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Research on the Impact of Digital Financial Inclusion on Household Financial Assets

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Abstract: Amidst the relentless and daily acceleration of digital technology's evolution, digital inclusive finance, a pivotal branch of financial innovation, is flourishing at an unprecedented pace. It has widely penetrated into every facet of socio-economic life, especially exerting a profound impact within the family dimension. Thus, this paper aims to investigate the impact of digital inclusive finance on household financial assets. By adopting the digital inclusive finance index as the independent variable and household financial assets as the dependent variable, this study incorporates indicators such as the household head's age, education level, and risk appetite as control variables to construct a regression model for quantifying the relationship between the two. The research concludes that the development of digital inclusive finance promotes the growth of household financial assets and facilitates rational allocation of household assets, thereby assisting households in wealth management. Finally, addressing the existing issues in the field of digital inclusive finance, including the significant urban-rural development gap, customer information leakage, and low financial literacy among residents, this paper proposes corresponding solutions aimed at promoting the healthy development of digital inclusive finance and enabling it to better serve the households.

Keywords: Digital Inclusive Finance, Household Financial Assets, Household Asset Allocation.

1. Introduction

Inclusive finance means extending financial services to a broader spectrum of individuals and enterprises at a lower price [1]. It is able to offer more targeted financial services to vulnerable groups such as low-income individuals as well as small and micro-enterprises, which aligns with the financial service demands of the broad masses of the people. Consequently, with the support of national policies, inclusive finance has advanced vigorously. Nevertheless, in recent years, the situation has shifted somewhat. On the one hand, the growth momentum of inclusive finance has slightly waned amidst the increasingly sluggish global financial market environment. On the other hand, the popularization of computer technologies and Internet has gradually emerged as an indispensable driving force in the financial sector, ushering in a new era of digitization.

Against this backdrop, the integration of inclusive finance with digitization has emerged as a novel concept—digital inclusive finance (hereinafter referred to as DIF). It entails the application of digital technologies such as computers, the Internet, and big data analytics in the field of inclusive finance,

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aiming to achieve efficient analysis and sharing of financial information and enhance the efficacy of inclusive finance implementation.

Compared to traditional inclusive finance, the infusion of digital technologies has breathed new life into the sector. Digitalization reduces the cost of providing inclusive financial services, enabling clients to conduct transactions through digital platforms, thereby saving both the costs of visiting physical branches for customers and the expenses incurred by financial institutions in establishing offline outlets. Furthermore, the integration of big data assists financial institutions in precise marketing, matching customers with personalized products by analyzing individual characteristics, risk appetites, and other information, thereby boosting sales of financial products. The emergence of DIF represents a major leap forward in the realm of inclusive finance.

The macro-level effects of DIF are apparent. Firstly, DIF has expanded the coverage of financial services [1]. It can reach more remote rural areas and numerous small and micro-enterprises through the internet, breaking through the constraints of space, thereby satisfying the demand for financial services in remote regions. Secondly, it can bridge the gap in income between urban and rural areas, promoting common prosperity among regions [2]. It facilitates financial growth in remote rural areas, enhances asset allocation efficiency, and subsequently boosts regional economic development. Thirdly, it can optimize industrial structures [3]. This is mainly achieved by micro-credit loans, supply chain loans and other more targeted products to support the development of small and micro enterprises to enhance the vitality of the industry. Fourthly, it can improve the stability within the financial sector and improves its resilience to risks [4]. Through the establishment of digital platforms, financial institutions can better allocate resources, share information, and conduct real-time risk monitoring based on detailed data.

Moreover, the impact of DIF on households cannot be overlooked. Digital payment and digital credit services can lower the cost of financial services, so that residents can obtain financial products more conveniently, thus promoting the purchase of financial products [5]. Additionally, DIF provides more diversified financing channels and investment opportunities, which contribute to expanding household production scales, enhancing production efficiency, and ultimately improving household economic conditions and incomes [6]. This enables households to more easily preserve and increase the value of their assets, ultimately exerting an influence on the amount of household financial assets.

