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Analysis of Fertility Intentions from the Perspective of People's Livelihood Finance

-- The Case of Anhui Province

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Abstract

Human beings are the basic building blocks of economic and social development. Following the full opening of the three-child policy after the seventh population census, the decline in fertility rate and policy changes have aroused widespread concern and discussion in society. How to correctly perceive the influencing factors of fertility rate, play the role of macroeconomic regulation and control in the field of social and livelihood protection, and solve the worries of fertility with financial underwriting has become a hot topic of discussion. This paper uses Eviews9 software to analyse the public expenditure factors driving fertility growth from the perspective of fiscal expenditure in Anhui Province, taking fertility intentions as the starting point. Combined with a multiple linear regression model, the paper concludes that social security and employment expenditures, health care expenditures, and culture and environment expenditures are the three factors positively and significantly driving the growth of fertility rate in Anhui Province. The paper proposes to expand the scale of fiscal expenditure on people's livelihood, improve the structure of expenditure on people's livelihood, and expand fiscal-led investment to help support the implementation of the three-child policy and ensure the stability of fertility and the improvement of livelihood conditions in Anhui Province.

Keywords

Fertility Rate; Livelihood Finance; Multiple Linear Regression.

1. Introduction

According to Anhui's full population database, the annual growth rates of births in Anhui province from 2017 to 2021 were -12.1%, -11.4%, -15.8% and -17.8%, with an overall cliff-like decline and the problem of low fertility coming to the fore. 27 September to 26 October 2021, Anhui Province promulgated the Anhui Provincial Regulations on Population and Family Planning (Draft Revision for Comments) Draft) with a view to reducing the burden of childbirth, parenting and education on families through financial and taxation support measures.

In Anhui Province, the birth rate has been negative for four consecutive years since 2017, and the fertility rate is also on the decline. How to safeguard the advantages of the demographic dividend, slow down the ageing process and improve the welfare of marriage and childbirth has become a social focus. From the perspective of the current socio-economic situation in the province, studying the specific issue of fertility intentions in the process of economic development is necessary to ensure that the provincial policy actually touches the pain points of fertility and achieves the effectiveness of policy implementation. The study takes fertility intentions from the perspective of people's livelihood and finance as the starting point, measures and analyses the main factors affecting fertility changes, discusses the problems and

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improvements of provincial fiscal policies in the area of fertility promotion, and draws on the experience of fertility protection, in order to provide theoretical support for the implementation of residents' sense of well-being and access, and the improvement of supporting measures for population promotion policies.

2. Literature Review and Theoretical Analysis

2.1. Analysis of the Current State of Fertility Intentions

In domestic research on fertility intentions, Jia and Luo (2018) show that since the implementation of the "comprehensive two-child" policy, the fertility intentions of urban and rural residents in China have changed significantly, and the differences in fertility intentions between different groups of childbearing age have gradually narrowed. Currently, China's economic transformation has entered a new stage, and with an ageing population and low fertility rate, some scholars have examined the role of economic growth on fertility intentions from the perspective of macroeconomic development. Li Zhongqiu et al. (2019) conclude that fertility costs and dependency can be influenced through household income in the short term, and will affect fertility levels in the long term by changing residents' fertility attitudes and fertility environment. At the current stage, both paths point to the cost effect of economic factors on fertility behaviour. Zhang Zhao (2020) argues that the direct and indirect costs of childbearing are the most important reasons for lower fertility intentions, and therefore gives suggestions to differentiate between different income groups' categories and implement differentiated fiscal policies to reduce the costs of childbearing, so as to achieve the effect of incentivising fertility intentions and complementing population policies.

In foreign studies of fertility intentions, A. Dumot suggests that the level of civilization can interfere with many people's thoughts on fertility, and that some dynamics in society can subconsciously affect individuals; Kohler (2002) finds that the existing fertility policies of a country's population can affect the fertility intentions of women of reproductive age in that area. For example, the fertility policies designated during the former Soviet Union looked at a range of social benefits and other aspects to encourage people to have children, but after the collapse of the Soviet Union, the policies weakened and fertility rates fell further.MIicheal J. Abrams and Jason Weeden (2016) conducted a study from an individual perspective, comparing students at prestigious universities compared to students at regular universities who planned their fertility later and found that educational attainment had a significant impact on the fertility intentions of the population of women of school age.

2.2. Financial Analysis of People's Livelihoods

Many domestic scholars have explored the connotation of livelihood finance, but there is no uniform standard for defining livelihood finance. Zhang Xin (2015) agrees that livelihood finance is essentially public finance, and he believes that livelihood finance is a finance used to solve livelihood problems and alleviate social conflicts, thus achieving the purpose of promoting social justice. Ma Haitao argues that livelihood finance can also be understood as the institutional arrangement for fiscal expenditure, which aims to achieve social equity and justice and comprehensive development with individuals and society. Secondly, from the overall direction of livelihood finance expenditure, scholars such as Chen Shaohui and Zhu Zhen (2016) believe that livelihood finance is a fiscal policy that needs to raise the income of all residents as well as make the expenditure on social security, education, health care and other aspects of people's livelihood higher and dominant in the total fiscal expenditure, which can exactly and practically promote the welfare of the nation and increase the happiness of the nation. The focus of attention is on the most urgent livelihood issues in the ladder of livelihood needs, and social security, health care and education are the most prominent ladder of livelihood issues in

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China. In terms of specific path options for livelihood finance, Wei Xiangjie (2011) suggests that increasing the ratio of vertical and horizontal transfer payments, guiding livelihood investment with tax concessions, and establishing a livelihood-based performance appraisal system can help build a path for local governments to optimise livelihood investment and maximise the investment of limited financial resources in livelihood effectiveness. Based on the starting point of transforming the economic development mode, Liu Rong (2012) analyzes the rural areas, education and health care protection, and proposes the necessity of livelihood-oriented fiscal system reform and the optimization of the total amount and structure of fiscal expenditure.

