Study on the Impact of Urban Economic Resilience Improvement on Urban and Rural Income Gap

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Abstract: Narrowing the income gap between urban and rural residents is key to achieving comprehensive rural revitalization. Based on panel data from 285 prefecture-level cities in China between 2003 and 2022, this study constructs an urban economic resilience evaluation system comprising three dimensions: resistance and resilience, adaptability and regulatory capacity, innovation and transformation capacity. The economic resilience index is measured using the entropy method, and a unidirectional fixed-effects model is employed to empirically investigate the relationship between urban economic resilience and the urban-rural income gap. The research findings reveal that urban economic resilience and the urban-rural income gap exhibit a significant "U"-shaped relationship.

***Keywords*:** urban economic resilience; urban-rural income gap; U-shaped relationship; entropy method

1. Introduction

The report of the 20th National Congress of the Communist Party of China clearly states that we must accelerate the establishment of a new development paradigm, with high-quality economic growth as the central focus. It emphasizes that "to comprehensively build a modern socialist country, we must adhere to promoting high-quality development as the theme." This provides guidance for urban economic development, shifting the economic model toward stable and high-quality growth. Guided by the spirit of the 20th National Congress, governments at all levels uphold a bottom-line mindset, actively promote the upgrading of urban public facilities, continuously enhance urban comprehensive carrying capacity, and accelerate the creation of safe, livable resilient cities. The report also stresses advancing common prosperity for all people, with narrowing the urban-rural income gap being key to achieving this goal. The urban-rural income disparity, a long-standing structural issue in China's socio-economic development, stems from both the urban-rural dual system and multiple factors including economic models and resource allocation efficiency. The 2023 Central Economic Work Conference pointed out that we should "promote two-way flow of various factors, advance new-type urbanization with counties as key drivers, and form a new pattern of integrated urban-rural development." The 2024 Decision of the CPC Central Committee on Further Comprehensively Deepening Reforms and Advancing Chinese-Style Modernization further emphasizes "improving institutional mechanisms for integrated urban-rural development," including coordinating new-type industrialization, new-type urbanization, and rural revitalization. This aims to comprehensively enhance the integration of urban-rural planning, construction, and governance, facilitate equal exchange and bidirectional flow of urban-rural factors, narrow urban-rural disparities, and promote common prosperity between urban and rural areas.

In recent years, with the advancement of new-type urbanization and the implementation of rural revitalization strategies, the urban-rural income ratio has decreased from 3.23 in 2010 to 2.45 in 2022. However, significant regional disparities persist, with some cities still grappling with imbalanced urban-rural development. Meanwhile, global economic fluctuations have heightened uncertainties in urban economic growth. "Economic resilience" —a core capability that measures cities' ability to withstand shocks, restore growth, and achieve transformation—has become a crucial factor influencing urban-rural income distribution. The pressing challenges now lie in balancing high-quality urban development with rural revitalization efforts, while also addressing the tension between urban economic resilience and income inequality among residents.

Existing research has extensively explored the drivers behind the widening and narrowing of urban-rural income disparities. Some scholars indicate that material capital accumulation[1], educational resource gaps [2], and information infrastructure development [3] are primary contributors to this disparity. Other studies demonstrate that targeted poverty alleviation policies [4] and rural e-commerce initiatives [5] can effectively reduce income gaps between urban and rural residents. Empirical research further reveals a significant "U-shaped" relationship between digital economy and urban-rural income inequality [6]. While numerous studies have examined factors influencing income disparities, most focus on single aspects, with limited attention paid to the relationship between urban comprehensive capabilities and income gaps. Urban economic resilience, as a comprehensive indicator reflecting a city's overall capacity, addresses this gap by examining

multiple elements across a broad spectrum. This approach effectively compensates for previous studies' limitations in comprehensiveness and systematic analysis. The marginal contributions of this paper are twofold: First, it overcomes the limitations of literature focusing on single-factor perspectives by adopting a multi-factor approach to urban economic resilience, enabling a more holistic understanding of income disparity dynamics. Second, using prefecture-level city data allows for micro-level analysis of how urban economic resilience impacts urban-rural income gaps.

2. Theoretical analysis and research hypotheses

According to income distribution theory, the urban-rural income gap fundamentally reflects disparities in returns from market-based allocation of production factors among different resident groups. Urban industrial upgrading alters economic resource demands and allocation patterns, thereby influencing income distribution across factor ownership. The widening urban-rural income divide stems from this process. During initial urban industrial development, rural low-skilled labor migration directly contributed to urban wealth creation, narrowing income gaps. However, as industrial upgrading shifts economic priorities from quantity to quality, rural factors become marginalized in resource competition, leading to widening returns and renewed income disparity. Urban economic resilience enhances urban-rural income inequality through two key mechanisms: First, industrial upgrading drives high-quality urban development, serving as a critical tool for narrowing income gaps and strengthening urban economic resilience [7]. This process extends industrial chains to boost rural industries, creating employment opportunities that increase rural incomes and reduce urban-rural wealth gaps. Second, rational resource allocation critically shapes urban economic resilience, with factor mobility between urban and rural areas directly determining income distribution patterns. The free and efficient circulation of resource elements between urban and rural areas is the core driving force to break the urban-rural dual structure and narrow the income gap. However, with the improvement of urban economic resilience, there are often unreasonable upgrading of industrial structure and resource barriers, leading to a widening of the urban-rural income gap.

