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The Impact of Public-Service Fiscal Policy on Population Growth: An Empirical Analysis Using China's Provincial Panel Data

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Abstract. Population growth relates directly to labor supply, social welfare, and economic development, and is therefore a critical determinant of a country's long-term trajectory. This paper employs a simple linear regression model on provincial panel data from China covering 2007–2023 to examine the effect of fiscal policies for public services on population growth. We further perform heterogeneity analyses across regions and time periods. The empirical results indicate that: (1) fiscal policy for public services has a positive and significant effect on population growth; (2) this effect is strongest in the Northeast, followed by the Western and Central regions, and weakest in the Eastern region; (3) after the nationwide implementation of the two-child policy, the influence of public-service fiscal policy on population growth increased.

Keywords: Public-service fiscal policy, population growth, regression analysis, China

1. Introduction

As both consumers and producers, people constitute the fundamental element and driving force of economic and social development. Fertility, the key determinant of population growth, has direct implications for labor supply, social well-being, and socioeconomic development, and thus represents a major issue shaping a nation's long-term prospects. In recent years, China has experienced consecutive years of negative population growth, with both the birth rate and the natural growth rate continuing to decline. By the end of 2024, China's population had fallen to 1.40828 billion, down 1.39 million from the previous year. The national birth rate stood at 6.77 per thousand —among the lowest in the world and a sharp drop from 18.25 per thousand in 1978 at the outset of reform and opening-up. The natural population growth rate has also remained negative for three consecutive years.

In this context, it is essential for the government to adopt measures aimed at boosting fertility. Since 2016, China has gradually relaxed birth restrictions. On May 31, 2021, the Political Bureau of the CPC Central Committee announced the further adjustment of fertility policy, allowing each couple to have up to three children and introducing a set of accompanying support measures. Following the introduction of the three-child policy, the government has strengthened fertility-related services, such as subsidies for childbirth and childcare, maternity insurance, individual

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income tax deductions, and extended parental leave, all of which aim to lower the costs of childbearing, parenting, and education. On October 28, 2024, the General Office of the State Council issued the Several Measures on Accelerating the Improvement of the Fertility Support Policy System and Promoting the Building of a Fertility-Friendly Society, which further reduced family-related costs in childbearing, parenting, and education, while encouraging society to cultivate a supportive environment that respects and promotes fertility.

Public services in areas such as healthcare, public health, and the environment are critical safeguards for maintaining higher fertility rates, and only regions with sufficient fiscal resources can provide such high-quality services. This raises two key questions: Can provincial-level public-service fiscal policies effectively promote population growth? And more broadly, how can improvements in the fiscal system at the macro level contribute to a rise in fertility in China?

To address these questions, this paper undertakes an empirical analysis of the relationship between public-service fiscal policy and population growth in China. Using provincial panel data from 2007 to 2023, the study applies a simple linear regression model and supplements the analysis with robustness checks and heterogeneity tests to obtain more comprehensive findings. The results are expected to provide insights for ensuring both the size and quality of the population, optimizing the allocation of policy resources, and advancing the construction of a fertility-friendly society.

2. Literature review

The first body of relevant literature centers on studies of population growth. Zhuo et al. [1] found that under the dual "accelerators" of "population mobility–regional differentiation" and "population mobility–fertility," the negative externalities of migration have become increasingly pronounced, giving rise to problems such as "big city maladies" and the unsustainable development of shrinking cities. Chen et al [2]. argued that the fertility environment of a single city is not a necessary condition for sustaining high population growth, but that ecological conditions exert a more decisive influence. Yang [3] highlighted employment challenges as the central factor behind the declining birth rate in China. Similarly, Gu [4] showed that the global slowdown in population growth is primarily driven by falling fertility rates in an increasing number of countries, while future demographic trajectories differ substantially across regions and nations.

A second stream of research examines the interaction between population growth and fiscal policy. Zheng [5], in the context of an aging population, analyzed the relationship between the "demographic dividend" and economic development from multiple perspectives, and further explained how population structure shapes economic outcomes under prevailing institutions and policy frameworks. Based on empirical evidence, Ding [6] argued that a higher ratio of government expenditure to output is not conducive to improving population growth, while its effect on economic growth remains uncertain. Tan [7] also found that population aging significantly increases fiscal expenditure, creating direct short-term impacts on economic growth and, in the long run, shaping the implementation of fiscal policies. Wang and Wu [8] further contended that the intensifying pace of aging is reshaping China's fiscal expenditure structure: excessive aging not only increases government burdens and alters fiscal allocations but also undermines the sustainability of public finance and expands the debt load, thereby testing the resilience of fiscal policy.

