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Does Digital Inclusive Finance Facilitate the Development of Urban Medical Insurance?

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Abstract: ***China clearly states that efforts should be made to build a Healthy China, with the medical security system being an important institutional guarantee for achieving people's health. Based on the panel data of 30 provinces in China from 2012 to 2022, this paper uses the mediation effect model to conduct an empirical study on whether digital inclusive finance can promote the development of urban medical insurance. The conclusion proves that digital inclusive finance has a significant promoting effect on urban medical insurance and can increase the number of insured people by increasing the disposable income of urban residents. At the same time, digital inclusive finance has a significant promoting effect on both urban employees and urban residents. The expansion of its coverage, the deepening of its usage, and the digital transformation of urban areas have encouraged more people to participate in basic medical insurance. The conclusion of this paper aims to provide certain reference and inspiration for promoting the development of urban basic medical insurance in China.***

Keywords: Digital inclusive finance, Medical insurance, Disposable income.

1. Introduction

The 20th National Congress of the Communist Party of China explicitly emphasized that the core of the "Healthy China" strategy lies in the well-being of the people. It also highlighted the necessity for further deepening the reform of the medical and health system to achieve coordinated governance among medical insurance, healthcare services, and pharmaceuticals. As a pivotal foundational institution for realizing the "Healthy China" objective, China's basic medical insurance system bears the significant responsibility of safeguarding the fundamental rights and healthy development of every member of society. It is also intrinsically linked to social equity and justice, as well as the long-term stability and sustainable development of the nation. In the context of the current digital revolution, digital finance is propelling socioeconomic development at an unprecedented pace. Documents released by the State Council, including the "Plan for Promoting the Development of Inclusive Finance (2016-2020)" and the "Overall Plan for the Development of Digital China," have provided a clear orientation and strategic arrangements for the development of inclusive finance. This further underscores the positive impact of digital inclusive finance on the national economy. Under such circumstances, it is imperative to contemplate whether inclusive finance can serve as a potent instrument in advancing the development of urban medical insurance in China. If so, how exactly does it exert this influence? Moreover, does inclusive finance have differential impacts on urban employee medical insurance and urban resident medical insurance? Among the three dimensions of digital inclusive finance, which one has a more pronounced effect on urban basic medical insurance? Additionally, how do the impacts of digital inclusive finance vary between the eastern regions and non-eastern regions of China? This paper aims to delve into these questions in order to provide novel insights and recommendations for the sustainable development of urban medical insurance in China.

At present, although China's basic medical insurance system has achieved remarkable results, it still faces multiple challenges. Viewed from a macroscopic perspective, Lei Ting et al. [1] have revealed through their research that the overall level of basic medical security in China has generally been on an upward trend. However, it has shown a slight decline since 2020. The level of medical security in the eastern region is comparatively higher. Moreover, in regions with a relatively high level of economic development, the accessibility and sustainability of medical security are stronger. Nevertheless, the fairness of medical security remains at a relatively low level. Specifically, the absolute gap in the level of medical security in the eastern region is gradually widening, while that in other regions is gradually narrowing. Jia Hongbo et al. [2] hold that the absolute gap in the high-quality development of China's basic medical insurance is expanding, and a polarization trend has emerged in the eastern region. From a meso-level perspective, Zhang Anqi et al. [3] found that after the consolidation of urban and rural basic medical insurance, the disparity in the number of health examination items between urban and rural residents has been reduced. Nevertheless, among the group with poor health conditions, urban residents gain more from inpatient treatment. As a result, this has further widened the gap in the utilization of medical services between urban and rural areas. From a micro perspective, the research conclusion of Zhou Qin et al. [4] shows that the level of medical insurance compensation obtained by low-income groups is significantly lower than that of high-income groups, especially for the lowest 20% income group. Despite paying the same premiums, they have not been able to enjoy compensation commensurate with their contributions. On the contrary, the compensation received by high-income groups exceeds their premium contributions, resulting in an unfair phenomenon where low-income groups indirectly subsidize high-income groups. This reveals the unfairness in the distribution of medical insurance benefits. Currently, the situation of medical inequality in China is severe at the macro, meso, and micro levels. In the eastern regions, where the economy is more developed, the inequality is even more pronounced. Establishing a comprehensive and equitable social security system remains a significant challenge. In addition, as the coverage of medical insurance expands and the urban-rural gap narrows, medical insurance expenditure is rising rapidly, making the issue of high medical costs even more intractable [5]. Moreover, the current medical service market is characterized by a pronounced information asymmetry. Medical service providers may exploit this

information gap to induce patients to consume more services, leading to moral hazard [6]. This, in turn, exacerbates tensions between doctors and patients and generates public discontent.

The digital economy represents the cutting-edge and core aspect of contemporary financial development, and its characteristics have propelled the inclusiveness and sustainable development of finance. Xie Xuanli et al. [7] demonstrated that the entrepreneurial incentive characteristics of digital finance play a stronger role in provinces with lower levels of urbanization and in small and micro enterprises with less registered capital. This finding highlights the inclusive nature of digital finance, indicating that it provides more financial support and opportunities for a greater number of entrepreneurs. Zhang Zhongxiang and Hu Yahui [8] have found that the development of digital inclusive finance can smooth household consumption and optimize the household debt structure, thereby significantly reducing the risk of excessive household debt. This is of great significance for helping to resolve the excessive debt risks in rural households in central and western regions caused by low education levels and low income. Chen Jing et al. [9] also found that digital inclusive finance can enhance the social welfare performance of residents, and this is mainly achieved through economic and social aspects, indicating that digital inclusive finance not only improves the economic welfare of residents but also promotes the overall well-being of society. Zou Xinyue and Wang Wang [10] concluded in their research that inclusive finance can enhance the consumption of urban and rural residents through means such as income, mobile payment, and consumer credit. Moreover, this promoting effect is more significant in the western regions, demonstrating the crucial value of inclusive finance in promoting balanced regional development. Existing studies have all shown that inclusive digital finance can significantly improve the living standards of residents and stimulate their consumption ability, thus promoting China's economic growth. Nevertheless, there is little literature explaining how it impacts urban medical insurance, which is precisely the content to be explored in this paper.

