

The Function of Digital Inclusive Finance in Shaping Urban Household Consumption: Insights from a 2011 – 2023 City-Level Panel in China

Jiu Xu *, Jingyun Cao

School of Economics, Shanghai University, Shanghai, China, 200444

* Corresponding Author Email: jsp@shu.edu.cn

Abstract. Against the backdrop of China's transition toward a development model driven by domestic demand and high-quality growth, unlocking the consumption potential of residents has become a pressing and essential challenge. As a key outcome of the integration between technology and finance, Digital Inclusive Finance (DIF) is coming into view as a new way of stimulating consumption growth. Drawing on a city-level panel dataset encompassing 296 cities from 2011 to 2023—characterized by its extensive temporal span and wide geographic coverage—this paper captures the dynamics of both the development of DIF and shifts in consumption patterns. Building on this foundation, this paper not only conducts a positive analysis of the direct promotive effect of DIF on urban household consumption, but also examines its underlying mechanisms through three sub-dimensions: coverage breadth (cover), usage depth (dept), and the degree of digitalization (digit). The results reveal that DIF significantly promotes urban household consumption, which are consistently supported by a series of robustness texts. Heterogeneity analysis further indicates that the positive effect of DIF on consumption is more pronounced among high-income groups, in regions with underdeveloped communication infrastructure, and in cities exhibiting greater foreign direct investment. This verifies the variation in effect intensity across cities with different characteristics. Building upon these findings, this paper recommends promoting the development of DIF in a city-specific manner, maximizing the effectiveness of the allocation of policy resources, and perfecting the precision of financial service delivery. Such efforts are expected to further unleash urban consumption potential and contribute to the pursuit of quality-focused economic modernization.

Keywords: Digital Inclusive Finance, Urban Household Consumption, Opening-Up, Communication Infrastructure.

1. Introduction

Amid a sluggish global economic recovery and rising external uncertainties, China's economy is gradually transforming towards a new model that relies on domestic demand for impetus and pursues high-quality development. As a key pillar of domestic demand, consumption plays a central role in fostering economic expansion, promoting social stability, and improving residents' living standards. However, according to 2023 statistics, China's final consumption expenditure reached 70 trillion RMB, accounting for approximately 55.5% of GDP [1]. Compared with developed economies, the contribution of consumption to economic growth in China still falls short. Therefore, how to stimulate consumption potential and promote consumption upgrading has become a critical issue in the current stage of economic development.

As a product of the deep convergence between inclusive finance and digital technology, DIF enhances the accessibility of financial services by reducing transaction costs and alleviating information asymmetry. Consequently, it plays a vital role in stimulating household consumption potential and promoting overall consumption growth.

This paper aims to explore how DIF promotes household consumption by alleviating information asymmetry and liquidity constraints. Compared with existing literature, the unique value of this present paper lies in the following aspects: First, in terms of research design, this paper employs city-level panel data from 2011 to 2023 to conduct positive analysis on the direct effect of DIF on enhancing urban household consumption. Second, from the perspective of research focus, an

extensive analysis is undertaken regarding the impact of three sub-metrics - cover, dept, and digit - on urban residents' consumption in DIF. Third, according to methodology, this paper employs heterogeneity analysis to examine how the impact of DIF on urban household consumption intensity differs among cities with characteristics not lacking in specificity, such as income levels, communication infrastructure, and levels of foreign direct investment. This provides empirical evidence to support more targeted policies for stimulating urban consumption.

2. Literature Review

In recent years, DIF has played a decisive role in moving forward green development and modernization of the economy prioritizing quality improvement. On the one hand, research shows that it effectively enhances the green production efficiency of manufacturing enterprises by easing financing constraints and stimulating green consumption [2], and promoted the the cultivation of advanced productivity in collaboration with green finance [3]; On the other hand, DIF not only facilitates superior-level development by optimizing the consumption structure [4], but also serves as a critical lever for SMEs to access financing, thereby alleviating financial pressures and supporting sustainable business operations [5]. Furthermore, at the micro level, DIF has improved capital apportionment and risk proclivities among metropolitan and agrarian households, with a particularly stronger effect on agrarian families [6]. At the same time, by strengthening households' savings capacity and innovation capability, it contributes to reducing the disparity in incomes between urban and rural areas [7].