To delve into the impacts of DIF on the household level, this paper argues that a reasonable research target is the quantity of household financial assets. This is because the primary intention of DIF is to make financial services accessible to every individual who needs them, satisfying the demand for financial products across all social strata. Household financial assets serve as the most direct indicator reflecting its practical effectiveness at the household level. Consequently, this paper will investigate the influence of DIF on household financial assets. It meticulously dissects this relationship from a theoretical perspective and construct a regression model to further explore the extent of this influence.

This research holds significant practical implications. Firstly, it can offer insights for financial institutions in innovating digital inclusive financial products. A deeper understanding of household financial behavior amidst the digital finance landscape enables financial institutions to grasp families' preferences for financial products and the evolving direction of their demands, facilitating the creation of more targeted products tailored to families. Secondly, DIF can optimize household asset allocation. Studying its impact assists families in comprehending the characteristics of various emerging financial products and fully recognizing potential risks, enabling them to make rational asset allocation decisions. This enhances the understanding of the effectiveness of DIF in household wealth management, aiming to provide more practical guidance for household asset allocation. Thirdly, this research measures the actual effectiveness of DIF at the household level, elucidating its necessity at

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the individual level and offering insights and assistance for the implementation and formulation of future policies.

2. Literature review

The origination of digital financial inclusion stem from the 2016 G20 Hangzhou Summit, where financial representatives from all countries jointly signed the G20 High-level Principles on Digital Financial Inclusion, advocating the use of digital technology to promote the development of inclusive finance. Since then, research projects on digital financial inclusion have begun to emerge.

Firstly, numerous scholars have delved into the measurement of DIF indices. Notably, the research conducted by Guo Feng et al. [7] holds considerable influence. Utilizing extensive micro-data provided by a major Chinese digital financial institution, Alipay, they compiled a comprehensive DIF index system, laying a solid theoretical foundation for subsequent studies.

Subsequently, in the research progress on the topic of DIF's impact on household financial assets, scholars have different perspectives.

Some scholars have focused on the impact of DIF on the allocation of household financial assets. For instance, Zhou Yuqing et al. [8] constructed an intertemporal investment decision-making model and reached the conclusion that DIF has led to an elevation in the share of rural households investing in risky financial assets. Zhang Hongwei et al. [9] discovered a positive correlation between the extent of digital financial inclusion and the diversity of risky financial assets being held by individuals. Shi Xiao et al. [10] discovered that DIF can significantly enhance the diversification of household asset portfolios, with more pronounced effects on rural and low-income households. Wu Yu et al. [11] argued that the improvement in the effectiveness of household financial asset portfolios due to digital finance is primarily achieved through increased investment convenience, enhanced access to financial information, and higher risk-taking levels.

Other researchers have delved into the impact of DIF on the total amount of household financial assets. For example, Liao Jinglin [12] and Sun Yan et al. [13] used models such as Probit to demonstrate that DIF promotes household investments in risky financial assets. Shen Yan et al. [14] found that digital finance not merely fosters a broader spectrum of residents to engage in risky financial asset investments but also promotes the investment share for those families already invested in such assets. Zhou Hong [15] discovered that inclusive finance promotes household investments in risky assets primarily by promoting household income and enhancing their risk appetites.

In summary, research on the impact of DIF on household financial assets mainly focuses on two directions: asset allocation and total asset volume. Regarding the latter, existing studies are relatively scarce, and their model constructions are not entirely comprehensive. Therefore, this paper aims to conduct further research on this issue to better explain the extent of its influence on the amount of household financial assets.

3. Research design

3.1. Data Source

The data on basic family member information used in this paper is sourced from *the China Household Finance Survey (CHFS)* in 2019 conducted by Southwestern University of Finance and Economics. This micro-level database surveyed residents from 25 provinces and municipalities, collecting information on over 30,000 households and more than 100,000 family members. It encompasses three modules of information: individual, family, and comprehensive variables, ensuring the comprehensiveness of the sample. The survey focuses primarily on demographic and basic information about families and individuals, as well as families' assets and liabilities, income and

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expenditure, and financial behaviors. The wide range of information covered is extremely useful for research in the financial field.

The Digital Inclusive Finance Index was developed by the Digital Finance Research Center of Peking University. It measures the degree of the development and trends of DIF across provinces, prefecture-level cities, and even districts and counties in China, establishing an authoritative and reliable indicator system for this field.