The above-mentioned literature has conducted in-depth discussions on basic medical insurance and digital inclusive finance. However, the existing literature has paid relatively little attention to the relationship between digital inclusive finance and basic medical insurance. Only Wang Yanan et al. [11] have explored this issue from the perspective of heterogeneity, suggesting that digital inclusive finance promotes medical insurance, endowment insurance, and unemployment insurance. The main intermediary transmission mechanisms are income effect and employment effect. From this, it can be seen that digital inclusive finance not only enhances the overall level of social security but also, to a certain extent, improves the uneven distribution of medical insurance resources in various regions. This is particularly evident in areas with relatively backward economic development in our country, providing certain ideas for reference for the theme of this article.

Compared with existing literature, this paper makes three marginal contributions. First, it focuses on the impact of digital inclusive finance on urban basic medical insurance. Second, it delves into the differences in the impact of digital inclusive finance on urban employee medical insurance and urban resident medical insurance. Third, it conducts heterogeneity analysis on urban basic medical insurance using three dimensions of digital inclusive finance, urban employees and residents, and eastern and non-eastern regions, respectively, to observe the respective impacts. The main research approach is as follows: first, theoretical analysis is conducted and hypotheses are proposed. Then, regression analysis is carried out based on the hypotheses, and the robustness and endogeneity of the analysis results are tested. Finally, the mediating effect and heterogeneity of digital inclusive finance on urban basic medical insurance are analyzed and discussed, and relevant policy suggestions are provided.

2. Theoretical Analyses and Research Hypotheses

With the rapid advancement of digital technologies, digital inclusive finance has emerged as a new focal point in the realm of finance. Leveraging technologies such as the Internet, mobile communications, and big data analytics, it extends financial services to social groups that are otherwise hard to reach for traditional financial institutions, offering more accessible and cost-effective financial services. This transformation has not only exerted a profound influence on the operational models of the financial industry but also had a notable impact on urban basic medical insurance. This paper will explore, from three perspectives, how digital inclusive finance affects the enrollment in urban basic medical insurance. Specifically, it will examine how digital inclusive finance boosts the income levels of urban residents and employees through promoting local entrepreneurship and employment, expanding investment channels, and driving economic growth.

2.1 Enhancing Employment and Entrepreneurship Opportunities

Digital inclusive finance can simplify the process of accessing financial services and lower the threshold for people to start businesses and find employment. First, in terms of entrepreneurship, digital inclusive finance helps entrepreneurs quickly obtain start-up funds by providing convenient financing channels and low-cost financial services [12]. Meanwhile, through Internet platforms, entrepreneurs can more easily access market information, business resources and technical support, thereby increasing the success rate of entrepreneurship. Moreover, digital inclusive finance builds entrepreneurship service platforms to offer one-stop services to entrepreneurs, including policy consultation, project incubation and market promotion, further stimulating entrepreneurial vitality. For instance, personal entrepreneurship loans in Dongguan, Guangdong Province and personal entrepreneurship guarantee loan services in Gansu Province are all manifestations of digital inclusive finance promoting residents' entrepreneurship.

In terms of employment, digital inclusive finance has created more job opportunities by promoting industrial upgrading and transformation. On the one hand, the introduction of digital technologies has spurred the development of emerging industries, such as the Internet, e-commerce, and financial technology, which have provided a large number of new job positions in the labor market. On the other hand, digital

inclusive finance also increases the demand for labor by supporting the development of small and micro enterprises, individual businesses, and other economic entities, thereby driving employment. In order to address social issues such as employment difficulties and labor shortages, China Bank launched the "Hui Ru Yuan • Qian Gang Wan Jia" inclusive finance action plan on January 26, 2022. This plan aims to enhance the role of inclusive finance in promoting employment and to make concrete contributions to serving the real economy and stabilizing the economic situation.

The employment and entrepreneurial opportunities provided by digital inclusive finance can increase the sources of income for urban residents, thereby raising their disposable income. This, in turn, enhances the willingness of urban residents to either join the urban employee medical insurance, which offers a higher level of coverage, or to participate in the urban basic medical insurance that provides basic coverage.

2.2 Widening the Channels of Investment

Within the framework of the traditional financial system, low-income groups have long faced multiple barriers that impede their effective participation in investment activities in the capital market. These barriers primarily include high capital thresholds, complex investment procedures, and pervasive information asymmetry, which collectively exclude many potential investors from the trajectory of wealth accumulation. Specifically, high capital thresholds make it difficult for small investors to meet the minimum subscription requirements of certain investment products, while information asymmetry prevents investors from obtaining accurate and timely market information, thereby increasing the risks and uncertainties associated with investment decisions.