With the advent of digitalization, household consumption—an essential component of expanding domestic demand—is undergoing continuous transformation. On one side, the digital economy (DE) has enhanced both the diversity and quality of consumption, especially in third-tier cities [8]; On the other side, the DE has strengthened rural residents' consumption capacity by promoting industrial upgrading, exhibiting characteristics of increasing marginal returns [9]. An additional point is that the improvement of digital infrastructure has significantly boosted emerging forms of consumption, such as tourism-related spending [10].

Against this backdrop, the favorable influence of DIF on household consumption has increasingly attracted attention from both academia and industry. From one perspective, mobile payment systems, as a key manifestation of DIF, have a non-mediated effect on promoting both developmental and hedonic consumption, while also supporting basic consumption through inclusive financial mechanisms [11]; from another perspective, DIF can also reshape urban–rural consumption patterns by perfecting financial literacy and optimizing social network structures [12]. Moreover, through mechanisms such as improved financial asset allocation and increased life satisfaction, its consumption-promoting effect is found to be more pronounced in eastern and rural regions [13]. Finally, mobile payment systems have been shown to significantly enhance the well-being of vulnerable groups, thereby indirectly unlocking greater consumption potential [14].

Hence, the following hypotheses are formulated:

H1: DIF contributes to promoting urban household consumption.

H2: Cover, dept, and digit can positively contribute to enhancing urban household consumption.

H3: The impact of DIF on urban household consumption exhibits heterogeneity based on income levels, the availability of communication infrastructure, and the degree of openness to foreign investment.

3. Methodological Framework

3.1. Information Origin

Given data availability, this present paper utilizes panel data from 296 Chinese cities, including 292 prefecture-level cities (excluding Sansha City due to missing data) and 4 centrally administered municipalities, covering the period from 2011 to 2023. With its extended time span and broad city

coverage, this dataset offers a portrayal of the evolution of DIF and consumption trends, which is not narrow in perspective, thereby ensuring that the conclusions are both timely and representative. The original data of DIF comes from the China DIF Development Index System developed by scholars such as Guo Feng from Peking University in 2020. This index system includes the overall DIF Index as well as three sub-dimensions: cover, dept, and digit. It provides a precise quantitative assessment of the development of DIF in China and offers broad geographic coverage, making it well suited for integration with the sample data used in this paper. Other pertinent data are sourced from the CCSY, CUCSY, the GTA Database, the CEIC Database, and the Cninfo Statistical Database. Missing values within the sample are handled by direct deletion.

3.2. Model Design

Not independent of the preceding theoretical analysis, this present paper examines the impact of DIF on urban household consumption through a two-way fixed effects model. The specific model is constructed as equation (1), where i denotes the region; t denotes the time period; β_1 captures the effect of DIF on urban household consumption; $houcons_{it}$ is the dependent variable, namely the level of household consumption in city i during year t ; $citydif_{it}$ denotes the dominant independent variable, specifically the overall DIF Index for city i in year t ; X_{it} is a vector of control variables; φ_i captures region fixed effects; v_t captures time fixed effects; ε_{it} is the random error term.

$$houcons_{it} = \beta_0 + \beta_1 \times citydif_{it} + \beta_2 \times X_{it} + \varphi_i + v_t + \varepsilon_{it} \quad (1)$$

This paper includes the following city-level variables as control variables, which may influence urban household consumption:

- (1) Population Growth Rate, $peorate$, measured by the natural population growth rate of each city.
- (2) Secondary Industry Structure, $secind$, indicated by the relative contribution of secondary industry output to the total gross domestic product of the city.
- (3) Tertiary Industry Structure, $thrind$, quantified through the relative contribution of tertiary industry output to the overall gross domestic product of the city.
- (4) Level of Financial Development, $jinr$, proxied by the relative scale of the year-end balance of credit provided by financial institutions in relation to the city's overall gross domestic product.

3.3. Descriptive Statistical Analysis

Descriptive summary of variable characteristics are shown in Table 1

Table 1. Descriptive Statistics of the Main Variables

VarName	Obs	Mean	SD	Min	Max
houcons	3376	2.1033	0.7423	0.7743	5.4919
citydif	3768	201.0737	79.0465	17.0200	373.2215
peorate	2341	4.2853	5.0327	-16.5000	31.0900
thrind	3287	0.4409	0.1035	0.1015	0.8485
secind	3287	0.4354	0.1143	0.0885	0.8934
jinr	3711	1.1123	0.6940	0.1180	12.8216

4. Positive Analysis

4.1. Benchmark Regression

This paper uses the model to test the impact of DIF on urban household consumption. The results are set forth in Table 2. As presented, the coefficient of DIF is significantly greater-than-zero at the 1% level. After not excluding control variables, the magnitude of the coefficient only fluctuates slightly, while its significance and direction remain unchanged. These findings confirm the significant positive effect of DIF on urban household consumption, thereby supporting the proposed H1.