3.2. Model setting and variable definition

The model used in this paper is regression model. The specific model is as follows:

$$\log(\text{fina\_asset} + 1) = \beta_0 + \beta_1 \text{dif} + \beta_2 X + \epsilon. \quad (1)$$

Where X represents a vector composed of control variables containing the following variables: rural/urban, number of family members, age, age^2/100, gender , marital status, education level, physical condition, household attention to finance, household risk appetite, internet financial account holding, the attributes of housing, total household assets.

In this model, the dependent variable is household financial assets (fina_asset), which comes from the master database in CHFS. It displays the total amount of financial assets in a household, including cash, deposits, wealth management products, stocks, funds, bonds, gold, and other items. Due to the large value of the variable, a logarithmic processing method was adopted.

The explanatory variable is the Digital Inclusive Finance Index (dif), which is a comprehensive indicator system devised across three dimensions: the breadth of coverage, the depth of usage, and the level of digitization. It includes 33 specific indicators, the names of which are detailed in Guo Feng [7] 's paper.

In addition, there are 13 control variables in this model. Among them, there are 5 demographic characteristics variables, including the age (age), gender (a2003), marital status (a2024), education level (a2012), and physical status (a2025b) of the head of a family. Among them, there are two regional characteristic indicators, including provincial GDP (pgdp), which represents the economic development level of each province, and the indicator (rural), which represents whether the family is in a rural or urban area. These two indicators can be used for regional analysis of this study. Among them, there are five indicators related to family information, including the number of members in a family, the family's attention to finance and economy (h3101), the family's risk appetite (h3104), and whether the family holds an Internet financial account (d1706d). This variable can indicate whether a family is involved in digital finance. Finally, the variables related to household asset allocation, including the ownership of the real estate in which the family lives (c1001) and the total assets of the family (total_asset), will help to analyze the impact on household asset allocation.

3.3. Descriptive Statistics

In this model, after excluding the missing values, there are 34,132 observations. The author makes descriptive statistics of all variables in the model and calculates their mean, standard deviation, minimum and maximum values. See table 1 for specific data:

Table 1: Descriptive Statistics

variable name	variable code	mean	sd	min	max
Household financial assets	fina_asset	133897	268081.50	0	1670840
Digital financial inclusion index	dif	327.4	35.22	16.22	458.97
Coverage breadth of dif	cov	310	32.44	1.96	455.912

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Table 1: (continued).

Use depth of dif	use	319.3	48.90	6.76	488.683
Provincial gdp	pgdp	37293	27296.37	605.83	110761
Rural/urban	rural	0.3561	0.48	0	1
Number of family members	member	3.089	1.54	1	11
Age	age	56.37	13.71	13	101
Gender	a2003	1.247	0.43	1	2
Marital status	a2024	2.426	1.25	1	6
Education level	a2012	3.346	1.62	1	9
Physical condition	a2025b	2.744	1.00	1	5
Household attention to finance	h3101	4.214	1.01	1	5
Household risk appetite	h3104	4.616	1.16	1	6
Internet financial account holding	d1706d	1.492	0.50	1	2
The attributes of housing	c1001	1.214	0.54	1	3
Total household assets	total_asset	1023323	1656889	2415.84	9413160

4. Empirical result

After performing the regression analysis, the outcomes of the regression are presented in Table 2 below:

Table 2: Regression Result

Variables	Estimate	Std. Error	Pr(>|t|)
(Intercept)	-2.5220	0.2796	< 2e-16 ***
Digital financial inclusion index	0.0018	0.0004	9.08e-05 ***
Provincial gdp	0.0792	0.0176	7.43e-06 ***
Rural/urban	-0.2392	0.0293	3.89e-16 ***
Number of family members	0.0117	0.0089	0.187
Age	0.1403	0.0061	< 2e-16 ***
Age^2/100	-0.1214	0.0054	< 2e-16 ***
Gender	0.0323	0.0303	0.286
Marital status	-0.1241	0.0108	< 2e-16 ***
Education level	0.2817	0.0096	< 2e-16 ***
Physical condition	-0.2304	0.0128	< 2e-16 ***
Household attention to finance	-0.1866	0.0130	< 2e-16 ***
Household risk appetite	-0.1305	0.0117	< 2e-16 ***
Internet financial account holding	-0.9773	0.0311	< 2e-16 ***
The attributes of housing	0.5095	0.0251	< 2e-16 ***
Log(total_asset+1)	0.7163	0.0098	< 2e-16 ***
Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1			
Multiple R-squared: 0.4416		Adjusted R-squared: 0.4414	
F-statistic: 1928 on 14 and 34132 DF		p-value: < 2.2e-16	

According to the regression results, the main explanatory variable, the DIF aggregate index, displays a positive coefficient of 0.0018, suggesting a positive correlation with the dependent variable. In other words, as DIF develops and expands, households can invest more money in financial assets.

