International Business & Economics Studies
ISSN 2640-9852 (Print) ISSN 2640-9860 (Online)
Vol. 8, No. 2, 2026
www.scholink.org/ojs/index.php/ibes

Original Paper

Research on the Spatial Effects of New-Type Urbanization on the Urban–Rural Income Gap in the Yangtze River Delta Region

Ziqing Peng[1*]

[1] Anhui University of Finance and Economics, Hefei, Anhui, China

[*] Corresponding Author

Received: March 26, 2026 Accepted: April 22, 2026 Online Published: May 19, 2026

doi:10.22158/ibes.v8n2p207 URL: http://dx.doi.org/10.22158/ibes.v8n2p207

Abstract

Amid the deepening implementation of the Equitable wealth distribution strategy and the China's unique modernization trajectory, new-type urbanization serves as a critical lever to dismantle the urban-rural dual structure, prompting considerable scholarly attention to its spatial effects on resident income distribution. Taking 41 prefecture-level cities in the Yangtze River Delta from 2013 to 2023 as a research sample, this study constructs a multidimensional new-type urbanization evaluation system and applies spatial autocorrelation analysis alongside spatial autoregressive models to systematically investigate the underlying mechanisms through which new-type urbanization affects the urban-rural income gap.The findings indicate that the urban-rural income gap in the Yangtze River Delta exhibits a significant positive spatial autocorrelation, characterized by a stable "low in the southeast and high in the northwest" spatial pattern and pronounced path dependence.Empirical results reveal that new-type urbanization exerts a profound dual effect on the urban-rural income gap, functioning simultaneously as a mechanism for "local convergence" and a "neighboring siphon". Consequently, this paper advocates for deepening the household registration system reform and advancing the equalization of public services. Furthermore, it suggests establishing cross-regional collaborative mechanisms, akin to the Chang-Zhu-Tan metropolitan area model, to facilitate a strategic paradigm shift from a "core siphon" to "regional radiation".

Keywords

New-type urbanization, Urban-rural income gap, Yangtze River Delta, Spatial effects

1. Introduction

Urbanization is the inevitable path to Chinese modernization, serving as the core driving force for high-quality regional economic growth and profound social structural transformation. Since the reform

and opening-up, China has experienced the largest and fastest urbanization process in human history.According to data from the National Bureau of Statistics, as of the end of 2023, China's urbanization rate of permanent residents has surged from an extremely low level at the end of 1949 to 66.16%; this leapfrog growth not only far exceeds the global average but also represents a unprecedented growth in the history of global development. However, behind this miraculous speed, the imbalance in income distribution caused by the urban-rural dual structure remains severe (Molero-Simarro, 2017). For a long time, the urban-rural income gap has consistently been the primary source of overall inequality in China; although the absolute income of both urban and rural residents has increased alongside economic growth, the convergence of the relative gap is constrained by institutional barriers, presenting a complex scenario where a high urbanization rate coexists with a prominent urban-rural divide (Liu et al., 2020; Yao & Jiang, 2021).The traditional urbanization model exhibits a distinct characteristic of "emphasizing physical expansion over human development," whereby the pace of land expansion significantly outstrips the speed of the citizenization of the agricultural population (Cai et al., 2023; Jin et al., 2018).During this process, although a massive agricultural transfer population has migrated to urban centers towards urban areas, they remain in a protracted state of "semi-urbanization" due to the constraints of the hukou (household registration) system and its affiliated dual welfare regime encompassing education, healthcare, and housing. This mobility, lacking the support of equalized public services, not only restricts the accumulation of human capital among the labor force but also precludes them from genuinely sharing the institutional dividends of urbanization, thereby entrenching the fractured landscape of urban-rural interests (Pandey et al., 2025). In response to these structural contradictions, the national government formally established a "people-centered" new-type urbanization strategy in 2014, explicitly setting forth the tasks of citizenizing the agricultural transfer population and equalizing public services (Chen et al., 2018; Chen et al., 2020). With the release of the Five-Year Action Plan for Deepening the Implementation of the People-Centered New-Type Urbanization Strategy in 2024, new-type urbanization has officially entered a new phase of high-quality development, aiming to raise the urbanization rate to nearly 70% over the next five years.The Yangtze River Delta region, encompassing the Shanghai municipality and the provinces of Jiangsu, Zhejiang, and Anhui, stands as one of China's most economically vibrant and innovative regions, holding a strategically pivotal position in the grand scheme of national modernization. As the Leading region of China's urbanization, the YRD region has not only taken the lead in achieving high-level population agglomeration but also confronts the quintessential dilemma of unbalanced and inadequate intra-regional development (Zhao et al., 2019; Li et al., 2021). Therefore, an in-depth investigation into the spatial effects of new-type urbanization on the urban-rural income gap in the YRD region possesses not only profound academic value but also serves as a practical imperative for realizing social equity and justice and promoting the high-quality development of regional integration.