Based on the above analysis, this paper puts forward the following research hypotheses:

The impact of urban economic resilience on the urban-rural income gap may have a "U-shaped" relationship of first suppression and then expansion.

3. Research design

3.1 Data sources

This paper uses panel data from 285 prefecture-level cities in China between 2003 and 2022 to empirically analyze the relationship between urban economic resilience and the income gap between urban and rural residents, with data sourced from the China Urban Statistical Yearbook.

3.2 Model construction

Drawing on the model design of Li Zhen et al., this paper introduces the first and second terms of the total index of urban economic resilience into the empirical model, and the model specification of this paper is as follows:

$$Gap_{i,t} = \alpha_0 + \alpha_1 UER_{i,t} + \alpha_2 UER_{i,t}^2 + \beta controls + \gamma_i + \sigma_{i,t}$$

In the model, i represents cities and t denotes time. Gap stands for the urban-rural income gap, UER for the urban economic resilience index, σ for the random error term, and controls for a series of variables. Additionally, the model incorporates γi to control for the fixed effects of cities on the urban-rural income gap.

3.3 Variable definition and descriptive statistics

The descriptive statistics of each variable are shown in Table 1. In addition, the mean value of variance inflation factor (VIF) of main variables in this paper is 2.59, and the maximum value is 3.38, both of which are less than 5, indicating that there is no serious multicollinearity between variables.

Table 1. Variable definitions and descriptive statistics

Type of variable	Name	Definition	Observed value	Mean	Variance	Least value	Crest value
Explained variable	Urban-rural income gap	The ratio of urban per capita disposable income to rural residents' disposable income	5300	2.5316	0.6341	0.3112	6.8852
Explanatory variable	Urban economic resilience	Economic Resilience Index	5300	0.0550	0.0412	0.0122	0.6220
	quadratic term	The square of the economic resilience index	5300	0.0047	0.0146	0.0001	0.3869
Controlled variable	government intervention	The ratio of local fiscal general budgetary expenditure to regional GDP	5300	0.1670	0.0849	0.0313	1.4852
	Year-end loan-to-deposit ratio of financial institutions	The ratio of the balance of deposits in financial institutions at the end of the year to the balance of loans in financial institutions at the end of the year	5300	1.5885	0.5303	0.1413	16.7327
	Intensity of education investment	Education expenditure as a percentage of gross regional product	5300	0.0292	0.0142	0.0012	0.1080
	Level of economic development	Logarithmization of GDP per capita	5300	10.3589	0.8332	4.5951	13.0557
	The level of Internet development	Logarithm of Internet access users	5300	12.9270	1.3166	5.4681	17.7617

3.3.1 Dependent variable: urban-rural income gap (Gap)

Referring to the research of Yao and Jiang, the urban-rural income gap is measured by the urban-rural income ratio. This index has the characteristics of good comparability, intuitive accuracy and so on, and has become one of the most widely used indicators.

3.3.2 Explanatory variable: Urban economic resilience (UER)

As for the definition and connotation of economic resilience, we refer to the view of Guo Hongfeng et al.: Economic resilience usually refers to the ability of a country (region) economy to effectively respond to shocks, resist risks, recover to the original level, and even continue to renew and find new development paths [8].

The index selection is based on the research of Ding Jianjun et al. [9], and 14 three-level indicators are selected from the three dimensions of resistance and resilience, adaptation and regulation force, innovation and transformation force to construct the economic resilience evaluation index system. See Table 2 for details.

Table 2. Comprehensive evaluation index system of economic resilience

Primary indicators	Secondary indicators	Third-level indicators	Indicator properties
Economic Resilience Index	Resilience and recovery capacity	Per capita GDP	+
		GDP rate of rise	+
		Urban unemployment rate	-
	Adaptation and regulation	Proportion of output value of tertiary industry	+
		Number of hospital beds per capita	+
		Market activity	+
		Financial self-sufficiency rate	+
		Per capita consumer spending	+
		Per capita fixed asset investment	+
		Per capita financial expenditure	+
		Per capita education expenditure	+
	Innovation and transformation power	Number of patents granted per capita	+
		Per capita expenditure on science and technology	+
		Urbanization rate	+

3.3.3 Control variables

Drawing on relevant studies, the following control variables were included: government intervention (Gov); year-end loan-to-deposit ratio of financial institutions (Fin); education input intensity (Edu); economic development level (Eco); and Internet development level (Internet).

