of digital finance usage on non-agricultural employment. Second, digital finance has significant resource allocation functions, including the allocation of financial resources and information resources. This paper attempts to explain the mechanisms through which digital finance influences non-agricultural employment from the perspective of financial usage. It provides an exploratory study on how digital finance usage affects non-agricultural employment. Third, this paper further investigates the regional heterogeneity of financial behavior regarding the impact of digital finance on non-agricultural employment. It

offers effective answers on how to use digital finance to promote sustained non-agricultural employment.

Theoretical Analysis

Digital Finance and Non-agricultural Employment

Regarding the research on the relationship between digital finance and non-agricultural employment, some scholars propose that as a product of the new era's financial development, digital finance has stronger inclusivity. It provides credit support for expanding and innovating business operations, generating more demand for labor, and creating employment opportunities (Nguyen, Uong, et al. 2020). Digital finance can also enhance credit availability for urban and rural residents, alleviate financing constraints, diversify operational risks, and promote entrepreneurship among urban and rural residents(Ji, Wang, et al. 2021). The increase in entrepreneurship will provide a large number of non-agricultural positions to society, increase non-agricultural employment opportunities for the labor force, broaden their range of employment choices, and facilitate the completion of the non-agricultural migration task for rural labor. Additionally, digital finance can accelerate the development of the social economy, and the rapid development of the economy is accompanied by an increase in the employment rate.

The Development of Digital Finance Facilitates Non-agricultural Employment for Households

Currently, the non-agricultural positions provided by China's labor market cannot fully meet the demand of the social workforce (Xue, Xu, et al. 2019). The level of non-agricultural employment in society mainly depends on the quantity of non-agricultural positions supplied in the labor market. Unlike traditional finance, digital finance frees itself from reliance on physical branches, has low construction costs, can provide financial products at a lower cost, and can facilitate borrower loans by overcoming temporal and spatial restrictions. It reduces time costs and generally does not require enterprises and individuals to provide collateral. Instead, it decides whether to lend through technical means that aggregate and process credit information for both parties. This significantly reduces the borrowing costs for enterprises and individuals, creating favorable conditions for the expansion of business operations and entrepreneurship for residents. The establishment and development of enterprises release a large number of job opportunities, contributing to non-agricultural employment for farmers(Kristiansen 2003). Empirical tests by Liu Dan and others (2023) demonstrated that digital finance has a promotional effect on non-agricultural employment for households and spatial spillover effects. Zhang Bing and colleagues found that digital finance can promote non-agricultural employment for rural households. Therefore, digital finance can provide financial services for enterprises, promote the establishment and development of businesses, alleviate financing constraints faced by the workforce, and be conducive to promoting non-agricultural employment for households.

The Regional Disparities in the Promotional Effect of Digital Finance on Non-agricultural Employment

Existing research has confirmed that there is a significant regional disparity in the level of digital finance development in China. Influenced by factors such as natural conditions, infrastructure, and regional economic differences, the regional differences in the development of digital finance in China are gradually widening(Lv, Song et al. 2022). In the eastern regions, the level of digital finance development is significantly higher than that in the central, western, and northeastern regions(Liu, Puah et al. 2023). The disparity in the development of digital finance between urban clusters is increasing(Dong, Du et al. 2022). There is a growing severity

in the polarization of digital finance development levels between urban and rural areas, and the widespread issue of financial exclusion in rural areas, hindering the further improvement of China's digital finance level(Lu, Wu, et al. 2022). The regional differences in industrial structure, measured by Yang Qian and others across 30 provinces in China, reveal a gradient distribution pattern of industrial structure optimization and upgrading, decreasing gradually from east to west. The regional disparities in digital finance and non-agricultural employment also imply that the promotional effect of digital finance on non-agricultural employment has significant regional differences (Wang, Xin, et al. 2020).