Table 2. Benchmark Regression

	(1) houcons	(2) houcons
citydif	0.0069*** (0.001)	0.0070*** (0.002)
peorate		0.0037* (0.002)
thrind		-1.4029** (0.577)
secind		-0.3944 (0.441)
jinr		0.0179 (0.015)
_cons	0.7353*** (0.240)	1.4498*** (0.488)
N	3369	1759
F	32.4125	4.4987
Year fixed effects	√	√
Region fixed effects	√	√
Adj.R ²	0.9379	0.9420

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, standard errors are clustered at the city level throughout the regression analysis, unless otherwise specified.

4.2. Robustness Test

The reliability of the results is examined by adopting alternative measurement methods for the core variables, incorporating additional control variables, excluding the impact of public health events, and applying winsorization to the sample.

To avoid potential bias arising from a single measurement method for the non-independent variable, this paper replaces the measure of urban residents' consumption with that of prefecture-level residents' consumption, thereby recalculating the consumption levels of residents in each prefecture-level city over the sample period. As reported in the first column of Table 3, after substituting the statistical definition of the core variable, DIF continues to exhibit a positive effect on urban residents' consumption. The level of statistical significance remains consistent with that of the benchmark regression results, indicating that the conclusion is not affected by the measurement method of the variable and is therefore robust.

To eliminate estimation biases that may be caused by incomplete setting of control variables, this paper incorporates additional controls for government intervention (govsu), the degree of economic openness (ecopen), and educational expenditure (edufe) in the check. Specifically, govsu is measured by the quantitative ratio of government fiscal expenditure to gross domestic product (GDP); ecopen is captured by the quantitative ratio of total imports and exports to GDP; and edufe is represented by the quantitative ratio of local government spending on education to GDP. Re-regression was conducted on the sample data, and the results are displayed in the second column of Table 3. This indicates that after including additional control variables, the significance level of citydif aligns with the findings of the benchmark regression, which means that the baseline conclusion was not disturbed by the issue of omitted variables, and its robustness was verified.

To eliminate the systematic interference of factors such as the alienation of residents' consumption behavior and the deviation from the normal economic operation during public health events on the estimation results, this paper re-estimates the model using data from 2011 to 2019. As shown in column 3 of Table 3, within this sample period, the direction of effect, magnitude of impact, and significance level of the core variable closely align with the full-sample regression outcomes. This points to the conclusion that the results in this paper are not driven by anomalous data from specific years.

To eliminate the potential influence of extremum and outlier values on the estimation outcomes, this paper applies winsorization at the 1st and the 99th percentiles of the sample data. The robustness

check results based on the processed sample, as reported in column 4 of Table 3, show that the coefficient of citydif does not differ significantly from that in the baseline regression, thereby providing strong confirmation of the model's accuracy and robustness.

Table 3. Robustness Tests: Reliability Verification via Multiple Approaches

	(1) Variable Measurement Adjustments	(2) Extended Controls	(3) Exogenous Event Exclusion	(4) Winsorization
citydif	0.0112*** (0.003)	0.0051*** (0.002)	0.0042*** (0.001)	0.0051*** (0.001)
govsu		-0.3096 (0.234)		
ecopen		-0.4883*** (0.157)		
edufe		3.3944** (1.408)		
_cons	0.8379 (1.069)	1.3648*** (0.482)	1.8065*** (0.421)	1.5896*** (0.454)
N	546	1759	1349	1719
F	9.3675	5.7293	2.1635	3.8529
Year fixed effects	√	√	√	√
Region fixed effects	√	√	√	√
Control variables	√	√	√	√
Adj.R ²	0.9720	0.9474	0.9562	0.9406

4.3. Further Analysis

Indicators from different dimensions provide distinct perspectives for measuring the development level of DIF, and each sub-dimension of DIF can exert an impact on urban residents' consumption. Based on the above, this paper separately employs the cover, dept, and digit of the DIF Development Index as core explanatory variables, and constructs a model to probe their effects on the consumption of urban residents. The analysis results, as presented in Table 4, show that the coefficients for cover, dept and digit are all statistically meaningful in influencing urban residents' consumption. This indicates that all three dimensions exert beneficial impacts on promoting urban residents' consumption, thereby verifying the H2.