4. Empirical analysis

4.1 Regression results

Using panel data, we employ a unidirectional fixed-effects model to examine the "U-shaped" relationship between urban economic resilience and the income gap between urban and rural residents. Models (1)-(3) sequentially incorporate urban economic resilience, its squared term, and control variables, with regression results presented in Table 3. Model (3) demonstrates that, after controlling for other variables, the coefficients for urban economic resilience and its squared term are-5.8397 and 8.1170 respectively, both statistically significant at the 1% confidence level. This confirms the validity of the "U-shaped" relationship between urban economic resilience and the income gap between urban and rural residents, thereby validating the hypothesis.

Table 3. Regression results

Variable name	(1)	(2)	(3)
	Gap	Gap	Gap
UER	-6.7850***	-12.9403***	-5.8397***
	(0.4145)	(0.3967)	(0.5886)
UER2		19.7711***	8.1170***
		(1.5178)	(1.0884)
Gov			-0.8306***
			(0.3079)
Fin			0.0510
			(0.0368)
Edu			1.0775
			(1.4841)
Eco			-0.0365*
			(0.0212)
Internet			-0.0980***
			(0.0135)
Constant	2.9051***	3.1505***	4.4852***
	(0.0232)	(0.0177)	(0.1529)
City FE	YES	YES	YES
Observations	5300	5300	5300
R-squared	0.7256	0.7644	0.7849

4.2 Robustness tests

To enhance the robustness of the research findings, this section adopts the substitution method for explanatory variables, following the approach proposed by He Xiaogang and Teng Ruifeng [10]. The entropy-based method was replaced with the entropy-weighted TOPSIS method, yielding regression results in Models (1)-(2) of Table 4. When principal component analysis was substituted for the entropy method, corresponding results are presented in Models (3)-(4) of Table 4. All analyses demonstrate that the regression coefficients for urban economic resilience and squared terms in the income gap between urban and rural residents first show statistically significant negative coefficients before transitioning to positive coefficients, indicating robustness of the regression conclusions.

Table 4. Replacement of explanatory variables

Variable name	(1)	(2)	(3)	(4)
	Gap	Gap	Gap	Gap
UER	-15.4002***	-5.9502***	-0.6490***	-0.1835***
	(0.6531)	(0.6178)	(0.0498)	(0.0448)
UER2	22.9477***	8.3854***	0.0713***	0.0144**
	(2.3056)	(1.2248)	(0.0104)	(0.0063)
Gov		-0.7982***		-0.7024**
		(0.3096)		(0.2870)
Fin		0.0548		0.0711
		(0.0385)		(0.0471)
Edu		0.6034		0.8453
		(1.4930)		(1.4121)
Eco		-0.0728***		-0.0897***
		(0.0201)		(0.0240)
Internet		-0.1006***		-0.1034***
		(0.0137)		(0.0142)
Constant	3.0697***	4.8239***	2.5056***	4.7723***
	(0.0213)	(0.1467)	(0.0056)	(0.2110)
City FE	YES	YES	YES	
Observations	5300	5300	5173	5173
R-squared	0.7468	0.7843	0.7578	0.7930

5. Conclusions and recommendations

Based on panel data from 285 cities in China between 2003 and 2022, this paper constructs an economic resilience index system for each city to conduct an in-depth analysis of the impact of urban economic resilience on the income gap between urban and rural residents, building upon theoretical analyses regarding how urban economic resilience affects this disparity. The research findings indicate that urban economic resilience and the income gap between urban and rural residents exhibit a “U” -shaped nonlinear relationship. The paper further proposes the following policy recommendations:

(1) Promote rational industrial upgrading and strengthen urban-rural industrial synergy. During the initial phase of enhancing urban economic resilience, we should steer industrial transformation toward integrated urban-rural development, avoiding over-reliance on technology and capital at the expense of low-skilled labor. Specifically, this can be achieved by improving industrial chain support policies, encouraging urban industries to expand into rural areas, and developing supporting sectors like agricultural product processing, rural logistics, and e-commerce. These measures will create more job opportunities matching local skill levels for rural residents, thereby narrowing the urban-rural income gap through coordinated industrial development.

(2) Breaking down barriers to factor mobility and optimizing resource allocation mechanisms. During the process of enhancing urban economic resilience, not only do factor barriers emerge, but they may even become critical obstacles hindering resilience development. These barriers, fundamentally institutional and structural impediments arising from factor mobility, allocation, or upgrading processes, weaken cities’ flexibility and recovery capacity in coping with shocks. They also serve as hidden drivers widening the urban-rural income gap. At the resource allocation level, we should further dismantle restrictions on factor mobility under the urban-rural dual system, establish and improve unified labor markets, land markets, and capital markets across urban and rural areas, enabling rural resources to participate equally in economic development and receive fair returns.

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