A third group of studies investigates the relationship between population growth and public services. Dai [9] examined the allocation of population and public-service resources, emphasizing its importance for understanding demographic trends and promoting balanced long-term population development, which is directly tied to public welfare. Li [10] argued that, against the backdrop of slowing population growth, demographic aging, and urban concentration, the enhancement of public

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services plays a significant role in promoting economic growth. Dong [11] further suggested that higher levels of urban public services accelerate the pace of urban population growth.

Taken together, the existing literature has examined the mechanisms of population growth and its determinants from multiple angles, yet systematic attention to the institutional factor of public-service fiscal policy remains limited. This study seeks to contribute in four ways. First, methodologically, it employs statistical techniques to conduct an empirical analysis, incorporates robustness checks for the baseline regression, and uses heterogeneity tests across regions and time periods to provide a more nuanced understanding of how fiscal policies for public services shape population growth. Second, the topic is highly timely, enriching the academic discourse on the determinants of population growth in China. Third, the study draws on comprehensive and up-to-date provincial panel data spanning 2007–2023 and covering 31 provinces, municipalities, and autonomous regions. Fourth, by transforming fiscal expenditures on education, healthcare, and social security into quantifiable indicators, it reveals the transmission pathways through which fiscal policy influences population growth via public services. In doing so, the study not only extends research in population economics with respect to public-service fiscal policy but also offers a theoretical foundation for advancing high-quality demographic development and fiscal sustainability in China.

3. Public-service fiscal policy in China and stylized facts of population growth

Figure 1 illustrates the evolution of China's public-service fiscal policy from 2007 to 2023, measured by the share of general public-service expenditure in overall fiscal expenditure at the national, central, and local levels. Specifically, the indicator is defined as the ratio of general public-service expenditure to total expenditure for the national government, the central government, and local governments, respectively. In terms of long-run trends, the shares of national, local, and central public-service expenditure all exhibit a downward trajectory, which, however, leveled off around 2015. Thus, while China's fiscal commitment to public services showed signs of contraction, this contraction was concentrated prior to 2015. In terms of speed, the most pronounced decline occurred between 2007 and 2009, slowed substantially during 2009–2015, and virtually stagnated thereafter. In other words, although public-service fiscal policy displayed a retrenchment, the pace of decline consistently decelerated and nearly came to a halt after 2015. Examining differences across levels of government, prior to 2008 the central government devoted the highest share of expenditure to public services, followed by the national aggregate, with local governments allocating the least. After 2008, however, this ranking reversed: local governments' share became the largest, followed by the national aggregate, with the central government contributing the smallest proportion.

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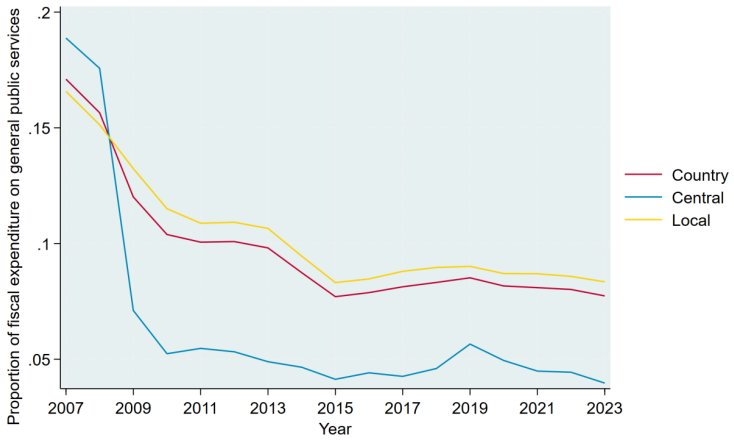

Figure 1. Trends in China's public-service fiscal policy

Source: National Bureau of Statistics of China.

Figure 2 depicts the trajectory of China's natural population growth rate between 2007 and 2023, defined as the ratio of net natural increase (births minus deaths) to the average annual population. Before 2016, the natural population growth rate remained relatively stable with mild fluctuations. Since 2016, however, it has exhibited a pronounced downward trajectory, signaling a significant decline in population growth. In terms of speed, the rate fell sharply between 2016 and 2018, decelerated somewhat in 2018–2019, and then resumed a rapid decline. This pattern indicates that while population growth has been declining since 2016, short-lived phases of deceleration—likely influenced by policy interventions—were also present.