Table 4. Further Analysis of Sub-Dimensions of DIF

	(1) Coverage Breadth	(2) Usage Depth	(3) the Degree of Digitalization
cover	0.0037** (0.002)		
dept		0.0028*** (0.001)	
digit			0.0014* (0.001)
_cons	2.0748*** (0.462)	1.8460*** (0.467)	2.0934*** (0.441)
N	1759	1759	1759
F	3.5848	4.0951	3.1283
Year fixed effects	√	√	√
Region fixed effects	√	√	√
Control variables	√	√	√
Adj.R ²	0.9399	0.9398	0.9405

5. Heterogeneity Analysis

5.1. Heterogeneity by Income Level

The sample is categorized into groups according to per capita disposable income, namely high-income (HI) and low-income (LI). As shown in columns 1 and 2 of Table 5, the results show that, among the HI group, DIF effectively meets their diversified financial service needs, thereby stimulating consumption vitality. For the LI group, although DIF has significantly improved accessibility, their consumption still remains largely concentrated on basic living expenses due to inherent income constraints and prevailing consumption habits.

5.2. Heterogeneity by Communication Infrastructure Level

The sample is grouped based on the average year-end number of mobile phone users, categorized as high communication infrastructure construction (HCIC) and low communication infrastructure construction (LCIC), as shown in columns 3 and 4 of Table 5. The results indicate that in regions with more advanced communication infrastructure—reflected in higher mobile communication penetration rates—the marginal utility of financial products tends to decline, and consumer behavior becomes more rational, thereby weakening the stimulative effect of DIF. As a result, the citydif coefficient is not statistically significant. In contrast, in regions with less developed communication infrastructure, DIF provides small-scale financial services tailored to local needs, alleviating the problem of insufficient coverage by traditional financial institutions. This effectively stimulates basic consumption and contributes to overall consumption growth.

5.3. Heterogeneity by Degree of Economic Openness

This paper incorporates an interaction term between actual foreign direct investment (FDI) and DIF into the empirical model. As presented in column 5 of Table 5, the results suggest that cities with greater foreign capital penetration show a more pronounced consumption-promoting effect of DIF. On the one hand, the entry of foreign capital provides more funds and technical support for financial institutions, which helps them optimize service processes and promote product innovation, as a result, elevating both the service radius and client-specific adaptation. On the other hand, foreign capital intensifies market competition, driving DIF to extend further into population segments traditionally underserved by conventional financial systems.

In summary, H3 is confirmed.

Table 5. Heterogeneity Analysis about Income Level, Communication Infrastructure Level, Degree of Economic Openness

	(1) HI	(2) LI	(3) HCIC	(4) LCIC	(5) houcons
citydif	0.0082*** (0.003)	0.0004 (0.001)	0.0052 (0.003)	0.0059*** (0.002)	0.0072*** (0.002)
fdi*citydif					0.0083*** (0.002)
_cons	-1.9667* (1.137)	0.8362** (0.344)	5.9108 (4.112)	1.6098*** (0.490)	1.7165*** (0.453)
N	696	1036	67	1611	1543
F	5.3619	1.7372	1.2088	3.6015	9.6416
Year fixed effects	√	√	√	√	√
Region fixed effects	√	√	√	√	√
Control variables	√	√	√	√	√
Adj.R ²	0.9363	0.9286	0.9839	0.9350	0.9453

6. Conclusion and Recommendations

This paper sorts out the logic of the function of DIF in China's development process and theoretically points out that it can stimulate residents' consumption potential through mechanisms such as alleviating information asymmetry and enhancing financial accessibility. Drawing on complete longitudinal records for all 296 municipal units (2011-2023), this present paper examines the impact of DIF on urban residents' consumption and reveals the key role of DIF in enhancing the consumption level. The findings reveal that DIF has a great overall positive effect on the consumption of urban residents. Multiple robustness checks—including alternative variable measurements, expanded control variables, exclusion of abnormal years, and winsorization—yield consistent results, thereby confirming the reliability of the study. Further analysis shows that DIF operates through three dimensions—breadth of coverage, depth of use, and degree of digitalization—working in concert to promote consumption. Heterogeneity analysis suggests that this positive effect is particularly strong in high-income groups, in cities with less-developed communication infrastructure, and in regions characterized by higher levels of foreign capital.

