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A Study on the Impact of Inclusive Finance on Reducing the Urban-Rural Income Gap in Sichuan Province

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Abstract **Original Research Article**

This paper empirically analyzes the correlation between inclusive finance development and the urban-rural income gap in Sichuan Province. Based on the provincial statistical data from 2011 to 2023, this study adopts multiple linear regression and the Generalized Least Squares (GLS) method, taking the aggregate index, coverage breadth, usage depth and digitalization level of digital inclusive finance as core explanatory variables. The results show that digital inclusive finance significantly narrows the urban-rural income gap, with the aggregate index and coverage breadth playing dominant roles, while digitalization level widens the gap slightly in the short term. Heteroskedasticity and multicollinearity tests verify the good robustness of the revised model. This paper proposes policy suggestions including promoting inclusive finance development in central and western regions, optimizing capital allocation and bridging the digital divide, so as to provide references for improving urban-rural income distribution and realizing common prosperity.

Keywords: Inclusive Finance, Rural Residents' Income Growth, Multiple Linear Regression.

1 Introduction

With the rapid economic and social development of China in recent years, the urban-rural income gap has become increasingly prominent. Narrowing this gap has become one of the key tasks for achieving common prosperity and rural revitalization. Against this backdrop, inclusive finance, as an important initiative to drive high-quality economic development, has been entrusted with the new mission of improving income distribution and facilitating integrated urban-rural development. As a major province in western China, Sichuan presents significant disparities in regional economic development and financial service levels, and inclusive finance has great potential in alleviating the urban-rural income gap. Statistics show that as of the third quarter of 2024, the balance of loans to micro and small enterprises in Sichuan increased by 18.6% year-on-year, the balance of inclusive agriculture-related loans rose by 8.7% compared with the beginning of the year, and the balance of loans in poverty-alleviated counties grew by 24.8% year-on-year, further improving the coverage and accessibility of inclusive finance. Nevertheless, the development of inclusive finance in central and western Sichuan still lags behind that in eastern regions. Issues such as the digital divide and capital misallocation constrain the role of inclusive finance in narrowing the urban-rural income gap. Studying the impact of inclusive finance on the urban-rural income gap in Sichuan Province can reveal the implementation effect of inclusive finance policies, provide a theoretical basis for policy

optimization and financial service system improvement, and offer scientific support for further advancing rural revitalization and common prosperity.

2 Literature review

In recent years, domestic scholars have conducted extensive research on the relationship between digital inclusive finance and the urban-rural income gap. Lin Yongzhen (2024) adopted a fixed-effect model based on the panel data of 13 prefecture-level cities in Jiangsu Province from 2014 to 2019, and found that digital inclusive finance significantly narrows the urban-rural income gap, mainly by expanding service coverage and improving digitalization levels[1]. Based on the data of 275 prefecture-level cities nationwide, Wang Xingguo and Yu Ting (2024) applied fixed-effect and threshold effect models and concluded that digital inclusive finance narrows the urban-rural income gap through industrial structure upgrading, presenting a nonlinear "N-shaped" characteristic[2]. Based on the data of 287 cities from 2013 to 2021, Xian Chengyi et al. (2024) adopted spatial autocorrelation test and trend surface analysis, and found that the impact of digital inclusive finance on the urban-rural income gap shows an inverted U-shaped spatial distribution, with a more prominent effect in low-urbanization areas and obvious spatial transmission effects[3]. Based on the spatial econometric model analysis of data from 31 provinces from 2011 to 2020, Guo Hang (2024) pointed out that digital inclusive finance has an inverted U-shaped relationship with the urban-rural income gap; it may widen the gap in the short term but help converge it in the long run, with significant spatial spillover effects[4]. Based on the data of 31 provinces from 2011 to 2022, Liu Xiangyu and Li Jigang (2024) adopted fixed-effect, mediating effect and threshold effect models, and found that digital inclusive finance narrows the urban-rural income gap through mediating effects such as resident consumption, entrepreneurial vitality and fiscal level, with obvious regional heterogeneity across different areas[5]. Based on the data of prefectures in Xinjiang from 2011 to 2020, Hou Zhenmei and Diao Xiaoyan (2024) applied quantile regression and generalized spatial models and verified that digital inclusive finance can narrow the urban-rural income gap, with coverage breadth and usage depth exerting significant effects while the spatial spillover effect is insignificant[6]. Based on the prefecture-level panel data from 2011 to 2021, Qin Fang and Liu Jia (2024) adopted a fixed-effect model and found that digital inclusive finance effectively narrows the urban-rural income gap, with a more prominent effect in western regions and greater benefits for rural residents[7]. Based on the two-way fixed-effect spatial Durbin model analysis of data from 31 provinces from 2013 to 2022, Niu Wei (2024) found that digital inclusive finance narrows the urban-rural income gap within the province but widens that in neighboring provinces, with coverage breadth playing the most critical role[8].