Model Specification and Variable Description

Data Source

The China Household Finance Survey (CHFS) is a nationwide survey conducted by the China Household Finance Survey and Research Center at the Southwestern University of Finance and Economics. It aims to collect relevant information at the micro-level of family finance, including population characteristics and employment, assets and liabilities, income and consumption, social security, and insurance. The CHFS2019 data used in this paper is from the fifth round of surveys conducted successfully in 2019. The sample covers 29 provinces (autonomous regions, municipalities directly under the Central Government) nationwide, excluding Tibet, Xinjiang, Hong Kong, Macao, and Taiwan regions, encompassing 343 counties, and 1360 villages (residential committees). It obtained financial microdata from over 30,000 households.

Model Specification

This study focuses on the impact of digital inclusive finance on non-agricultural employment (Ren, Gao, et al. 2023). Considering that the dependent variable "whether non-agricultural employment" is a binary variable, this paper establishes a Probit regression model to analyze the impact of digital finance. It examines the influence of digital finance under the framework of the latent variable Y*. When Y* > 0, the dependent variable takes the value of 1; otherwise, it takes the value of 0. Based on theoretical analysis, this paper determines the expressions of the latent variable and the baseline model.

$$\mathbf{Y^* = \alpha_0 + \Sigma\alpha_i X_i + \Sigma\beta_j X_j + \varepsilon Y} = \begin{cases} \mathbf{1}, \mathbf{Y^* > 0} \\ \mathbf{0}, \mathbf{Y^* \leq 0} \end{cases}$$

$$\mathbf{Prob(Y = 1) = Prob(Y^* > 0) = \emptyset(\alpha_0 + \Sigma\alpha_i X_i + \Sigma\beta_j X_j + \varepsilon)}$$

Assuming ε follows a standard normal distribution (ε ~ N(0,1)), Y* follows a normal distribution. Y* is an unobservable latent variable in the research process but can be indirectly inferred, representing the inclination toward non-agricultural employment.Xi and Xj respectively represent the core explanatory variables related to digital inclusive finance and various control variables. αi and βj are the regression coefficients corresponding to each variable.

Variable Selection and Explanation

The dependent variable in this study is non-farm employment (nonfarm). Based on the CHFS 2019 questionnaire question "Have you engaged in agriculture, forestry, or fishing in the past 12 months," respondents answering "yes" are assigned a value of 1, otherwise, it is assigned a value of 0.

The explanatory variable in this study is digital financial usage. The study examines rural households' digital financial usage from three dimensions: the use of third-party payment

products, internet financial products, and credit cards. First, the use of third-party payment products. The questionnaire asks, "Has your household opened third-party payment accounts such as Alipay, WeChat Pay, JD.com online banking wallet, Baidu wallet, etc.?" Confirmation of household usage of third-party payment products is made if the respondent selects "yes"; otherwise, it is considered that the household does not use third-party payment products. Second, the use of Internet financial products. The questionnaire asks, "Currently, does your household have financial investment products?" Confirmation of household ownership of financial investment products is made if the respondent selects "yes," indicating the household uses internet financial products; otherwise, it is considered that the household does not use internet financial products. Third, the use of credit cards. "Does your household use credit cards? Inactivated credit cards are not included." Confirmation of household credit card usage is made if the respondent selects "yes," indicating the household uses credit cards; otherwise, it is considered that the household does not use credit cards. If the household participates in any of the three: third-party payment, internet financial products, or credit cards, it is considered that the household uses digital finance.

Control Variables: Drawing on existing literature, this study selects control variables that include respondent characteristics (age, gender, marital status), household demographic features (educational level), and household economic features (risk preference, total family income).

Descriptive Statistics of Variables:

Table 1 Definitions and Descriptive Statistics of Variables.