However, with the rapid development of digital technology, digital inclusive finance has emerged, bringing revolutionary changes to this situation. Digital inclusive finance utilizes advanced technologies such as the Internet, big data, and cloud computing to innovate financial service models, breaking the physical limitations and cost barriers of traditional financial services and opening up new investment channels for low-income groups. Currently, popular Internet financial products include money funds, P2P lending, and regular investment in stock funds, etc. These products have lowered the investment threshold, enabling more urban residents and workers to participate in diverse investment activities. This not only enriches the investment portfolio of urban residents, enhances the operability of investment and financial management, but also provides them with opportunities for asset appreciation, thereby increasing their overall income level. The improvement of investment concepts and the increase in income levels help urban residents realize the necessity of purchasing basic medical insurance for urban residents to deal with future risks and have the ability to purchase it. Therefore, the expansion of investment channels can, to a certain extent, promote the increase in the number of participants in basic medical insurance for urban residents.

2.3 Promoting the Development of the Local Economy

The popularization of digital inclusive finance has also promoted the overall development of the local economy. On the one hand, it has optimized the allocation of resources, improved the efficiency of capital utilization, and facilitated the growth of small and micro enterprises and individual business owners, injecting new vitality into economic growth. On the other hand, the convenience of digital finance has promoted consumption upgrades, stimulated domestic demand, and formed a virtuous cycle of economic growth. Hu Chaofan et al. [13] found that digital inclusive finance plays a significant role in promoting high-quality economic development in China, the prosperity of the real economy, and the efficiency of financial services for the real economy. The economic prosperity directly leads to a general increase in residents' income, providing a solid economic foundation for the expansion of the coverage of basic medical insurance. Zhang Liliang et al. [14] proposed that the improvement of economic development level would bring higher-level medical insurance investment to employee medical insurance, such as an increase in the number of people willing and able to participate in employee medical insurance, thereby promoting an increase in the number of participants in employee medical insurance. In addition, the improvement of the economic level leads to an increase in income level, which raises the contribution base of employee participants. Moreover, digital finance can provide better medical services for urban residents through online services, breaking through the limitations of time and space for the handling, payment, and report viewing of medical insurance, greatly enhancing convenience and high-quality service experience, and avoiding the rejection of basic medical insurance due to the complicated procedures for using it to see a doctor.

Therefore, this paper proposes the following hypotheses:

H1: Digital inclusive finance can increase the number of participants in urban basic medical insurance.

H2: Digital inclusive finance increases the number of participants in urban basic medical insurance by raising the per capita disposable income of urban residents.

3. Data Sources and Model Specifications

3.1 Variable Specification

(1) Dependent Variable: The dependent variable is the number of participants in the urban basic medical insurance (mi) in 30 provinces from 2012 to 2022, as obtained from the China Statistical Yearbook. It is calculated as the sum of the number of participants in urban employee basic medical insurance (including retirees) and the number of participants in urban resident basic medical insurance.

(2) Core Explanatory Variable: The core explanatory variable is the Digital Inclusive Finance Index (ia) from Peking University for the period of 2012–2022. For missing data, the average growth rate method was employed to supplement the values. To ensure that the Digital Inclusive Finance Index can be used for both cross-sectional (regional) and longitudinal (temporal) comparisons, the Digital Finance Research Center at Peking University first normalized the indicators across different dimensions and then determined the weights for synthesizing these indicators. Finally, they used an arithmetic mean synthesis model to obtain the composite index.

Table 1: Overview of Control Variables

The level of urbanization (ul)	Total urban population/Total population
Degree of openness to the outside world (o)	The total volume of imports and exports of goods classified by the location of operating units/the GDP of each province
The level of transportation infrastructure (ti)	The mileage of highways in each province/the land area of each province
Scale of fiscal expenditures (li)	General budgetary expenditures of public finance/regional gross domestic product
The permanent resident population in urban areas (p)	The permanent resident population of the town at the end of the year
Industrial upgrading (iu)	Value-added of the tertiary industry/Value-added of the secondary industry
The greening rate in the built - up area (g)	The ratio of green space area to built-up area (%)

(3) Control Variables: To avoid estimation bias, this paper includes a series of control variables. Drawing on the research of Wang Yanan [11] and others, the following seven main indicators were selected: urbanization level (ul), degree of openness to the outside world (o), level of transportation infrastructure (ti), scale of fiscal expenditure (li), urban resident population (p), industrial upgrading (iu), and green coverage rate in built-up areas (g). These indicators are all derived from provincial panel data.

3.2 Model Specification

To gain a clearer understanding of the impact of digital inclusive finance on urban basic medical insurance, this paper constructs the following econometric model for empirical testing:

$$mi_{it} = \beta_0 + \beta_1 ia_{it} + \rho control_{it} + \lambda_i + \mu_t + \varepsilon_{it}$$

Among them, the explained variable mi_{it} refers to the number of insured persons in the urban basic medical insurance of province i in year t; The core explanatory variable ia_{it} represents the digital inclusive finance index of province i in year t; $control_{it}$ is the sum of control variables, including the level of urbanization, the degree of opening to the outside world, the level of transportation infrastructure, the scale of fiscal expenditure, the industrial upgrading of the permanent urban population, and the greening rate of the built-up area. λ_i is the individual fixed effect, μ_t is the time fixed effect, and ε_{it} is the random disturbance term.