Existing studies generally confirm that digital inclusive finance can narrow the urban-rural income gap, while its effects vary in terms of regions, mechanisms and time horizons.

3 Variable Selection and Model Construction

This study empirically investigates the impact of inclusive finance development on the urban-rural income gap in Sichuan Province. The explained variable is defined as the urban-rural income gap, which measures the disparity in per capita disposable income between urban and rural residents. The core explanatory variables include the comprehensive index of digital inclusive finance, digitalization degree, coverage breadth, and usage depth, which comprehensively reflect the overall development level, technical infrastructure, service coverage, and resource utilization efficiency of digital inclusive finance, respectively.

The research data are sourced from the *2024 China Statistical Yearbook*, *2023 Sichuan Provincial Statistical Yearbook*, and the public database released by the Peking University Digital Inclusive Finance Research Center.

Table 1 Variable Definition and Description

Variable Type	Variable Name	Symbol	Unit
Explained Variable	Urban-rural Income Gap	Y	/
Explanatory Variabl	Comprehensive Index of Digital Inclusive Finance	X1	/
	Coverage Breadth	X2	/
	Usage Depth	X3	/
	Digitalization Degree	X4	/

The basic multiple linear regression model is constructed as follows:

$$Y=\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\varepsilon$$

4 Variable Descriptive Statistics

4.1 Descriptive Statistical Analysis

Descriptive statistics results reveal significant income differences between urban and rural residents in Sichuan Province. The average per capita disposable income of rural residents is 12,730.70 yuan, while that of urban residents reaches 31,324.84 yuan. The mean value of the urban-rural income gap is 2.51 with a standard deviation of 0.15, indicating that the provincial urban-rural income disparity remains relatively stable during the sample period. The mean value of the digital inclusive finance index is 249.05 with a relatively high standard deviation, which demonstrates prominent regional disparities in inclusive finance development across Sichuan.

The average values of coverage breadth and usage depth are 223.88 and 259.14, respectively, with concentrated numerical distribution, though coverage breadth presents a large range between the minimum and maximum values. The mean digitalization degree is 313.08 with a significantly negative skewness of -1.10, suggesting that most regions in Sichuan have achieved a relatively high level of digital financial development.

4.2 Time Series Trend Analysis

The time-series graph illustrates a continuous declining trend of the urban-rural income gap in Sichuan from 2011 to 2023, with the gap decreasing from 2.73 in 2011 to 2.26 in 2023, which verifies the steady convergence of urban-rural income inequality. All four dimensions of digital inclusive finance show consistent growth, reflecting the gradual improvement of Sichuan's inclusive financial system.

Specifically, the comprehensive digital inclusive finance index rises sharply from 40.16 in 2011 to 390.81 in 2023. Similarly, coverage breadth and usage depth increase substantially from 29.02 and 58.56 to 370.66 and 424.49, respectively. By contrast, the digitalization degree grows rapidly in the early stage, peaks at 396.51 in 2015, and then fluctuates slightly and stabilizes at approximately 390 in the later period.