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This paper argues that the potential mechanism for the DIF aggregate index to affect household financial assets is two-fold. Firstly, as DIF progresses, the reach and availability of financial services have significantly broadened, particularly for residents in remote areas and small and micro-enterprises. Consequently, the time cost, travel expenses, and transaction fees required for residents to purchase financial products have decreased, effectively lowering the threshold for financial products. This has led to increased opportunities for people to invest in financial products, ultimately resulting in an increase in household financial assets. Secondly, the advancement of DIF has expanded households' access to an extensive array of diversified and tailored financial products, such as mobile payments, internet wealth management, and internet lending. These financial products enable households to use their money to engage in activities that increase household income, such as investment and entrepreneurship. As household income increases, there occurs a transformation in the distribution of assets, with a greater proportion of funds being allocated to the purchase of financial assets. [9, 11, 15]

Furthermore, by observing the signs of the coefficients of the control variables, we can draw additional extensive conclusions regarding household financial assets.

The coefficients for the variables of *household financial concerns* and *household risk preference* are negative, indicating that when households have a higher level of financial concern and a greater preference for high-risk, high-return products, they tend to hold larger amounts of financial assets. This indicates a positive correlation between the extent of household involvement in the financial market and the intensity of their investment in financial assets.

The variable *rural/urban* is a dummy variable, where 0 represents urban areas and 1 represents rural areas, measuring the impact of urban-rural differences on household financial assets. Since its coefficient is negative, it indicates that urban households hold more financial assets than rural households. This can be attributed to the relatively lower levels of financial development and resident income in rural areas.

The variable, *the age of the head of household*, does not exhibit a linear relationship with the dependent variable. In the earlier stages, as age increases, household financial assets also increase. However, after approximately 55 years of age, household financial assets decrease with increasing age. The reason for this is that before the age of 55, people's salaries and incomes tend to increase with years of work, and their investment strategies are more aggressive, leading to a continuous increase in household financial assets. After 55, people generally begin to retire, resulting in a decrease in household income. Consequently, they adopt tighter and more conservative investment strategies, preferring to save money for medical and health expenses, thereby reducing household financial assets.

The variable of *total household assets* is a crucial indicator of a household's wealth level, encompassing all assets such as real estate, savings, and investments. The coefficient of this variable is positive, indicating that as total household assets increase, household financial assets also increase simultaneously. This suggests that the amount of total household assets directly influences the allocation of various types of assets within the household. Only when total household assets are sufficient, will households allocate extra funds towards the purchase of financial products.

5. Robustness Test

To ensure the robustness of the regression results concerning the impact of DIF on household financial assets, this study employs a substitution strategy, where the primary explanatory variable, namely the DIF index (dif), is sequentially replaced with two distinct sub-indices: the coverage breadth and the usage depth of DIF. This approach aims to validate the consistency and reliability of the initial results.

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Following the regression analysis, it was found that the signs of the regression coefficients for all variables remained consistent with those in the original model, indicating that the original model is robust and valid. The specific regression coefficients are presented in Table 3:

Table 3: Robustness Test

variable name	model1	model2	model3
(Intercept)	-2.5220239 (< 2e-16 ***)	-2.5353922 (< 2e-16 ***)	-2.1893132 (1.00e-14 ***)
Digital financial inclusion index	0.001891 (9.08e-05 ***)		
Coverage breadth of dif		0.0009397 (0.0562 .)	
Use depth of dif			0.0020055 (9.37e-09 ***)
Provincial gdp	0.0792611 (7.43e-06 ***)	0.1042473 (1.66e-10 ***)	0.0518835 (0.00539 **)
Rural/urban	-0.2392244 (3.89e-16 ***)	-0.2392999 (3.87e-16 ***)	-0.23822 (5.07e-16 ***)
Number of family members	0.0117566 (0.187)	0.0106333 (-0.2325)	0.0128818 (-0.14817)
Age	0.1403997 (< 2e-16 ***)	0.1401529 (< 2e-16 ***)	0.140417 (< 2e-16 ***)
Age^2	-0.1214207 (< 2e-16 ***)	-0.1209879 (< 2e-16 ***)	-0.1216164 (< 2e-16 ***)
Gender	0.0323923 (0.286)	0.0330613 (-0.2758)	0.0315914-0.29756
Marital status	-0.1241634 (< 2e-16 ***)	-0.1245303 (< 2e-16 ***)	-0.1237918 (< 2e-16 ***)
Education level	0.2817416 (< 2e-16 ***)	0.2817412 (< 2e-17 ***)	0.2818501 (< 2e-17 ***)
Physical condition	-0.2304818 (< 2e-16 ***)	-0.2298119 (< 2e-18 ***)	-0.2314453 (< 2e-18 ***)
Household attention to economics and finance	-0.1866151 (< 2e-16 ***)	-0.1856836 (< 2e-19 ***)	-0.1876287 (< 2e-19 ***)
Household risk appetite	-0.1305137 (< 2e-16 ***)	-0.1307716 (< 2e-20 ***)	-0.1302723 (< 2e-20 ***)
Internet financial account holding	-0.9773509 (< 2e-16 ***)	-0.9773729 (< 2e-21 ***)	-0.9772989 (< 2e-21 ***)
The attributes of housing	0.509508 (< 2e-16 ***)	0.5167538 (< 2e-22 ***)	0.5040235 (< 2e-22 ***)
Total household assets	0.7163933 (< 2e-16 ***)	0.7223452 (< 2e-23 ***)	0.7116923 (< 2e-23 ***)

6. Conclusion

By constructing a reasonable explanatory regression model, this paper delves into the impact of DIF on household financial assets, comprehensively considering various control variables such as the age of the head of household, risk preference, and total household assets, with the aim of more

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comprehensively measuring the factors influencing household financial assets. Through data analysis, the following conclusions were drawn:

Firstly, the advancement of DIF fosters increased investments in financial assets among households by expanding the coverage of financial services, diminishing their costs, and lowering the barriers to access. As DIF becomes more prevalent and accessible, households gain easier access to financial resources, enabling them to readily increase the value of their financial assets and subsequently enhance their ability to accumulate wealth. It is evident that DIF is highly beneficial for households.

Secondly, DIF also helps optimize the asset allocation structure of households. It reduces households' reliance on traditional savings methods, encouraging them to allocate more funds to financial products such as wealth management, funds, and stocks. This shift in allocation structure facilitates risk diversification and can even increase household income.

Furthermore, based on the model, we can derive several extended conclusions: Increases in factors such as the total amount of household assets, the level of financial concern among households, the preference for risky assets, the education level, and the stability of marriage can all lead to an increase in household financial assets. As for the age of the head of household, household financial assets tend to increase initially and then decrease with advancing age.

However, there are still some issues in the development of DIF. Firstly, there is a significant disparity in its development between urban and rural areas, leading to imbalanced development. Secondly, there is a potential risk of customer information leakage. Thirdly, the relatively low financial literacy of residents restricts the advancement of DIF.

To address these issues, this paper proposes a series of countermeasures. Firstly, the administration could implement measures aimed at bolstering the development and establishment of a robust rural financial system, establishing more financial institution branches in rural areas. Concurrently, the government should strengthen infrastructure construction such as communication networks in rural areas to establish a robust foundation for the advancement of digital finance. Secondly, the government can establish specialized departments and mechanisms for financial data security management, enhancing data protection training for financial institution personnel. Additionally, the government should promptly handle incidents of customer information leakage and punish those responsible. Thirdly, community-based financial knowledge promotion activities can be organized, including financial knowledge lectures and competitions, to raise residents' awareness of DIF and stimulate their investment activity.

In summary, the development of digital inclusive finance can promotes household financial assets and facilitates rational asset allocation, thereby assisting households in wealth management. Therefore, the digital inclusive finance is highly beneficial to households, and further endeavors ought to be undertaken to strengthen its construction and popularization to contribute to the family wealth management.

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