To explore whether digital inclusive finance affects the development of urban basic medical insurance by influencing residents' disposable income, this paper refers to the research results of scholars such as Wen Zhonglin [15] in the field of mediating effects and constructs the following equation:

$$money_{it} = \alpha_0 + \alpha_2 ia_{it} + \beta control_{it} + \lambda_i + \mu_t + \varepsilon_{it}$$

$$mi_{it} = \alpha_0 + \phi ia_{it} + \omega money_{it} + \beta control_{it} + \lambda_i + \mu_t + \varepsilon_{it}$$

Among them, the disposable income of urban residents ($money_{it}$) serves as a mediating variable. If both α_2 and ω are significant, and φ is also significant, it indicates a partial mediation process, meaning that only part of the impact of the digital inclusive finance index on the number of urban residents participating in basic medical insurance is achieved through the mediating variable of disposable income of urban residents. If φ is not significant, it indicates a complete mediation process, that is, the impact of the digital inclusive finance index on the number of urban residents participating in basic medical insurance is all realized through the mediating variable of disposable income of urban residents.

3.3 Data Sources and Descriptive Statistics

The data of the digital inclusive finance index employed in this study is sourced from the authoritative domestic report, *Peking University Digital Inclusive Finance Index (2011 - 2020)*. This index constructs a digital inclusive finance indicator system based on three dimensions: "depth of coverage", "breadth of usage", and "degree of digitalization", primarily characterizing the development trends and spatial features of digital inclusive finance in China. The data regarding the participation in urban basic medical insurance and the disposable income of urban residents are both obtained from the China Statistical Yearbook. The control variables are derived from the panel data of each province. Table 2 shows the results of descriptive statistics.

Table 2: Descriptive Statistics of Variables

Var.	Sample Size	Mean	SD	Min	Med	Max
mi	330	7.7574	0.8839	5.1492	7.7565	9.3301
ia	330	262.4	92.24	61.47	268.0	460.7
ul	330	0.607	0.117	0.363	0.593	0.896
ti	330	11.71	0.852	9.437	11.99	12.91
o	330	0.243	0.271	0.000256	0.133	1.441
p	330	4627	2873	571	3950	12684
li	330	0.254	0.105	0.107	0.229	0.758
iu	330	1.384	0 .751	0.611	1.221	5.283
g	330	40.15	3.49	29.79	40.52	49.77

4. Analysis of the Regression Outcomes

Following the correlation tests on various variables, an initial assessment indicates the existence of a correlation between the core explanatory variables and the explained variable. Specifically, upon performing the multicollinearity diagnosis, it was observed that the mean value of the variance inflation factor (VIF) test for each explanatory variable is 3.81. This value is significantly lower than 10, thereby suggesting the absence of a severe multicollinearity issue. Given the presence of cross-sectional correlation and heteroscedasticity problems in the model, an enhanced Hausman test was conducted. The resulting outcome was the rejection of the null hypothesis, suggesting that a fixed-effects model ought to be employed.

4.1 Benchmark Regression Results

The regression results are exhibited in Table 3. In light of the analysis of the benchmark regression model, Column 1 solely displays the regression outcomes of the number of urban basic medical insurance enrollees and the digital inclusive finance index. Column 2, conversely, represents the regression analysis subsequent to the incorporation of a series of control variables. Evidently, irrespective of the inclusion or exclusion of control variables, the inclusive digital finance index exerts a notable influence on the number of urban basic medical insurance enrollees. Prior to the inclusion of control variables, digital inclusive finance exerted a negative impact on the number of urban medical insurance enrollees. Conversely, subsequent to the incorporation of control variables, this impact shifted to a positive one. This finding validates Research Hypothesis 1 of this paper, namely, that digital inclusive finance can facilitate the development of urban basic medical insurance.

Table 3: Results of the Benchmark Model Estimation

Var.	(1) lnmi	(2) lnmi
ia	-0.0037**	0.0050***
	(0.00122)	(0.00157)
Control Variable	N	Y
Constant	Y	Y
Sample Size	330	330
R^2	0.6881	0.7807
Time Fixed Effects	Y	Y
Individual Fixed Effects	Y	Y

Note: ***, ** and * represent significance levels of 1%, 5% and 10% respectively. The values in parentheses are standard errors (the same for the following table).

4.2 Robustness Test

4.2.1 Alternative Regression Methodology

To assess the robustness of the model, one approach employed in this study is to conduct an analysis by replacing the regression method. After performing the Ordinary Least Squares (OLS) regression, the regression results presented in Table 4 were derived. Notably, even after applying the OLS method, digital inclusive finance continues to exhibit a significant promotional effect on the number of urban medical insurance enrollees. Consequently, the robustness test under this approach is deemed to have been successfully passed.

Table 4: OLS Estimation Results

Var.	The OLS Method	
	lnmi	lnmi
ia	0.0047***	0.0031***
	(0.000462)	(0.000353)
Control Variable	N	Y
Constant	Y	Y
Sample Size	330	330
R^2	0.237	0.835

4.2.2 Shrink the sample interval

Beyond the regression-method substitution approach, the second robustness-testing method employed in this paper involves compressing the sample interval. Years 2012, 2014, 2015, 2018, and 2020 were randomly selected for regression analysis after sample compression, and the resultant findings are presented in Table 5. As can be gleaned from the tabular data, following the regression analysis using the randomly selected years, the digital inclusive finance index continues to exert a notable promotional effect on the number of urban basic medical insurance enrollees. This result aligns with the conclusions drawn earlier, thereby indicating that the model exhibits a certain level of robustness.