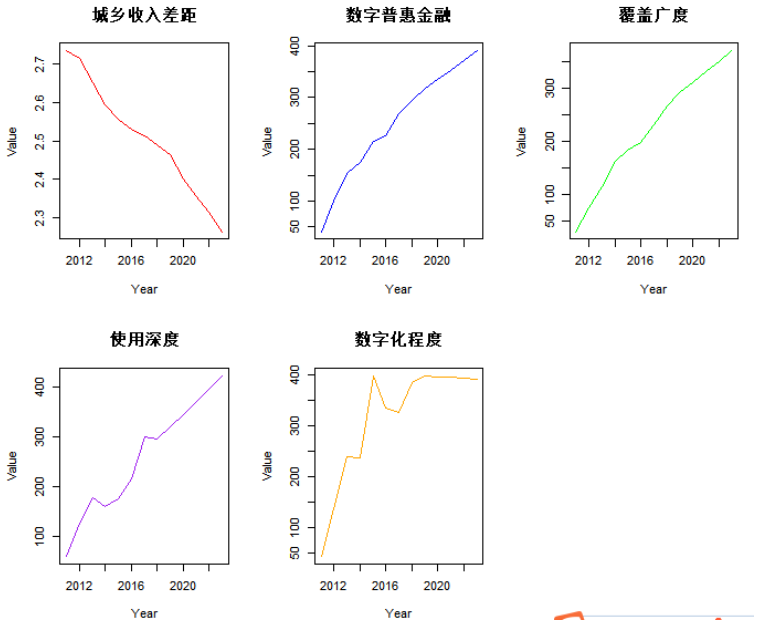

Figure 1 Time Series Trend Graph

4.3 Correlation Test

Correlation analysis results indicate that the urban-rural income gap (Y) is significantly and negatively correlated with all explanatory variables. The comprehensive index (X1, −0.975) and coverage breadth (X2, −0.983) present the strongest negative correlations, demonstrating that overall inclusive finance development and service coverage expansion are core drivers of income gap convergence. The correlation coefficients of usage depth (X3, −0.967) and digitalization degree (X4, −0.837) are relatively lower. In addition, severe positive correlations exist among explanatory variables, especially between X1 and X2 (0.997), implying the presence of serious multicollinearity that requires further diagnosis and model adjustment.

```
> print(correlation_matrix)
           y         x1         x2         x3         x4
y  1.0000000 -0.9754727 -0.9834108 -0.9671342 -0.8365909
x1 -0.9754727  1.0000000  0.9970759  0.9828901  0.9090712
x2 -0.9834108  0.9970759  1.0000000  0.9803625  0.8873970
x3 -0.9671342  0.9828901  0.9803625  1.0000000  0.8308748
x4 -0.8365909  0.9090712  0.8873970  0.8308748  1.0000000
>
```

Figure 2 Correlation Heatmap

5 Empirical Analysis

5.1 OLS Estimation and Basic Statistical Tests

The ordinary least squares (OLS) regression equation is established as follows:

$$y=2.7734-0.1264x_1+0.0669x_2+0.0377x_3+0.0207x_4$$

The F-statistic of the model is 207.1 with a corresponding p-value of 4.149×10, which is far lower than the 5% significance level. This result

confirms the overall statistical significance of the model, indicating that the selected explanatory variables jointly and significantly explain the changes in the urban-rural income gap.

T-test results show that all variables pass the significance test at the 1% level. The negative coefficient of X1 verifies that the overall development of digital inclusive finance helps narrow the urban-rural income gap. However, the positive coefficients of X2, X3, and X4 are inconsistent with theoretical expectations, which is primarily attributed to coefficient bias caused by severe multicollinearity.

The model achieves a high goodness-of-fit, with an R of 0.9904 and an adjusted R of 0.9857, indicating that 98.57% of the variations in the urban-rural income gap can be explained by the model. The residual standard error is 0.01755, which demonstrates excellent fitting performance and high prediction accuracy.

```
> lm.sol<-lm(y~x1+x2+x3+x4,data = data)
> summary(lm.sol)

Call:
lm(formula = y ~ x1 + x2 + x3 + x4, data = data)

Residuals:
       Min         1Q     Median         3Q        Max
-0.0209916 -0.0111500 -0.0009979  0.0104995  0.0210686

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  2.773351   0.019037 145.686 5.51e-15 ***
x1          -0.126407   0.033713  -3.749  0.00563 **
x2           0.066868   0.018292   3.656  0.00644 **
x3           0.037736   0.010029   3.763  0.00552 **
x4           0.020651   0.005444   3.793  0.00529 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.01755 on 8 degrees of freedom
Multiple R-squared:  0.9904,    Adjusted R-squared:  0.9857
F-statistic: 207.1 on 4 and 8 DF,  p-value: 4.149e-08
```

Figure 3 OLS Parameter Estimation Results

5.2 Multicollinearity Test and Model Revision

Variance Inflation Factor (VIF) is a standard indicator for measuring multicollinearity, which quantifies the degree of variance inflation caused by linear correlation among explanatory variables. The calculation formula is presented as:

$$VIF_j = \frac{1}{1-R_j^2}$$

,where $$R_j^2$$ refers to the coefficient of determination of the regression model for the j-th explanatory variable. A VIF value greater than 10 indicates severe multicollinearity, which leads to biased and unstable parameter estimation.

