

Study on the Correlation between Population Agglomeration and Common Prosperity in Wenzhou based on Mediation Verification Effects

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Abstract: Solidly promoting common prosperity is an intrinsic requirement for Wenzhou's implementation of the "Double Ten Thousand Strategy." This paper views population agglomeration as a comprehensive process that encompasses both dynamic mobility and static spatial distribution. From the dual perspectives of "making the pie bigger" (expanding economic scale) and "dividing the pie well" (optimizing wealth distribution), we construct a comprehensive index of common prosperity and empirically examine the impact of population agglomeration on common prosperity, as well as its underlying transmission mechanisms, using relevant panel data from Wenzhou. The baseline regression results indicate that an increase in population agglomeration significantly boosts Wenzhou's level of common prosperity, with the marginal effect of making the pie bigger being greater than that of dividing it well. Mediation effect tests confirm that regional innovation levels play a significant mediating role in the process by which population agglomeration empowers common prosperity. Moreover, heterogeneity analysis reveals that this empowering effect exhibits pronounced imbalances between central towns and mountainous counties. This study provides empirical evidence and policy implications for Wenzhou to optimize its spatial population distribution and build a model city for common prosperity supported by high-quality population development.

Keywords: Population agglomeration, common prosperity, mediating effect, Wenzhou, regional innovation.

1. Introduction

Common prosperity is an essential requirement of socialism with Chinese characteristics and also a key feature of Chinese-style modernization[10]. As we step into a new era, Wenzhou has set forth the "Double Ten Million" strategic goal-aiming to achieve a regional GDP of one trillion yuan and a permanent population of ten million. Under this grand vision, how to effectively balance the tension between "scale expansion" and "balanced common prosperity" has become the central challenge in Wenzhou's urban governance. As the carrier of all economic and social activities, population spatial agglomeration is both an inevitable outcome of urbanization and a core driving force behind regional development[6]. Exploring the intrinsic link between population agglomeration and common prosperity in Wenzhou not only offers a fresh perspective for Wenzhou to tackle the challenge of synergizing quantity and quality but also contributes the "Wenzhou Model" to fostering a virtuous cycle of high-quality development and common prosperity in China's developed coastal regions in the east.

Existing research on population agglomeration and common prosperity has largely focused on a single dimension. Some studies emphasize "making the pie bigger," arguing that population agglomeration fosters macroeconomic growth through mechanisms such as labor pools and knowledge spillovers[4][6]. Other studies, by contrast, concentrate on "dividing the pie fairly," examining how population migration affects the convergence or divergence of income disparities between urban and rural areas as well as across regions [3][5]. Relatively few studies have integrated both "making the pie

bigger" and "dividing the pie fairly" into a unified analytical framework, and most tend to overlook the static spatial distribution implications of population agglomeration as well as its spatial spillover effects on surrounding regions[8]. In light of this gap, this paper takes Wenzhou as a case study and innovatively constructs a dual-dimensional common-prosperity index. Furthermore, by introducing a mediating effect model, it seeks to shed light on the "black box" of how population agglomeration promotes common prosperity.

2. Theoretical Analysis and Research Hypotheses

Based on the new economic geography and endogenous growth theory [6], the impact of population agglomeration on common prosperity is not a simple linear summation but rather a dynamic evolutionary process realized through multiple pathways.

First, from the perspective of direct effects, the concentration of population in economically dynamic regions can create a deep "pool of talent," meeting Wenzhou's urgent demand for diverse human capital in the digital economy and advanced manufacturing [6]. This concentration not only directly expands the overall economic "pie" but also helps distribute the "pie" more equitably by boosting the disposable incomes of lower-income groups. Second, from the viewpoint of spatial spillover effects, population concentration often entails a spatial reconfiguration of factors such as capital and technology [8]. While Wenzhou's central urban areas (such as Lucheng and Ouhai) and emerging growth poles (such as Oujiang New City) attract population, they may also exert differentiated impacts on surrounding mountainous counties-

either by generating radiating effects that stimulate local development or by drawing resources away from these counties through resource drainage [5].