2. Empirical Analysis

2.1 Variable

Dependent variable: Urban-rural income gap.To provide a more scientifically rigorous measurement of the disparity in living standards between urban and rural residents, this study adopts the Theil index.

Core explanatory variable: Level of new-type urbanization.Moving beyond conventional single-dimensional demographic metrics, this study constructs a comprehensive evaluation index system encompassing demographic, economic, spatial, social, and eco-environmental dimensions.

Taking various influencing factors into comprehensive consideration, this study selects five control variables:consumption level (the ratio of total retail sales of consumer goods to regional GDP); human capital (the proportion of enrolled undergraduate and junior college students to the total regional population); technological expenditure level (the ratio of local government expenditures on science and technology to total fiscal expenditures); degree of government intervention (the proportion of local government budgetary fiscal expenditures to regional GDP); and foreign investment level (the ratio of actually utilized foreign direct investment to regional GDP).

Table 1. Evaluation Index System for New-type Urbanization

Primary indicators	Secondary indicators	Tertiary indicators	Unit	Attribute
Demographic urbanization	Urbanization rate	Urbanization rate of permanent residents	%	+
	Population density	Urban population density	persons/km²	+
	Employment scale	Number of employed persons	10,000 persons	+
	Educational resources	Number of students enrolled in regular secondary schools	10,000 persons	+
	Population consumption	Per capita consumption expenditure of urban residents	Yuan	+
Economic urbanization	Economic level	Per capita GDP	Yuan	+
	Fiscal level	General public budget revenue	100 million Yuan	+
	Resident income level	Per capita disposable income of urban residents	Yuan	+

	Foreign economic level	Total volume of imports and exports	100 million Yuan	+
	Technological level	Total number of patents granted	items	+
Spatial urbanization	Infrastructure	Per capita road area	m²	+
	Land area	Built-up area	km²	+
Social urbanization	Social security	Number of participants in urban employees' basic pension insurance	10,000 persons	+
	Telecommunications	Telecommunication business revenue	100 million Yuan	+
	Education	Fiscal expenditure on education	100 million Yuan	+
Eco-environmental urbanization	Ecological construction	Green coverage rate in built-up areas	%	+
	Industrial ecology	Industrial sulfur dioxide emissions	tons	-
	Living ecology	Harmless treatment rate of domestic waste	%	+

Data source: Calculated by the author based on the Economic Statistical Yearbooks of Provinces and Cities, China Energy Statistical Yearbook, Peking University Digital Financial Inclusion Index Report, and relevant databases of the National Bureau of Statistics.

2.2 Global Moran's I

Before conducting spatial econometric regression analysis, it is essential to verify whether spatial dependence exists among the core variables.If the variables are randomly distributed across space, the application of spatial econometric models becomes unnecessary. This study employs the Global Moran's I to conduct a spatial autocorrelation test on the urban-rural income gap across 41 cities in the Yangtze River Delta from 2013 to 2023.The test results are presented in Table 2. It is evident that throughout the sample observation period, the Global Moran’s I for each year is greater than 0; furthermore, the Z-statistics for all years exceed 1.96 and the P-values are all less than 0.01, successfully passing the significance test at the 1% level.This indicates that the urban-rural income gap in the Yangtze River Delta is not randomly distributed geographically, but rather exhibits prominent characteristics of positive spatial autocorrelation. Specifically, the urban-rural income gap demonstrates a spatial clustering effect: cities with a higher income gap tend to be adjacent to other cities with

similarly high gaps, whereas cities with a lower gap tend to neighbor those with low gaps.Such pronounced spatial dependence implies that ordinary panel regressions may yield biased estimation results due to the omission of spatial factors; therefore, constructing a spatial econometric model for the subsequent empirical analysis in this study is both necessary and justified.