Variable Name	Variable Description	Standard Deviation	Mean	Minimum Value	Maximum Value
nonfarm	Respondent engaged in non-agricultural forestry and animal husbandry = 1, engaged in agriculture or unemployed = 0	0.323	0.468	0	1
fin	Using digital finance = 1, not using digital finance = 0	0.591	0.492	0	1
age	Age of the respondent when surveyed	54.408	13.079	13	101
gender	Male = 1, Female = 0	0.793	0.405	0	1
marriage	Unmarried = 1, Married = 0	0.907	0.291	0	1
degree	The education level of the head of the household ranging from 1 to 9, with 1 indicating no education and 9 indicating a Ph.D.	3.321	1.581	0	9
aversion	Choosing slightly low-risk and risk-free projects = 1, otherwise = 0	0.62	0.485	0	1
income	Total income of the family in the past 12 months (in ten thousand yuan)	9.218	22.9	-54.9	1.21e+07

Empirical Results Analysis

Overall Sample Regression of the Probit Model

Table 2 presents the regression results of the Probit model. The regression results indicate that digital inclusive finance has a significant positive impact on non-agricultural employment. On the one hand, the development of digital finance reduces transaction costs for financial institutions in acquiring information, alleviating the degree of information asymmetry. This enables financially vulnerable groups to obtain financing for profitable projects at reasonable prices. On the other hand, digital finance diversifies employment forms, not only promoting self-employment among residents but also, to some extent, creating more job opportunities for others. Furthermore, observing the control variables reveals that gender, marital status, education level, risk preference, and total family income significantly promote non-agricultural employment, while age significantly inhibits non-agricultural employment.

Table 2 Probit Model Analysis of Household Non-Agricultural Employment.

	Include control variables.
	Nonfarm
Fin	0.1288***
	(12.7234)
Age	-0.0401
	(-1.0e+02)
Gender	0.3146***
	(27.4253)
marriage	0.1009***
	(5.6050)
degree	0.1875
	(62.1904)
aversion	0.0297***
	(3.2589)
income	0.0000***
	(5.5943)
_cons	0.5398***
	(16.8912)
N	106707
Pseudo.R-Square	0.1910

Regional Heterogeneity Analysis of the Probit Model

Column (1): Eastern Region. The Probit model reports that the use of digital finance by households has no significant impact on non-agricultural employment in the Eastern region. Column (2): Central Region. The Probit model reports that the use of digital finance by rural households has a significant positive impact on non-agricultural employment at the 1% significance level in the Central region. Column (3): Western Region. The Probit model reports that the use of digital finance by households has a significant positive impact on non-agricultural employment at the 1% significance level in the Western region. Column (4): Northeast Region. The Probit model reports that the use of digital finance by households has a significant positive impact on non-agricultural employment at the 1% significance level in the Northeast region.

Overall, there is a significant regional difference in the promotion effect of digital finance on non-agricultural employment. The use of digital finance in the Eastern region has

no significant impact on non-agricultural employment, possibly because the level of digital finance development in the Eastern region is significantly higher than that in the Central region and the national average, while the development level in the Western and Northeast regions is relatively low. The Eastern region, due to its geographical advantages, receives much more support in terms of resource tilt and policy assistance compared to the Central and Western regions. The industrial structure in the Eastern region has developed from a low to a high level, gradually becoming more sophisticated and rational. The proportion of the primary industry is already very low, indicating that non-agricultural employment in the Eastern region constitutes a high proportion of the total employment, almost close to 1. There is a significant gap between the Eastern region and the Central and Western regions. However, with the rapid development of digital finance, the widespread adoption of digital technology, and the improvement in the efficiency of financial resource allocation, the Central and Western regions have significant advantages in catching up. Therefore, the impact of digital finance development on non-agricultural employment in these regions is very significant. The level of economic development in the Central and Western regions is far lower than that in the Eastern region, with the potential being slightly greater in the Western region than in the Central region. In the Central region, the proportion of primary and secondary industries is still relatively high, and although the proportion of agriculture has declined, it remains higher than the national average. The Western region generally relies on upgrading its industrial structure by transforming advantages such as natural resources and geographical location into paths for social productivity. The proportion of the primary industry is relatively high, while the proportions of the secondary and tertiary industries are both lower than the national average. The development of the service industry in the Western region has shown a fluctuating trend in the past decade. The Northeast region is the most distinctive among the four regions. Due to the Northeast region's excessive reliance on resources and heavy industry, with most capital and personnel concentrated in the industrial sector, the impact of industrial structure adjustment has been significant. The transformation and development of the old industrial base in the Northeast have lagged behind, leading to severe outflows of local labor, capital, and enterprises. This has not only hindered the development of the service industry but also greatly restricted the overall economic development of the entire Northeast region.