Table 5: Estimation Results with Reduced Sample Interval

Var.	Reduced Sample Size Test Method lnmi
ia	0.0093**
	(0.0024)
Control Variable	Y
Constant	Y
Sample Size	150
R^2	0.8410
Time Fixed Effects	Y
Individual Fixed Effects	Y

4.2.3 Instrumental Variable Tests

Given that digital inclusive finance influences basic medical care in urban areas, urban residents and employees may use their income to purchase financial products of digital inclusive finance for investment or apply for small loans, as they already have basic medical insurance. Therefore, there may be a causal relationship of mutual influence between digital inclusive finance and basic medical insurance in urban areas, which may lead to endogeneity. To address the issue of endogeneity, this study estimates using the Two-Stage. Least Squares (2SLS) method. Drawing on the research ideas of Huang Zuhui et al. [16], the interaction term (sphere) between the spherical distance from the provincial capital cities or municipalities directly under the Central Government of each province to Hangzhou and the average value of the digital inclusive finance index across the country (excluding the local province or municipality) is employed as an instrumental variable for the digital inclusive finance index. As Hangzhou is the center of digital finance development, the spherical distance between other cities and Hangzhou will have an impact on the development of digital inclusive finance to a certain extent. However, the spherical distance between other cities and Hangzhou has no direct influence on the number of participants in the basic medical insurance for urban residents. Considering the above conditions, it is reasonable to take the interaction term of the spherical distance from provincial capitals and municipalities directly under the Central Government to Hangzhou and the average value of the national (excluding the province or municipality) digital inclusive finance index as the instrumental variable. The estimation results obtained after conducting the two-stage least squares method are shown in Table 6.

As evident from Table 6, the Kleibergen-Paap rk LM statistic is significant at the 1% significance level. This result indicates that the instrumental variables are successfully identified. For the weak-instrument variable test, the Kleibergen-Paap rk Wald F statistic is 16.485, which exceeds the 10% critical value of 16.38, thereby demonstrating a strong correlation. From the first -stage regression results, it can be discerned that the interaction term between the spherical distance from provincial capitals or municipalities directly under the Central Government to Hangzhou and the average value of the national digital inclusive finance index (excluding the local province or municipality) has a highly significant influence on the digital inclusive finance index. The negative coefficient implies that regions in closer proximity to the digital finance development hub tend to exhibit a higher level of digital inclusive finance development, which is in line with the reality of the economy. The second-stage regression outcomes demonstrate that, after accounting for the instrumental variables, digital inclusive finance still exerts a relatively notable positive impact on the number of urban basic medical insurance enrollees. This serves to validate the robustness of the benchmark regression findings.

Table 6: Instrumental Variable Model Estimation Using Distance to Hangzhou as an Instrument

Var.	First Stage ia	Second Stage lnmi
sphere	-0.0000456***	
	(0.00001)	
ia		0.0083**
		(0.0033)
Control Variable	Y	Y
Constant	Y	Y
Sample Size	330	330
R^2	0.997	0.931
Time Fixed Effects	Y	Y
Individual Fixed Effects	Y	Y

Kleibergen－Paap rk LM Statistic	44.002***
Kleibergen－Paap rk Wald F Statistic	16.485

4.2.4 Alternative Instrumental Variable Tests

To enhance the robustness of the estimation results, this study draws on the research of Wang Yanan et al. [11] and employs the one-period lagged digital inclusive finance index as an instrumental variable. The one-period lagged digital inclusive finance index is closely associated with the current-period value. Nevertheless, it does not have an impact on the current number of individuals enrolled in urban basic medical insurance. Thus, it satisfies the requirements for an instrumental variable. The resulting estimation outcomes are presented in Table 7.

Table 7: The Estimation Results of the One-period Lagged Instrumental Variable Model

Var.	First Stage ia	Second Stage lnmi
L.ia	0.7036*** (0.0485)	
ia		0.0114*** (0.0028)
Control Variable	Y	Y
Constant	Y	Y
Sample Size	330	330
R^2	0.998	0.930
Time Fixed Effects	Y	Y
Individual Fixed Effects	Y	Y
Kleibergen－Paap rk LM Statistic		77.285***
Kleibergen－Paap rk Wald F Statistic		210.077

Note: The values within parentheses represent the standard errors of t.; * p < 0.1, ** p < 0.05, *** p < 0.01. Variable names are shown in Table 1.

As can be gleaned from the results presented in Table 7, within the context of the under-identification test, the Kleibergen-Paap rk LM statistic is significant at the 1% significance level. This leads to the rejection of the null hypothesis of "inadequate identification of instrumental variables", thereby suggesting that the instrumental variables chosen in this study are quite suitable. Meanwhile, for the weak-instrument variable identification test, the Kleibergen-Paap rk Wald F statistic is 210.077. This value exceeds the 10% critical value of 16.38, which implies a strong correlation between the instrumental variables and the endogenous variables. Ultimately, the test findings demonstrate that, after taking into account the issue of endogeneity, the digital inclusive finance index continues to have a relatively substantial positive influence on the number of individuals enrolled in urban basic medical insurance. In other words, both the outcomes of the benchmark regression and those of the instrumental variable regression lend support to this research conclusion.