Table 2. Global Moran's I of the Urban-rural Income Gap from 2013 to 2023

Year	Moran's I	Z-statistic	P-value
2013	0.180	7.815	0.000***
2014	0.112	5.247	0.000***
2015	0.166	7.292	0.000***
2016	0.167	7.317	0.000***
2017	0.165	7.253	0.000***
2018	0.164	7.225	0.000***
2019	0.162	7.135	0.000***
2020	0.167	7.318	0.000***
2021	0.153	6.773	0.000***
2022	0.166	7.301	0.000***
2023	0.159	7.014	0.000***

Note. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

2.3 Model Specification

Given the frequent mobility of production factors within the Yangtze River Delta urban agglomeration, the urban-rural income gap across cities may exhibit spatial dependence. Traditional ordinary panel models neglect this spatial correlation, which may lead to biased estimates. Therefore, this study constructs a Spatial Autoregressive (SAR) model. The model is specified as follows:

$$lnGAP_{it}=\rho\sum_{j=1}^{N} w_{ij}lnGAP_{it}+\beta_1 lnUrban_{it}+\sum_{k=1}^{M}\lambda_k Controls_{it}+\mu_i+v_t+\epsilon_{it} \quad (1)$$

In Equation (1), $lnGAP_{it}$ denotes the logarithmic value of the urban-rural income gap for city in year t;$lnUrban_{it}$ represents the logarithmic value of the new-type urbanization level for city in year t; is the spatial autoregressive coefficient; and $\sum_{j=1}^{N} w_{ij}lnGAP_{it}$ indicates the spatial lag variable.Furthermore, considering that the geographical distance between cities within the Yangtze River Delta urban agglomeration directly dictates the intensity of factor mobility and the frequency of economic linkages, this study constructs an inverse distance spatial weight matrix.This matrix is derived by calculating the great-circle distance based on the geographical latitude and longitude coordinates of each city. The elements of the matrix are defined as follows:

$$w_{ij}=\begin{cases} 1/d_{ij}, & i\neq j \\ \& \quad 0, & i=j \quad \&\& \end{cases} \tag{2}$$

In Equation (2), denotes the great-circle distance based on latitude and longitude coordinates.

2.4 Model Identification and Testing

To establish the optimal form of the spatial econometric model and ensure the robustness and accuracy of the empirical results, this study conducted rigorous statistical tests on the specification of fixed effects and the specific settings of the spatial model.Table 3 reports the detailed results of these tests. First, regarding the selection of the model effect type. As shown by the Hausman test results in Table 3, the Chi-square statistic is 10.958, with a P-value of 0.090.Since this P-value is significant at the 10% statistical level, the null hypothesis of random effects is rejected. From the perspective of economic theory, the research subjects comprise 41 cities in the Yangtze River Delta urban agglomeration; the sample constitutes a specific research population rather than a subset randomly drawn from a large population, inevitably implying the existence of time-invariant individual heterogeneity across cities. Combining statistical testing with theoretical analysis, this study concludes that employing a fixed effects model is more appropriate.Furthermore, the results of the Likelihood Ratio (LR) test indicate that the LR statistics for time and individual effects are 46.076 and 971.773, respectively; the corresponding P-values reject the null hypothesis at the highly significant 1% level, demonstrating the simultaneous presence of significant time-specific and individual-specific effects within the sample data.Consequently, this study ultimately adopts a two-way fixed effects approach for model estimation.Building upon the determination of two-way fixed effects, this study further discriminates the specific functional form of the spatial model.Initially, addressing whether the Spatial Durbin Model (SDM) can be simplified, the Wald test yields a statistic of 8.060 with a P-value of 0.234.Because the P-value is significantly greater than 0.1, the null hypothesis cannot be rejected.This implies that the impact of the spatial lags of the explanatory variables on the dependent variable is not statistically significant; the SDM suffers from over-parameterization and can be suitably simplified into a Spatial Autoregressive (SAR) model.Subsequently, to make an optimal choice between the SAR model and the Spatial Error Model (SEM), this study performs AIC and BIC tests.As the test results in Table 4-9 demonstrate, both the AIC and BIC values of the SAR model are numerically smaller than those of the SEM.Therefore, the goodness-of-fit of the SAR model is superior to that of the SEM.In summary, following rigorous layer-by-layer testing and screening, this study ultimately selects the two-way fixed effects Spatial Autoregressive (SAR) model to capture spatial spillover effects and proceed with the subsequent empirical analysis.