Table 3 Probit Model Analysis Based on Non-agricultural Employment in Different Regions.

	(1) East nonfarm	(2) Central nonfarm	(3) West nonfarm	(4) Northeast nonfarm
fin	0.0130	0.1452***	0.1515***	0.2133***
	(0.7603)	(6.7306)	(8.4605)	(6.1514)
age	-0.0443	-0.0401	-0.0385	-0.0386***
	(-70.5262)	(-44.8041)	(-55.6171)	(-28.0844)
gender	0.2619***	0.4022***	0.3339***	0.2785***
	(14.2483)	(16.1840)	(15.7800)	(7.4893)
marriage	0.1731***	-0.0532	0.1166***	0.0403
	(5.6775)	(-1.4270)	(3.6357)	(0.7039)
degree	0.1543***	0.1702***	0.2062***	0.2767***
	(33.1541)	(24.1984)	(36.2066)	(25.5618)
aversion	0.0899***	-0.0577***	0.0523***	-0.0821**
	(5.9564)	(-2.9442)	(3.3081)	(-2.3766)
income	0.0000*	0.0000***	0.0000***	0.0000
	(1.8107)	(5.1529)	(5.5080)	(0.0918)
_cons	0.9754***	0.7264***	0.2534***	0.0989
	(18.3216)	(9.9400)	(4.5458)	(0.9111)
N	38799	23604	34558	9746
Pseudo.R-Square	0.1967	0.1813	0.1911	0.2279

Marginal Effect Analysis of Regional Regression Based on Probit Model

Column (2): Central Region. The Probit model indicates that in the Central region, for each one-unit increase in the digital finance index, the probability of households choosing non-agricultural employment will increase by 4.16%. Column (3): Western Region. The Probit model indicates that in the Western region, for each one-unit increase in the digital finance index, the probability of households choosing non-agricultural employment will increase by 4.23%. Column (4): Northeast Region. The Probit model indicates that in the Northeast region, for each one-unit increase in the digital finance index, the probability of households choosing non-agricultural employment will increase by 5.41%.

Table 4 Marginal Effect Analysis of Non-agricultural Employment Regression Based on Different Regions.

	East ,dydx(*)	Central ,dydx(*)	West ,dydx(*)	Northeast ,dydx(*)
fin	0.0038	0.0416***	0.0423***	0.0541***
	(0.7603)	(6.7425)	(8.4761)	(6.1784)
age	-0.0131	-0.0115	-0.0107	-0.0098***
	(-84.6987)	(-49.4408)	(-61.3355)	(-30.5256)
gender	0.0774***	0.1153***	0.0931***	0.0707***
	(14.3258)	(16.3538)	(15.8973)	(7.5287)
marriage	0.0511***	-0.0153	0.0325***	0.0102
	(5.6798)	(-1.4276)	(3.6344)	(0.7036)
degree	0.0456***	0.0488***	0.0575	0.0702***
	(34.9981)	(25.3070)	(38.4937)	(29.2635)
aversion	0.0266***	-0.0165***	0.0146***	-0.0208**
	(5.9671)	(-2.9466)	(3.3078)	(-2.3807)
income	0.0000*	0.0000***	0.0000***	0.0000
	(1.8109)	(5.1657)	(5.5290)	(0.0918)
N	38799	23604	34558	9746
Pseudo.R-Square				

Robustness Test

To further ensure the reliability of the regression results, this paper conducts a robustness test by replacing the empirical model. As shown in Table 4, the Probit model is replaced with the logistic model, and empirical regression tests are performed again on the core explanatory variables and the explained variables. The directions and significance levels of the regression coefficients in the above tables are generally consistent with the previous analysis, indicating that the robustness of the research conclusions in this paper is well-maintained.