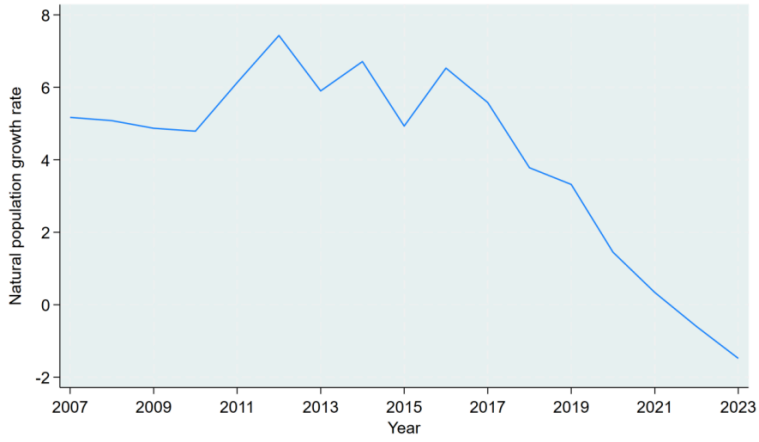

Figure 2. Trends in China's natural population growth rate

4. Research design

4.1. Variable selection

The dependent variable is population growth, measured by the natural population growth rate. The key independent variable is public-service fiscal policy, proxied by the ratio of general public-service expenditure to general budgetary expenditure. To verify robustness, the mortality rate is introduced as an alternative measure.

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4.2. Data source

The dataset comprises a balanced panel of 31 provinces, municipalities, and autonomous regions in China covering the period 2007–2023. All data are sourced from the National Bureau of Statistics of China. Table 1 reports the descriptive statistics of the main variables.

Table 1. Descriptive statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
Local general public-service expenditure (100 million RMB)	527	435.2	303.1	38.39	1890
Local general budgetary expenditure (100 million RMB)	527	4611	3269	241.8	18533
Natural population growth rate (‰)	527	4.163	3.584	-6.920	11.78
Mortality rate (‰)	527	6.300	1.021	4.210	9.840

4.3. Model specification

To empirically assess the relationship between public-service fiscal policy and population growth, we estimate the following simple linear regression model:

$$Y=\alpha X+\beta+\varepsilon \tag{1}$$

where Y denotes population growth, X represents public-service fiscal policy, and ε is the stochastic error term.

5. Empirical analysis

5.1. Correlation analysis

Figure 3 provides a descriptive assessment of the relationship between population growth and public-service fiscal policy. At a preliminary level, population growth tends to rise with an increasing share of public-service fiscal expenditure. Nevertheless, during the initial stage of the observation period, no evident correlation can be observed. Hence, regression analysis is required to rigorously verify the association.

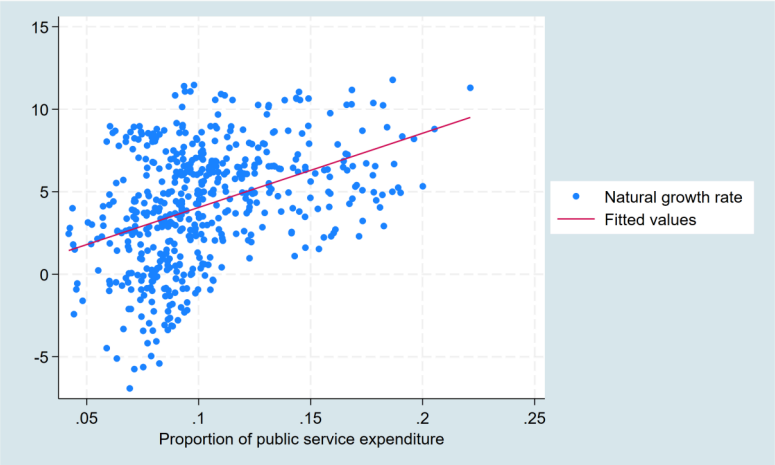

Figure 3. Correlation between population growth and public-service fiscal policy

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5.2. Baseline regression

Table 2 presents the benchmark regression results. In Model (1), the coefficient of the core explanatory variable is estimated at 36.1548, which is significantly positive at the 1% level. This finding provides initial evidence that public-service fiscal policy has a significantly positive effect on population growth in China

Table 2. Baseline regression, robustness checks, and temporal heterogeneity analysis

	(1)	(2)	(3)	(4)
	y	y	y	y
x	36.1548***	-9.6968***	2.8682**	102.6136***
	(9.8000)	(-8.9125)	(2.5206)	(5.0713)
_cons	0.4546	7.2943***	5.0903***	-5.7035***
	(0.7885)	(41.7260)	(10.7949)	(-3.2086)
N	527	527	248	279
R2	0.2058	0.0245	0.1541	0.2426

*Note: ***, *, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Robust t-statistics are reported in parentheses.