4.3 Mediation Effect Analysis

In the foregoing discussion, it was hypothesized that urban residents can leverage digital inclusive finance to elevate their income levels, thereby facilitating an increase in the number of enrollees in urban basic medical insurance. Table 8 showcases the regression results regarding the mediating mechanism of urban residents' disposable income. The results in Column 1 suggest that the digital inclusive finance index exerts a significant influence on the number of urban residents enrolled in basic medical insurance. Hence, the second step can be initiated. Subsequently, a regression analysis was carried out between the disposable income of urban residents and the digital inclusive finance index. The findings reveal that the digital inclusive finance index has a notable impact on the disposable income of urban residents, indicating that the third step can proceed. Finally, a regression was conducted with both the digital inclusive finance index and the disposable income of urban residents as independent variables against the number of urban residents enrolled in basic medical insurance. As presented in Column 3, both the digital inclusive finance index and the disposable income of urban residents are highly significant concurrently. According to the conclusion of the mediation effect test proposed by scholars such as Wen Zhonglin [15], it can be known that the disposable income of urban residents plays a partial mediating role. Based on speculations regarding the actual economic situation, digital inclusive finance may influence the participation of urban residents in basic medical insurance not only by increasing residents' disposable income, thus enabling them to have more abundant resources to purchase insurance, but also through other reasons. For example, it may provide more job positions and boost the employment rate, ensuring a more secure income source for a greater number of residents. Therefore, the claim put forward in Hypothesis 2, stating that the digital inclusive finance index can increase the number of urban residents enrolled in basic medical insurance by boosting their disposable income, has been corroborated to some degree.

Table 8: Estimation Results of Mediation Effects

Var.	(1) mi	(2) money	(3) mi
ia	11.6727*** (1.1489)	81.6909*** (4.202)	18.0228*** (1.6279)
money			-0.0777*** (0.0147)
Control Variable	Y	Y	Y
Constant	Y	Y	Y
Sample Size	330	330	330
R^2	0.811	0.878	0.826
Time Fixed Effects	Y	Y	Y
Individual Fixed Effects	Y	Y	Y

5. Heterogeneity Analysis

5.1 Heterogeneity Test between Urban Employees and Urban Residents

The enrollment of urban basic medical insurance is composed of two main components: the urban employee medical insurance (s) and the urban resident medical insurance (r). This study aims to analyze the influence of the digital inclusive finance index on the structure of urban basic medical insurance. The conclusions presented in Table 9 are derived from separate regressions on urban employee medical insurance and urban resident medical insurance.

As can be observed from Table 9, the digital inclusive finance index exerts a significant influence on both the urban employee medical insurance (s) and the urban resident medical insurance (r). This finding is consistent with Hypothesis 1, indicating that digital inclusive finance significantly facilitates the growth in the number of enrollees in urban basic medical insurance.

Table 9: Heterogeneity Analysis of Urban Employees and Urban Residents

Var.	(1) s	(2) r
ia	3.5827** (1.6376)	32.4164*** (9.692)
Control Variable	Y	Y
Constant	Y	Y
Sample Size	330	330
R^2	0.385	0.650

5.2 Heterogeneity Analysis of Three Dimensions of Digital Inclusive Finance

Given that the digital inclusive finance index consists of three dimensions: coverage breadth, usage depth, and degree of digitalization, this paper conducts regressions of these three dimensions separately against the number of urban medical insurance enrollees and then makes comparisons. The regression results are presented in Table 10. As can be seen from the results, both the coverage breadth (cover) and the degree of digitalization (digital) significantly contribute to urban basic medical insurance. Among them, the coverage breadth has a more pronounced promoting effect on urban basic medical insurance. However, the effect of the usage depth (deep) is not statistically significant.

Table 10: Heterogeneity Analysis of the Three Dimensions

Var.	(1) lnmi	(2) lnmi	(3) lnmi
cover	0.0122*** (0.003)		
deep		0.0023 (0.0015)	
digital			0.0029*** (0.0008)
Control Variable	Y	Y	Y
Constant	Y	Y	Y
Sample Size	330	330	330
R^2	0.789	0.779	0.787

The possible reasons for this phenomenon are as follows: First, with the expansion of the coverage of digital inclusive finance, urban residents can use electronic tools such as Alipay and WeChat to pay, check and handle activities related to basic medical insurance more conveniently. They can complete the previously complicated procedures simply by applying, paying and claiming reimbursements on their mobile phones, which directly promotes the development of urban basic medical insurance. Second, although the use of digital inclusive finance is becoming increasingly widespread, for disadvantaged groups, there is no overly high threshold to participate in urban medical insurance. They only need to master some simple operations. Complex operations are not acceptable or willing to be learned by the general public. Third, digitalization has become relatively common in urban areas, and it has also given rise to a large number of new types of employees. This makes residents' income sources more diversified. Whether they are unemployed ordinary residents or employees, they can use their spare time to earn some income through digital finance.

5.3 Heterogeneity Analysis between Eastern and Non-Eastern Regions

Taking into account the substantial differences in economic development between the eastern and non-eastern regions of China, this regional economic imbalance may result in significant variances in the influence of digital inclusive finance on urban basic medical insurance across different regions. Consequently, after performing heterogeneity analyses on eastern cities and non-eastern provinces respectively, the results shown in Table 11 were derived.

Table 11: Heterogeneity Analysis Between Eastern and Non-Eastern Regions

Var.	eastern regions lnmi	non-eastern regions lnmi
ia	0.0064 (0.0052)	0.0102*** (0.0034)
Control Variable	Y	Y
Constant	Y	Y
Sample Size	110	220
R^2	0.781	0.838

The findings indicate that digital inclusive finance exerts a significant positive influence on non-eastern regions, whereas its effect on eastern regions is not statistically significant. There are several reasons accounting for this scenario:

Firstly, in the eastern regions, given their relatively advanced economic development and relatively sophisticated financial systems, traditional financial services have already been extensively disseminated. Consequently, the penetration of digital inclusive finance may not exert as profound an impact on their economic and social landscapes as it does in non-eastern regions. In contrast, in non-eastern regions, where the coverage of traditional financial services is inadequate, the advent of digital inclusive finance can bridge this gap. It exerts a more substantial impetus on the local economy, thereby augmenting enrollment in urban basic medical insurance.