The initial VIF test results show extremely high values for all variables (X1=526496.90, X2=153601.92, X3=50962.95, X4=15474.67), far exceeding the critical threshold of 10, confirming severe multicollinearity in the original OLS model. Stepwise regression is therefore adopted to eliminate multicollinearity bias.

```
> vif_test <- car::vif(lm.sol)
> print(vif_test)
       x1        x2        x3        x4
526496.90 153601.92  50962.95  15474.67
>
```

Figure 4 VIF Test Results

After stepwise regression screening at the 10% significance level, only the comprehensive index of

digital inclusive finance (X1) and digitalization degree (X4) are retained in the optimal model. The revised regression equation is:

$$y=2.8067-0.001664x_1+0.000369x_4$$

The coefficient of X1 is −0.001664 and statistically significant at the 1% level (p=4.79×10), indicating that the overall development of digital inclusive finance significantly reduces the urban-rural income gap. The coefficient of X4 is 0.000369 and marginally significant at the 10% level (p=0.0656), suggesting that digitalization degree exerts a weak widening effect on the income gap in the short term.

The revised model still presents strong overall significance, with an F-statistic of 142.3 and a p-value of 4.507×10. The adjusted R reaches 0.9593, which means the model can explain 95.93% of the income gap variations, with a residual standard error of 0.02958. The VIF values of X1 and X4 both decrease to 5.76 (below 10), which implies that multicollinearity has been effectively eliminated.

Economically, each unit increase in the comprehensive digital inclusive finance index reduces the urban-rural income gap by an average of 0.001664 units, confirming the gap-narrowing effect of inclusive finance. Conversely, each unit increase in digitalization degree widens the income gap slightly, proving that financial digitalization generates a short-term amplification effect on urban-rural income disparity in Sichuan Province.

5.3 Heteroscedasticity Test and Correction

The Breusch-Pagan (BP) test is applied to detect heteroscedasticity. The BP statistic is 1.7217 with a p-value of 0.4228, which is higher than the 5% significance level. The null hypothesis of homoscedasticity cannot be rejected, indicating no significant heteroscedasticity in the model and uniform residual variance distribution.

The Box-Ljung autocorrelation test for squared residuals yields a statistic of 7.3266 and a p-value of 0.8353, further verifying the absence of residual autocorrelation and heteroscedasticity.

5.4 Autocorrelation Test and GLS Correction

Autocorrelation tests are used to examine whether regression residuals exhibit sequential correlation over time, which violates the classical OLS independent error assumption and leads to inefficient parameter estimation and biased standard errors.

The Durbin-Watson (DW) test result shows a DW value of 0.99783 and a p-value of 0.002196, which rejects the null hypothesis of no autocorrelation and confirms significant first-order positive serial correlation in residuals. To address this problem, the Generalized Least Squares (GLS) method with an AR(1) structure is adopted for model correction.

The GLS estimation results show that the AR(1) coefficient is significant, effectively eliminating serial correlation. The coefficient of X1 is −0.0012763 with a t-value of −3.7446 and a p-value of 0.0038, remaining statistically significant at the 1% level, which robustly verifies the income gap-narrowing effect of digital inclusive finance. In contrast, the coefficient of X4 becomes statistically insignificant (p=0.2735) after correction.

The standardized residual distribution presents uniform and low-variance characteristics. The AIC and BIC values are −13.67782 and −12.16489, respectively, indicating excellent data fitting performance. In summary, the GLS revised model eliminates serial correlation and yields more reliable and robust empirical results, especially the significant negative impact of digital inclusive finance on urban-rural income disparity.

6 Conclusions and Policy Recommendations

6.1 Research Conclusions

First, in terms of variable characteristics, the urban-rural income gap in Sichuan Province is generally stable with a mean value of 2.51 and a standard deviation of 0.15. The development level of digital inclusive finance presents prominent regional differences. Coverage breadth and usage depth show concentrated distribution, while digitalization degree is skewed toward a high level.

Second, in terms of time-series trends, the urban-rural income gap in Sichuan continuously narrowed from 2.73 in 2011 to 2.26 in 2023. All dimensions of digital inclusive finance achieved steady growth during the sample period, among which the comprehensive index witnessed the most substantial increase.