5.3. Robustness checks

To ensure the robustness of the baseline results, we replace the measure of population growth with the mortality rate. Model (2) in Table 2 reports the results. The coefficient estimate indicates that public-service fiscal policy significantly reduces mortality, thereby reinforcing the conclusion that its impact on population growth remains significantly positive. Overall, the findings confirm the stability of the baseline regression results.

5.4. Heterogeneity analysis

5.4.1. Temporal heterogeneity

To examine temporal variation, we exploit the policy shock of the comprehensive two-child reform, which was announced at the Fifth Plenary Session of the 18th CPC Central Committee in October 2015 and formally implemented in January 2016. Accordingly, the sample is divided into two sub-periods: 2007–2015 and 2015–2023. Regression results, reported in Models (3) and (4) of Table 2, yield coefficients of 2.8682 and 102.6136, respectively, both statistically significant at the 5% and 1% levels. These results suggest that the effect of public-service fiscal policy on population growth was relatively weak in the pre-reform period but substantially stronger thereafter. This finding indicates that the comprehensive two-child policy amplified the effectiveness of fiscal support in stimulating population growth.

5.4.2. Regional heterogeneity

Regional heterogeneity is examined by adopting the 2011 classification of the National Bureau of Statistics, which divides China into Eastern, Central, Western, and Northeastern regions. Table 3 reports the region-specific regression results. The estimated coefficients are 26.3313 (East), 36.3685 (Central), 34.9351 (West), and 55.7011 (Northeast), all significant at the 1% level. These results

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indicate that public-service fiscal policy exerts the strongest positive effect on population growth in the Northeast, followed by the Central and Western regions, while the effect is weakest in the more developed Eastern region. This pattern may reflect differences in demographic structure, fiscal dependence, and marginal policy effectiveness across regions.

Table 3. Regional heterogeneity analysis

	(1)	(2)	(3)	(4)
	y	y	y	y
x	26.3313***	36.3685***	34.9351***	55.7011***
	(3.7776)	(3.9373)	(6.5456)	(5.3000)
_cons	1.4164	0.2966	1.7695*	-5.8292***
	(1.5786)	(0.2699)	(1.9510)	(-5.7734)
N	170	102	204	51
R2	0.3307	0.2561	0.2058	0.3830

Data sources: Eastern region (10 provinces/municipalities): Beijing, Hebei, Tianjin, Shandong, Shanghai, Jiangsu, Zhejiang, Guangdong, Hainan, Fujian. Central region (7 provinces/autonomous regions): Inner Mongolia, Shanxi, Henan, Anhui, Jiangxi, Hubei, Hunan. Western region (11 provinces/autonomous regions/municipalities): Xinjiang Uygur Autonomous Region, Tibet Autonomous Region, Gansu, Qinghai, Sichuan, Yunnan, Guangxi Zhuang Autonomous Region, Ningxia Hui Autonomous Region, Guizhou, Chongqing, Shaanxi. Northeastern region (3 provinces): Heilongjiang, Jilin, Liaoning.

6. Conclusions

This paper provides empirical evidence that public-service fiscal policy exerts a significant and positive impact on population growth in China. The effect is heterogeneous across time and space: it is most pronounced in the Northeast and least evident in the more developed Eastern region, and it has strengthened substantially since the comprehensive two-child reform in 2015. These findings suggest that public-service fiscal policy helps explain both the regional diversity and the temporal dynamics of China's demographic transition.

The policy implications are threefold. First, improving the precision of fiscal allocations to public services is essential for enhancing the pro-natal effect of fiscal policy. Beyond maintaining sufficient aggregate investment, greater emphasis should be placed on the quality, targeting, and efficiency of expenditures. Second, differentiated regional strategies are warranted. In the Northeast, sustained and optimized public-service investment is required to build competitive advantages in population retention and attraction. In the Central and Western regions, expanding the coverage and improving the baseline quality of public services can enhance living conditions and regional appeal. In the Eastern region, optimizing the expenditure structure, raising efficiency, and promoting service equalization are critical for addressing persistent barriers to fertility. Third, the design of fertility-supporting policies must be further deepened in the "post–two-child era." Reducing the systemic costs of childbirth, childcare, and education will be key to consolidating and amplifying the demographic benefits of fiscal policy, thereby transforming policy adjustments into sustainable drivers of population growth.

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