Secondly, research by scholars such as Xie Xuanli [7] and Zou Xinyue [10] has indicated that digital inclusive finance is especially beneficial to low-income groups. It can effectively enhance the level of social welfare through various means, including providing convenient entrepreneurial financing channels, mobile payment services, and facilitating income growth. This perspective aligns with the findings of this study. Specifically, digital inclusive finance can assume a more prominent role in economically less developed non - eastern regions. As a result, its influence on the enrollment numbers of urban basic medical insurance in these regions is also more pronounced.

6. Conclusions and Policy Implications

Based on the panel data analysis of the digital inclusive finance index and the number of participants in urban basic medical insurance across 30 provinces in China (excluding Tibet and Hong Kong, Macao, and Taiwan) from 2012 to 2022, and employing a mediation effect model, this study thoroughly investigates the impact of digital inclusive finance on urban basic medical insurance and its underlying mechanisms. The findings of this study are as follows: First, the digital inclusive finance index has a significant positive impact on the number of participants in urban basic medical insurance. This effect remains significant after addressing endogeneity issues. Additionally, the robustness of the results is confirmed by the consistency in the sign and significance of the coefficients when alternative regression methods are applied and when the sample period is narrowed. Second,

digital inclusive finance affects the number of participants in urban basic medical insurance through the mediating role of increasing urban residents' disposable income. However, the study concludes that urban residents' disposable income only constitutes a partial mediating effect. Therefore, identifying other potential mediating variables remains an area for further improvement in this research. Thirdly, the results of heterogeneity analysis show that the digital inclusive finance index has a more significant promoting effect on the relatively disadvantaged urban resident basic medical insurance, which is in line with the literature research conclusion that digital inclusive finance can promote the equalization of medical services. Among the three dimensions of digital inclusive finance, the promoting effect of coverage breadth is the most significant, and the promoting effect is also better. At the same time, the promoting effect of digital inclusive finance on increasing the number of urban medical insurance participants in non-eastern regions is very significant. In light of these research findings, this paper proposes the following policy recommendations, which are aimed at further promoting the development of urban basic medical insurance:

1) Expanding the Geographic Scope of Digital Inclusive Finance

Given the significant role of digital inclusive finance in promoting urban basic medical insurance participation as demonstrated in the preceding analysis, the government should continue to increase its support for digital inclusive finance, facilitating its expansion to a broader range of populations and regions. In particular, for urban residents who are unemployed or engaged in informal employment, enhancing their income levels through digital inclusive finance can bolster their willingness to participate in medical insurance.

First, financial institutions should be encouraged to develop inclusive finance products and services tailored to the needs of these groups. The government should also intensify the promotion of digital inclusive finance, reducing the barriers to accessing small loans, thereby integrating digital inclusive finance more seamlessly into daily life.

Second, in the relatively impoverished urban areas of central and western China, the government can provide subsidies and financial support to local financial institutions to lower their service costs. This will enhance the capacity of these institutions to establish a strong presence in these regions, thereby better serving urban residents with inclusive financial services.

2) Enhancing the Digitalization of Social Security Management and Accelerating Intelligent Transformation

Firstly, promote the mobile electronic social security card and speed up the opening of information intercommunication functions of medical databases across the country. This will enable insured individuals to not only access real-time information on their social security card balances but also significantly alleviate the challenges associated with medical treatment in different regions.

Second, the creation of a social medical insurance cloud platform is essential. By leveraging big data for real-time monitoring, this platform can effectively manage risks associated with medical fund management and enhance the efficiency of basic medical fund allocation. This will help address the issue of uncoordinated medical resource distribution across different regions.

Finally, the approval process for medical insurance claims should be streamlined. A rapid digital payment mechanism and a responsive monitoring system should be established to ensure that medical insurance funds are more equitably distributed, with a particular focus on directing more resources to households with lower incomes. This will help reduce disparities in the allocation of medical resources and improve overall social welfare.

3) Strengthening the Dissemination of Digital Inclusive Finance and Medical Insurance Knowledge

enhance the popularization and education of digital inclusive finance and medical insurance knowledge, especially among vulnerable groups in society, including the elderly, those with lower educational attainment, and those from less affluent families, to ensure their convenient participation in digital inclusive finance and digital social insurance services.

Firstly, regular digital finance training courses can be held in communities, with a focus on promoting medical insurance and training in internet finance knowledge.

Secondly, different training programs should be designed for different groups, and financial knowledge should be disseminated in as simple a form as possible. New media platforms can also be utilized to spread digital finance knowledge, using fragmented memory methods to supplement the digital finance knowledge of the general public.