Building on the above findings, this paper offers the following policy implications:

First, optimize the structural design of DIF. Financial institutions can offer varied products tailored to the needs of different population groups, and to make progress in the accessibility and stickiness of financial services through measures such as facilitating convenient account opening, simplifying mobile operations, and advancing intelligent data-driven risk control. At the same time, digital finance platforms should further strengthen their degree of digitalization, enhancing their capacity for intelligent matching and targeted service delivery.

Second, provide precise support for residents' consumption capacity. Formulate personalized financial support policies in light of the urban population structure and consumption habits. For example, introduce targeted consumer credit products for low-income groups and expand the reach of financial services in high-frequency consumption areas such as education and healthcare, thereby effectively increasing the total amount of basic consumption. For middle and high-income groups, strategies can be adopted to guide them to make reasonable investments and consume durable goods, thus broadening and deepening the consumption structure.

Third, narrow the digital divide across regions and population groups. It is recommended to increase investment in areas with weaker communication infrastructure to expand digital signal coverage and accelerate network speeds. At the same time, efforts should be made to strengthen digital financial education, enhancing the financial literacy and risk awareness of middle-aged and elderly individuals as well as those with lower educational attainment, so as to prevent misuse and losses arising from information asymmetry.

Fourth, foster the collaboration development of foreign capital and DIF. Through institutional opening and supportive policies, attract international financial capital to participate in the development of domestic consumer finance and DIF platforms. Introduce advanced technological and managerial systems, along with best practices in regulatory compliance and governance, to further optimize the digital financial ecosystem and enhance its overall efficiency and inclusiveness.

References

- [1] National Bureau of Statistics of China. 2023 nian jumin shouru he xiaofei zhichu qingkuang [2023 residents' income and consumption expenditure] [EB/OL]. (2024-01-16) [2025-08-11]. https://www.stats.gov.cn/sj/zxfb/202401/t20240116_1946622.html.
- [2] Fu H, Zheng C, Yang P. Digital inclusive finance and green transformation of manufacturing enterprises: Empirical analysis based on the dual perspectives of demand and supply [J]. *Technological Forecasting and Social Change*, 2024, 200: 123152.
- [3] Xu T, Yang G, Chen T. The role of green finance and digital inclusive finance in promoting economic sustainable development: A perspective from new quality productivity [J]. *Journal of Environmental Management*, 2024, 370: 122892.

- [4] Li E, Zhang Y, Chen L. Mechanism research on digital inclusive finance promoting high-quality economic development: Evidence from China [J]. *Heliyon*, 2024, 10(3): e25671.
- [5] Bu Y, Liu Y, Zhang H, Wang L. Digital inclusive finance: A lever for SME financing? [J]. *International Review of Financial Analysis*, 2024, 93: 103115.
- [6] He J, Liu Y. Digital inclusion finance, social governance and household investment decisions [J]. *Finance Research Letters*, 2024, 62: 105250.
- [7] Wang S, Wu C, Fu B. The dual effects of digital inclusive finance on the urban-rural income gap: An empirical investigation in China's Yangtze River Delta region [J]. *Finance Research Letters*, 2024, 69: 106049.
- [8] Zhou Q. Does the digital economy promote the consumption structure upgrading of urban residents? Evidence from Chinese cities [J]. *Structural Change and Economic Dynamics*, 2024, 69: 543-551.
- [9] Wang Y, Li L. Digital economy, industrial structure upgrading, and residents' consumption: Empirical evidence from prefecture-level cities in China [J]. *International Review of Economics & Finance*, 2024, 92: 1045-1058.
- [10] Lyu J. China cross-border e-commerce comprehensive pilot zone and urban residents' tourism consumption: Empirical study based on CHFS data [J]. *Finance Research Letters*, 2024, 64: 105396.
- [11] Hu N, Hou G. Mobile payment, digital inclusive finance, and residents' consumption behavior research [J]. *PLOS ONE*, 2024, 19(7): e0288679.
- [12] Sun L, Lin Z, Lai B. Examining the impact of digital inclusive finance on urban and rural consumption patterns: Insights from China Household Finance Survey in 11 Coastal Regions [J]. *Journal of the Knowledge Economy*, 2024.
- [13] Jiang W, Hu Y, Cao H. Does digital financial inclusion increase the household consumption? Evidence from China [J]. *Journal of the Knowledge Economy*, 2024, 15(4): 17333-17364.
- [14] Zhao C, Li X, Yan J. The effect of digital finance on residents' happiness: The case of mobile payments in China [J]. *Electronic Commerce Research*, 2024, 24(1): 69-104.