Third, correlation analysis confirms strong negative correlations between the urban-rural income gap and all inclusive finance indicators, while severe multicollinearity exists among explanatory variables.

Fourth, the initial OLS model has high fitting goodness and overall significance. The comprehensive index of digital inclusive finance significantly reduces the urban-rural income gap, whereas other indicators show biased coefficients due to multicollinearity.

Fifth, stepwise regression effectively eliminates multicollinearity. The retained comprehensive index and digitalization degree maintain high model explanatory power. Digital inclusive finance exerts a stable and significant gap-narrowing effect, while digitalization presents a short-term gap-amplifying characteristic.

Sixth, heteroscedasticity tests confirm the homoscedasticity of the model. Serial correlation exists in the original model and is effectively eliminated via GLS correction. The final revised model is robust and credible, further verifying the positive role of digital inclusive finance in narrowing urban-rural income disparity.

6.2 Policy Recommendations

First, accelerate the high-quality development of digital inclusive finance in rural areas. Local governments should prioritize financial resource inclination toward rural and underdeveloped regions, promote the popularization of mobile payment, online banking, and digital financial services, and improve the accessibility and convenience of rural financial services. Financial institutions should innovate low-cost and high-efficiency inclusive financial products targeting rural residents' demands for convenient payment, microcredit, and agricultural insurance, so as to boost rural residents' income growth and narrow urban-rural income gaps.

Second, optimize capital allocation and alleviate rural capital misallocation. Preferential fiscal and financial policies should be formulated to guide social capital to flow into rural industries and rural infrastructure construction, mitigating resource inequality caused by rapid urbanization. Governments should increase investment in rural infrastructure, agricultural modernization, rural education, and medical care to consolidate the foundation of rural economic development. Financial institutions should strengthen credit support for rural micro, small, and medium-sized enterprises and vulnerable groups, promoting rational capital allocation between urban and rural areas.

Third, bridge the urban-rural digital divide to unleash the inclusive effect of digital finance. Governments should increase investment in rural digital infrastructure such as network coverage and broadband construction, carry out targeted digital literacy training for rural residents, and reduce the digital access and usage gaps between urban and rural residents. Financial institutions should develop customized digital financial products adapted to rural scenarios, lower the threshold for rural residents to participate in digital financial systems, and fully release the income-increasing and gap-narrowing effects of digital inclusive finance to promote balanced urban-rural development and common prosperity.

References

[1] Lin Y Z. Can Digital Inclusive Finance Narrow the Urban-Rural Gap?——An Empirical Analysis Based on Data of Jiangsu Province[J]. *Hebei Enterprises*, 2024(12): 121-123.

[2] Wang X G, Yu T. Digital Inclusive Finance, Industrial Structure Upgrading and Urban-Rural Income Gap——An Empirical Test Based on Mediating and Threshold Effects[J]. *Dongyue Tribune*, 2024, 45(11): 129-138+192.

[3] Xian C Y, Wu Z Q, He X, et al. Does Digital Inclusive Finance Expand or Converge Urban-Rural

Income Gap[J]. *Financial Development Review*, 2024(09): 59-75.

[4] Guo H. Can the Development of Digital Inclusive Finance Narrow the Urban-Rural Income Gap[J]. *Journal of Jiangxi University of Finance and Economics*, 2024(05): 38-52.

[5] Liu X Y, Li J G. Mechanism of Digital Inclusive Finance Affecting Urban-Rural Income Gap——Analysis Based on Mediating and Threshold Effects[J]. *Hebei Finance*, 2024(09): 11-18+32.

[6] Hou Z M, Diao X Y. Research on the Income Growth and Gap-narrowing Effect of Digital Inclusive Finance——Empirical Evidence from Xinjiang[J]. *Xinjiang State Farms Economy*, 2024(08): 64-78.

[7] Qin F, Liu J. Research on the Impact of Digital Inclusive Finance on Urban-Rural Income Gap——Empirical Test Based on Prefecture-level Panel Data[J].*China Prices*, 2024(08): 94-99.

[8] Niu W. Spatial Econometric Research on the Impact of Digital Inclusive Finance on Urban-Rural Income Gap[J]. *Journal of Henan University of Economics and Law*, 2024, 38(04): 36-44.