References

[1] LEI Ting, XIANG Chuan & GUO Juan. (2023). Areal differences and dynamic evolution of medical security level in China. Social Security Studies, (06), 39-51.
[2] JIA Hongbo, CAI Yaoyao & TANG Zitong. (2023). Regional differences and formation mechanism of high-quality development for basic medical insurance in China: an empirical study based on provincial panel data from 2011 to 2020. Social Security Studies, (06), 3-19.
[3] ZHANG Anqi, ZHANG Geng & WANG Shengyu. (2024). Does the Basic Medical Insurance for Urban and Rural Residents Promote Fair Utilization of Medical and Health Services?. Economy and Management, 38 (02), 38-48.
[4] ZHOU Qin, TIAN Sen & PAN Jie. (2016). Inequity of Equalization—Theoretical and Empirical Analysis on Beneficial Equity of the Urban Resident Basic Medical Insurance in China. Economic Research Journal, 51 (06), 172-185.
[5] FENG Jin, YU Yangyang & LOU Pingyi. (2015). Medical Demand and Growing Medical Costs in China—Based on the Gap between Senior Citizens' Medical Costs in Urban and Rural Areas. Social Sciences in China, (03), 85-103+207.
[6] LU Hongyou, LIAN Yujun & LU Shengfeng. (2011). Measurement of the Information Asymmetric in Medical

Service Market of China. Economic Research Journal, 46 (04), 94-106.
[7] XIE Xuanli, SHEN Yan, ZHANG Haoxing & GUO Feng. (2018). Can Digital Finance Promote Entrepreneurship?—Evidence from China. China Economic Quarterly, 17 (04), 1557-1580.
[8] ZHANG Zhongxiang & HU Yahui. (2024). How Does Digital Inclusive Finance Affect Households' Over-Indebtedness?—Micro Evidence Based on Subjective and Objective Perspectives. China Economic Quarterly, 24 (02), 643-660.
[9] Chen Jing, Lyu Yanqin & Zhao Bin.(2024). Impact of Digital Inclusive Finance Development on Residents' Social Welfare Performance. Statistics & Decision, 40 (08), 138-143.
[10] Zou Xinyue & Wang Wang. (2020). The Impact of Digital Financial Inclusion on Household Consumption: An Empirical Analysis Based on a Spatial Econometric Model. Financial Economics Research, 35 (04), 133-145.
[11] Wang Yanan, Tan Zhuohong & Zheng Lekai. (2020). The Impact of Digital Inclusive Finance on Social Security. Journal of Quantitative & Technological Economics, 37 (07), 92-112.
[12] Liang Bang & Zhang Jianhua. (2018). Does China's Inclusive Finance Innovation Ease the Financing Constraints of Small and Medium-Sized Enterprises?. Forum on Science and Technology in China, (11), 94-105.
[13] HU Chao-fan & CHEN Liu-qin. (2023). Research on the development of Digital financial in China—Based on the Perspective of New Welfare Economics. Hainan Finance, (11), 54-70+87.
[14] Zhang Liliang, Tian Jiashuai, Zhang Jingyi, Dai Shanshan, Cai Xinyu & Gao Guangying. (2024). Research on the Operation Efficiency of Basic Medical Insurance for Urban Workers and Its Influencing Factors in China from 2020 to 2021. Chinese Health Economics, 43 (03), 10-15.
[15] Wen Zhonglin & Ye Baojuan. (2014). Analyses of Mediating Effects: The Development of Methods and Models. Advances in Psychological Science, 22 (05), 731-745.
[16] HUANG Zuhui, SONG Wenhao & YE Chunhui. (2023). The Impact and Mechanism of Digital Inclusive Finance During the Establishment of New Agricultural Operators: Evidence from 1,845 Chinese Counties. Journal of Financial Research, (04), 92-110.
[17] LV Yongbin & GUO Yichen. (2023). Dividing the Pie: How Can Digital Finance Promote Income Equality. Journal of Zhongnan University of Economics and Law, (04), 81-93.
[18] CAO Qinghua & SONG Hailun. (2022). Analysis on the Effect of the Outpatient Pooling Policy of Medical Insurance for Urban Employees--Empirical Evidence from CHARLS. Social Security Studies, (04), 23-32.
[19] YI Xingjian & ZHOU Li. (2018). Does Digital Financial Inclusion Significantly Influence Household Consumption? Evidence from Household Survey Data in China. Journal of Financial Research, (11), 47-67.
[20] Zou Hong, Yu Kaizhi & Li Aolei. (2013). A Study on Effects of Pension Insurance and Health Insurance on Urban Household Consumption. Statistical Research, 30(11), 60-67.
[21] Zang Wenbin, Liu Guoen, Xu Fei & Xiong Xianjun. (2012). The Effect of Urban Resident Basic Medical Insurance on Household Consumption. Economic Research Journal, 47(07),75-85.
[22] XIE E. (2009). Income-related Inequality of Health and Health Care Utilization. Economic Research Journal, 44(02), 92-105.
[23] Gu Weibing & Zhang Donggang. (2008). An Empirical Analysis of the Relationship between the Incomes of Urban and Rural Residents and Their Expenditures on Medical and Health Care. Consumer Economics, (01), 43-46.
[24] Kapoor, A. (2014). Financial inclusion and the future of the Indian economy. *Futures*, 56, 35-42.
[25] FANG Xianming & WANG Yu. (2024). The Role of Digital Financial Inclusion in the Process of Common Prosperity—Based on the Panel Data of 254 Prefecture-level Cities in China. On Economic Problems, (06), 1-9.
[26] Yang Weiming, Su Lin & Wang Mingwei. (2020). Digital Financial Inclusion and Income of Urban and Rural Residents: Based on the Intermediary Effect of Economic Growth and Entrepreneurial Behavior. Journal of Shanghai University of Finance and Economics, 22(04),83-94.
[27] Lee, C. C., & Chang, C. P. (2006). Social security expenditure and GDP in OECD countries: A cointegrated panel analysis. International Economic Journal, 20(3), 303-320.
[28] Mollick, E. (2014). The dynamics of crowdfunding: An exploratory study. *Journal of business venturing*, 29(1), 1-16.