Table 5 Robustness Test

	East nonfarm	Central nonfarm	West Nonfarm	Northeast nonfarm
fin	0.2214***	0.0295	0.2400***	0.2468***
	(12.6179)	(1.0123)	(6.4293)	(7.7702)
age	-0.0668	-0.0736	-0.0667	-0.0647
	(-99.2353)	(-67.6418)	(-42.6168)	(-53.1971)
gender	0.5331***	0.4390***	0.6773***	0.5729***
	(27.0054)	(14.0482)	(15.7292)	(15.5630)
marriage	0.1741***	0.3035***	-0.0920	0.1993***
	(5.4321)	(5.6007)	(-1.4234)	(3.4203)
degree	0.3191	0.2645***	0.2898***	0.3425***
	(61.1487)	(33.6390)	(23.6597)	(32.9783)
aversion	0.0560***	0.1655***	-0.0941***	0.0880***
	(3.5832)	(6.4140)	(-2.8088)	(3.2376)
income	0.0000***	0.0000*	0.0000***	0.0000***
	(4.5231)	(1.6928)	(3.8174)	(5.1336)
_cons	0.8570***	1.5595***	1.1857***	0.4045***
	(15.5190)	(17.0212)	(9.4272)	(4.1164)
N	106707	38799	23604	34558
Pseudo.R-Square	0.1892	0.1954	0.1789	0.1896

Conclusion and Implications

This study conducts an empirical investigation into the impact of digital finance on non-agricultural employment at the household level based on the 2019 China Household Finance Survey data. The research findings indicate that digital finance indeed compensates for the shortcomings of traditional finance with high entry barriers and significantly promotes non-agricultural employment. This conclusion holds even after undergoing model analysis, marginal effect analysis, stability tests, and other processes. Further heterogeneous analysis based on regional grouping reveals that the Eastern region has no significant impact due to factors such as economic development, industrial structure, the degree of digital finance development, and employment levels. In contrast, the Central and Western regions exhibit significant effects. Moreover, the Northeast region shows a more pronounced effect of digital finance development on non-agricultural employment compared to the Central and Western regions, highlighting significant regional disparities in the impact of digital finance on non-agricultural employment.

Investigating the influence of digital finance on non-agricultural employment holds crucial significance in both academic research and policy formulation. The empirical results of this study suggest the following reflections and recommendations: First, the government should further promote the development of digital finance by optimizing infrastructure and other means, enhancing the breadth, depth, and digitization level of digital finance. This would allow digital finance to complement traditional finance, better leveraging its positive role in promoting non-agricultural employment. Second, balancing the regional development of digital finance is essential. Addressing long-standing financial concentration phenomena requires balancing the development of digital finance across different regions. As a financial infrastructure, digital finance should leverage its inclusive characteristics, expanding coverage and depth. It should particularly address the inadequate financial infrastructure in rural and economically underdeveloped areas, ensuring that digital finance supports regional financial stability in a more accurate and effective manner. Strengthening regional cooperation to promote the regionalization of digital finance development is recommended. Given the intensified economic exchanges and mutual penetration of finance due to regional economic integration, establishing economic ties and collaborative relationships between different regions is essential. This ensures that the advantages of digital finance services are maximized. Building a comprehensive information-sharing platform to enhance the level of information sharing among different regions, leveraging the radiating effect of areas with higher economic development levels, narrowing the development gap between regions and urban-rural areas, and promoting coordinated development across all regions. Additionally, considering the varying levels of economic development and financial conditions in different regions, tailored approaches are necessary for providing digital finance services between regions.

Simultaneously, considering the positive spillover effects of digital finance on non-agricultural income at the provincial level, examining the impact of digital inclusive finance on non-agricultural income among provinces should consider the spatial correlation among provinces. This approach maximizes the regional radiation effect of digital finance, promoting an increase in non-agricultural income for farmers.

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