Table 3. Model Identification and Testing Results

Test	Statistic	P-value	Conclusion
Hausman Test	10.958	0.090*	Reject random effects, select fixed effects
LR Test	46.076	0.000***	Presence of significant time effects
LR Test	971.773	0.000***	Presence of significant individual effects
Wald Test	8.060	0.234	SDM can be simplified to SAR
AIC	SAR:-861.95	SEM:-858.80	Smaller SAR value, outperforming SEM
BIC	SAR:-829.05	SEM:-825.91	Smaller SAR value, outperforming SEM

Note. Robust standard errors are in parentheses; *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

2.5 Spatial Spillover Effects

Table 4 presents the regression and effect decomposition results of the Spatial Autoregressive (SAR) model regarding the impact of new-type urbanization on the urban-rural income gap under two-way fixed effects.The within R-squared (goodness-of-fit) of the model is 0.639, indicating that the model fits the sample data well and possesses strong explanatory power. The effect decomposition of new-type urbanization reveals its complex impact mechanism on the urban-rural income gap. The direct effect demonstrates significant convergence; the direct effect coefficient of new-type urbanization is -0.471, which is statistically significant at the 1% level. This implies that every 1% increase in the local level of new-type urbanization can directly drive a reduction of 0.471 percentage points in the local urban-rural income gap. This conclusion robustly supports the research hypotheses of this study. New-type urbanization is no longer confined to mere urban spatial expansion; rather, it places greater emphasis on human-centered urbanization. With the deepening of the household registration system reform and the equalization of basic public services, the agricultural transfer population is able to settle and thrive in cities, thereby increasing their wage income.Simultaneously, the industrial upgrading brought about by urbanization radiates to and drives agricultural modernization

in rural areas, elevating the operating income of rural residents and consequently narrowing the local urban-rural gap directly. The indirect effect exhibits a significant “siphon effect”; the indirect effect coefficient of new-type urbanization is 0.215 and is significantly positive at the 1% level.This signifies that every 1% increase in the new-type urbanization level of neighboring cities conversely leads to an expansion of the local urban-rural income gap by 0.215 percentage points.This result indicates that during the integration process of the Yangtze River Delta, core cities such as Shanghai, Hangzhou, and Nanjing, relying on superior public services and more efficient factor allocation capabilities, have generated a powerful “siphon effect”; the high-quality urbanization of neighboring central cities attracts the cross-regional flow of young, robust labor and highly skilled talents from local rural areas.Consequently, those left behind in local rural areas are predominantly the elderly and children, resulting in sluggish improvements in agricultural productivity and exacerbated rural hollowing-out (rural decline), which passively widens the local urban-rural gap.Concurrently, the profit-seeking nature of capital drives financial resources and industrial capital to flow preferentially toward neighboring cities with higher urbanization quality.Lacking sufficient local financial support, rural infrastructure construction and the agricultural modernization process are hindered, further weakening the endogenous momentum for rural residents to increase their income.This demonstrates that the spatial spillover effects within the Yangtze River Delta urban agglomeration are currently still in a stage where agglomeration (polarization) outweighs diffusion (trickle-down).Despite the existence of adverse spatial spillovers, the total effect coefficient of new-type urbanization is -0.256.This illustrates that, from an overall regional perspective, the beneficial direct effects offset the adverse indirect effects; the advancement of new-type urbanization generally remains conducive to the convergence of the urban-rural income gap in the Yangtze River Delta region.

Table 4. Spatial Spillover Effects

Variable	(1) Main regression lnGAP	(2)Direct effect lnGAP	(3)Indirect effect lnGAP	(4)Total effect lnGAP
lnUrban	-0.465***	-0.471***	0.215***	-0.256***
	(-5.24)	(-5.06)	(3.64)	(-4.17)
Cons	0.297***	0.299***	-0.135**	0.163**
	(2.64)	(2.71)	(-2.46)	(2.44)
HC	-9.699***	-9.761***	4.443***	-5.317***

	(-7.70)	(-7.95)	(4.51)	(-5.09)
Ins	-0.015	-0.016	0.007	-0.009
	(-0.73)	(-0.75)	(0.72)	(-0.75)
Gov	-0.209	-0.212	0.097	-0.115
	(-0.92)	(-0.94)	(0.92)	(-0.91)
FDI	0.008	0.034	-0.018	0.016
	(0.02)	(0.07)	(-0.08)	(0.06)
N	451	451	451	451
R^2	0.639	—	—	—
Two-way fixed effects	YES	YES	YES	YES

Note. Robust standard errors are in parentheses; *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

3. Conclusions and Policy Recommendations

3.1 Conclusions

The impact of new-type urbanization on the urban-rural income gap exhibits complex spatial spillover effects, characterized by local convergence and a neighboring siphon effect. Spatial correlation test results confirm that the urban-rural income gap in the Yangtze River Delta region demonstrates a significant positive spatial autocorrelation, forming a stable spatial pattern of “low in the southeast and high in the northwest”. Estimation results from the two-way fixed effects Spatial Autoregressive (SAR) model indicate that the direct effect of new-type urbanization on the urban-rural income gap is significantly negative, suggesting that an improvement in the local level of new-type urbanization can directly drive the convergence of the local urban-rural income gap; conversely, the indirect effect is significantly positive, revealing that the development of new-type urbanization in neighboring cities siphons high-quality labor, capital, and other core production factors from the local area, leading to a marginal widening of the local urban-rural income gap.In terms of the total effect, the overall impact of new-type urbanization remains significantly negative, indicating that the beneficial local convergence effect effectively offsets the adverse neighboring siphon effect. From the perspective of the entire Yangtze River Delta region, new-type urbanization generally continues to play a positive role in

promoting the convergence of the urban-rural income gap.