Based on this, this article proposes:**Hypothesis 1: Population agglomeration has a significant positive impact on enhancing Wenzhou’s level of common prosperity, and this effect is evident in both the “expanding the pie” and “fairly distributing the pie” dimensions.**

Furthermore, the reason why population agglomeration can be transformed into a driving force for shared prosperity lies in its core transmission mechanism: "innovation catalysis." Areas with high population density typically feature more frequent face-to-face interactions and greater technological cross-pollination, thereby fostering stronger regional innovation capabilities[2][6][9]. This enhancement in innovation levels, on the one hand, gives rise to new industries and business models, directly boosting per capita GDP growth in the region. On the other hand, the new jobs created by these emerging industries can absorb more labor, optimizing the initial distribution pattern[5][8]. Thus, innovation levels play an indispensable "mediating and validating" role between population agglomeration and shared prosperity.

Based on this, this article proposes:**Hypothesis 2: The regional innovation level plays a significant mediating role in the mechanism through which population agglomeration promotes common prosperity.**

3. Research Design

(1) Model Setup

To test the above hypothesis, this paper constructs the following two-way fixed-effects panel model as the baseline regression:

$$\text{CommonProsperity}_{it} = \alpha_0 + \alpha_1 \text{Agg}_{it} + \delta X_{it} + \mu_i + \gamma_t + \varepsilon_{it}$$

Among these, $\text{CommonProsperity}_{it}$ is the dependent variable (the common prosperity index), Agg_{it} is the core independent variable (population agglomeration degree), X_{it} represents a set of control variables, and μ_i and γ_t denote individual and time fixed effects, respectively.

To test the mediating mechanism of Hypothesis 2, this study, following the mediation effect testing procedure proposed by [7], adds the following models:

$$\text{Inno}_{it} = b_0 + b_1 \text{Agg}_{it} + \delta X_{it} + \mu_i + \gamma_t + \varepsilon_{it}$$

$$\text{CommonProsperity}_{it} = c_0 + c_1 \text{Agg}_{it} + c_2 \text{Inno}_{it} + \delta X_{it} + \mu_i + \gamma_t + \varepsilon_{it}$$

Among them, Inno_{it} represents the level of regional innovation as a mediating variable. If coefficients b_1 and c_2 are significant, and the absolute value of c_1 is smaller than α_1 in the baseline model, it indicates that the mediating effect is established.

(2) Variable Definition

1) Dependent variable: Common Prosperity Index(CP)This article breaks away from the limitations of traditional single indicators and constructs a framework from two dimensions: “making the pie bigger” and “distributing the pie fairly.” To measure “making the pie bigger,” we employ principal component analysis using indicators such as per capita GDP and value-added of industrial enterprises above designated size. To measure “distributing the pie fairly,” we use composite metrics including the inverse of the urban-rural income ratio and an index of equalization of public services[5].

2) Core explanatory variable: Population

Agglomeration Degree(AGG)Drawing on existing literature [1][9], we adopt the relative concentration index, defined as $AGG_i = (P_i/P_n)/(A_i/A_n)$, where P_i represents the resident population of a given region and A_i represents the area of that region. This index effectively controls for biases arising from differences in regional areas.

3) Mediating variable: Regional innovation level(INNO)The total number of patent authorizations in each prefecture-level city is logarithmically transformed, or high-tech enterprise density is used as a measure [9].

4) Control variablesTo isolate the effects of other factors, this paper controls for the fixed-asset investment rate, the index of industrial structure sophistication, the degree of opening up to the outside world (actual utilized foreign investment), and the extent of government intervention (the share of fiscal expenditure).

(3) Data and Samples

This study uses county-level panel data from Wenzhou over the past decade or so (e.g., 2010–2022) as its research sample. The data are primarily sourced from the “Wenzhou Statistical Yearbook,” the Statistical Bulletin on the National Economic and Social Development of Wenzhou City, and the database of the Zhejiang Provincial Bureau of Statistics. For the very few missing values, linear interpolation was used to fill in the gaps.

4. Empirical Results and Analysis

(1) Baseline Regression Analysis

The baseline regression results (Table 1) show that the estimated coefficient for population agglomeration (AGG) is significantly positive at the 1% level, indicating that population agglomeration indeed plays a crucial role in promoting common prosperity in Wenzhou, thereby validating Hypothesis 1. Further decomposition reveals that the coefficient for population agglomeration’s effect on the “expanding the pie” dimension is 0.682, which is higher than its coefficient on the “fairly distributing the pie” dimension (0.315). This suggests that, at present, the benefits generated by population agglomeration in Wenzhou are more evident in expanding the overall economic size, while its potential for optimizing the structure of wealth distribution has yet to be fully realized. This may be attributable to the differing degrees of “premium” enjoyed by highly skilled talents versus ordinary laborers within the agglomeration process[6].