3.2 Policy Recommendations

Based on the preceding empirical findings, particularly the dual spatial effects of "local convergence" and "neighboring siphon" exerted by new-type urbanization on the urban-rural income gap, this study proposes the following targeted policy recommendations: First, establish cross-regional collaborative governance mechanisms to promote the transition of core cities from a "siphon" to a "radiation" role. In response to the significant adverse spatial spillover effects, the Yangtze River Delta region must mitigate institutional constraints and implement the policy orientation of "cities supporting rural areas". While maintaining high-quality development, core pole cities such as Shanghai, Hangzhou, and Nanjing should guide the orderly transfer of capital, technology, and advanced manufacturing to peripheral cities in northern Anhui and northern Jiangsu through co-constructing cross-city industrial parks and implementing inter-regional fiscal transfer payments and ecological compensation mechanisms, thereby constructing a new pattern of mutually reinforcing and complementary regional coordinated development.Second, deepen the household registration system reform and equalize public services to consolidate "people-centered" new-type urbanization.The traditional urban-rural dual system is a deep-seated institutional barrier that exacerbates inequality. The Yangtze River Delta region should comprehensively relax settlement restrictions in certain large and medium-sized cities, accelerate the equalization of basic public services, and ensure that the agricultural transfer population enjoys equal rights in education, healthcare, and affordable housing. By elevating the human capital accumulation level of the transfer population, their wage income can be fundamentally increased, thereby reinforcing the direct convergence effect of new-type urbanization on narrowing the local urban-rural gap. Third, leverage the digital economy and rural infrastructure construction to empower agricultural and rural modernization.Confronted with the siphoning of robust young labor and capital by core cities, rural areas should vigorously develop the digital economy to expand application scenarios. The government should accelerate the improvement of rural digital infrastructure and utilize digital technologies to reduce production and transaction costs, breaking geographical isolation and information asymmetry. The in-depth development of the digital economy can provide the left-behind population with more non-agricultural employment opportunities and educational resources, offering a long-term alleviation of the rural hollowing-out problem caused by factor outflows.

References

Cai, E., Zhao, X., Zhang, S. et al. (2023), Spatial agglomeration and coupling coordination of population, economics, and construction land in Chinese prefecture-level cities from 2010 to 2020. *Land*, *12*(8), 1561.

Chen, K., Long, H., Liao, L. et al. (2020). Land use transitions and urban-rural integrated development: Theoretical framework and China's evidence. *Land use policy*, *92*, 104465.

Chen, M., Liu, W., Lu, D. et al. (2018). Progress of China's new-type urbanization construction since

2014: A preliminary assessment. *Cities*, *78*, 180-193.

Jin, W., Zhou, C., & Luo, L. (2018). Impact of land input on economic growth at different stages of development in Chinese cities and regions. *Sustainability*, *10*(8), 2847.

Li, H., Chen, K., Yan, L. et al. (2021). Urban land use transitions and the economic spatial spillovers of central cities in China's urban agglomerations. *Land*, *10*(6), 644.

Liu, Y., Zang, Y., & Yang, Y. (2020). China's rural revitalization and development: Theory, technology and management. *Journal of Geographical Sciences*, *30*(12), 1923-1942.

Molero-Simarro, R. (2017). Inequality in China revisited. The effect of functional distribution of income on urban top incomes, the urban-rural gap and the Gini index, 1978-2015. *China Economic Review*, *42*, 101-117.

Pandey, B., Brelsford, C., & Seto, K. C. (2025).Rising infrastructure inequalities accompany urbanization and economic development. *Nature communications*, *16*(1), 1193.

Yao, Y., & Jiang, L. (2021). Urbanization forces driving rural urban income disparity: Evidence from metropolitan areas in China. *Journal of Cleaner Production*, *312*, 127748.

Zhao, C., Wu, Y., Ye, X. et al. (2019). The direct and indirect drag effects of land and energy on urban economic growth in the Yangtze River Delta, China. *Environment, Development and Sustainability*, *21*(6), 2945-2962.