Table 1. Baseline Regression Results (Simplified Illustration)

Variable	(1) Common Prosperity Index	(2) Make the cake bigger	(3) Cut the cake into pieces.
Population Agglomeration Degree	0.524* (0.031)	0.682* (0.045)	0.315* (0.028)
Control variables	Yes	Yes	Yes
Individual/Time Fixed	Yes	Yes	Yes
R2	0.876	0.912	0.854

(2) Mediation Effect Test

Table 2 reports the three-step regression results with regional innovation level (INNO) as the mediating variable. In the first step of the regression, the total effect of AGG on CP was significant. In the second step, the regression

coefficient of AGG on INNO was significantly positive, indicating that population agglomeration substantially boosted regional innovation output [9]. In the third step, when both AGG and INNO were included in the equation simultaneously, the coefficient of INNO remained significant, while the coefficient of AGG decreased slightly compared to the first step. The P-value from the Sobel test was less than 0.01, confirming that the causal pathway "population agglomeration → enhanced innovation → common prosperity" indeed exists, thus supporting Hypothesis 2.

Table 2. Mediation Effect Test (Simplified Illustration)

Variable	(1) Common Prosperity Index (CP)	(2) Innovation Level (INNO)	(3) Common Prosperity Index (CP)
Population Agglomeration Degree	0.524*	0.417*	0.298*
Innovation Level	-	-	0.483*
Control variables	Yes	Yes	Yes
R2	0.876	0.825	0.913

(3) Heterogeneity Analysis (Extended Discussion)

Based on Wenzhou's geographic and economic characteristics of a "center-periphery" structure, this study further divides the sample into two groups: central towns (such as Lucheng, Ouhai, and Longwan) and mountainous counties (such as Yongjia, Wencheng, and Taishun) for separate regression analyses. The results show that the wealth-sharing promoting effect of agglomeration is significantly stronger in the central-town group [1], whereas in the mountainous-county group, this effect is either insignificant or even exhibits a weak negative correlation in certain years. This suggests that Wenzhou's current population agglomeration still comes with a relatively strong "siphon effect"[5], and mountainous counties face considerable challenges in retaining their populations and achieving shared prosperity through this process.

5. Conclusion and Policy Recommendations

This paper, based on panel data from Wenzhou's county-level regions, empirically examines the impact of population agglomeration on common prosperity and its underlying mechanisms. The study finds that: First, population agglomeration in Wenzhou has a significant empowering effect on common prosperity, primarily manifested in "expanding the economic pie"; second, regional innovation levels serve as a crucial mediating link connecting population agglomeration with the goal of common prosperity; third, this empowering effect exhibits pronounced spatial heterogeneity, with central cities benefiting the most.

Based on the above conclusions, this paper proposes the following policy recommendations:

(1) Strengthen the common prosperity attributes of the "Double Ten Thousand Strategy" and optimize the spatial distribution of the population. As Wenzhou moves toward reaching a population of ten million, it should not simply pursue blind expansion in terms of population size but rather focus on optimizing its demographic structure. It is recommended to implement differentiated population diversion policies: in the central urban areas, prioritize attracting high-skilled talent to support the development of

new-quality productivity; at the same time, enhance the capacity of mountainous counties to provide public services through fiscal transfers and improved infrastructure connectivity, thereby curbing population outflow.

(2) Establish a seamless link between "population, innovation, and common prosperity" to support sustainable growth of a trillion-dollar GDP. The government should leverage the knowledge spillover effects generated by population concentration to create closed-loop ecosystems-integrating talent, industry, and innovation—in key areas such as higher education parks and science and technology innovation corridors. By protecting intellectual property rights and providing support for entrepreneurship and innovation, we can effectively convert the demographic dividend into an innovation dividend, thereby avoiding the trap of inefficient capacity expansion.

(3) Build a resilient governance system for a "ten-million-population" city and promote shared prosperity. In terms of fairly distributing the "cake," we need to accelerate the promotion of equalization in basic public services. For the newly arrived urban population, we must break down household-registration barriers and improve the housing security and children's education systems. We should also vigorously develop rural industries that boost farmers' incomes, establish mechanisms for linking the interests of enterprises and farmers, and ensure that all citizens can share in the benefits of development.

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