Foreign scholars are more prominent in their research on micro areas related to livelihood finance, such as the reform of foreign education systems and public service systems, etc. They generally refer to "livelihood finance" as "public finance" or "public expenditure", without a clear definition. They believe that when government funds are used to produce public goods or services that are closely related to people's lives, the term "public sector spending" can be used. When the government's financial resources are used to produce public goods or services that are closely related to people's lives, the fiscal expenditure on people's livelihood can be expressed as "public sector spending". With regard to the study on fertility policy and public sector spending, Mehta (2018) studied Thailand's fertility encouragement policy and conducted a survey on fertility intentions after Thailand's fertility encouragement policy. The study showed that the government's fiscal support to build a public environment conducive to fertility is conducive to achieving the policy objectives, and that the government should also make active fiscal measures in response to population changes.

There are also many academic discussions on the definition of the scope of fiscal expenditure on people's livelihood, and JI (2015) proposes that fiscal expenditure on people's livelihood includes both broad-caliber and narrow-caliber aspects. Broad-calibre fiscal expenditure on people's livelihood refers to non-intuitive fiscal expenditure including transportation, urban and rural community affairs and environmental protection, which are closely related to people's lives but not obvious. Narrow-calibre fiscal expenditure on people's livelihood can be understood as direct expenditure on people's livelihood, including: culture, sports and media, education, health care, and social security and employment, which are related to people's daily lives and have intuitive feelings.

2.3. Fertility Policy and Livelihood Finance

Regarding the study on fertility policy and livelihood fiscal expenditure, domestic scholar Chen Weimin (2016) studied the comparison of fertility rates in China and Russia and pointed out that the low fertility dilemma needs to be solved jointly by the government and the people, proposing a number of countermeasures such as family subsidies and education protection. Among the specific fiscal incentives for fertility programs, He Yali (2016) explores the impact of education and social security inputs on fertility and the ways of action through a standby overlapping model, advocating the allocation of social security and education; Ding Hong (2017) studies the correlation between education spending and tax-based spending on fertility through a threshold regression model, advocating long-term measures to improve fertility by raising transfer payments, increasing education subsidies and reducing taxes Peng (2021) draws on empirical data from OECD countries, delves into the theoretical logic of tax incentives for fertility, and uses households as the unit of study to argue that raising tax relief policies in areas such as personal income tax education surcharges reduces the tax burden on fertile households and improves the fertility intentions of married and fertile households. Foreign scholar Mehta (2018) studied Thailand's fertility incentive policy and conducted a survey on fertility intentions after Thailand's fertility incentive policy. The study shows that government livelihood financial support to build a public environment conducive to a fertility climate is

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conducive to achieving policy goals, and at the same time, the government should make active fiscal measures in response to population changes.

This paper takes the perspective of narrow-calibre fiscal expenditure on people's livelihood, relates the expenditure on people's livelihood to their willingness to have children, and measures the current situation of the expenditure on people's livelihood in Anhui Province in terms of the expenditure on social welfare such as medical care, education and social security, and confirms that a fiscal expenditure policy on people's livelihood that is adapted to social and economic development is an important factor in ensuring the concept of "putting people first", promoting social stability, enhancing people's satisfaction and ensuring the stability of fertility. It further suggests the structure of the scale of fiscal expenditure on people's livelihood and the fiscal orientation of people's livelihood in Anhui Province.

3. Analysis of Fertility Changes based on Multiple Linear Regression

3.1. Study Design

Based on the above analysis of factors influencing the fertility intentions of the population at home and abroad, it is found that there are a wide range of factors influencing birth and fertility rates, but they mainly focus on the levels of healthcare, education and social security. From the perspective of rational economic choice, this paper examines the impact of financial expenditures on people's livelihoods such as healthcare, social security, education, housing prices, culture and the environment on fertility intentions, taking the cost and security of childbirth in the social environment as the main factor influencing fertility.

3.2. Indicator Selection and Data Sources

1. Explanatory variables

This paper examines the factors influencing fertility intentions in Anhui Province. The determination of fertility intentions mainly includes two types of indicators, namely the total fertility rate and the birth rate, of which.

$$Birth\ rate = \frac{\text{Number of births in an area during the year}}{\text{Total number of people surviving in the area during the year}}$$

$$Total\ fertility\ rate = \sum_{x=15}^{49} f_k(x)$$

$f_k(x)$is the fertility rate of women of reproductive age in year k at age x. The reproductive age range is 15 to 49 years, and the total fertility rate is the sum of the total number of births to women divided by the total number of women of reproductive age, so the effect of the age structure of the population on fertility levels is excluded. The birth rate is easy to calculate but is influenced by the demographic structure of the population such as gender and age, so the total fertility rate is chosen as the explanatory variable in this paper.

2. Explanatory variables

The intensity of fiscal expenditure on people's livelihood is used to measure the level of fiscal expenditure on people's livelihood in Anhui Province.

Intensity of expenditure on people's livelihood = total annual expenditure on people's livelihood by local governments / budgeted expenditure

A system of indicators affecting fertility is constructed, which includes: fertility rate, social security and employment expenditure, medical expenditure, and education expenditure.

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Sample data from 2007 - 2019 are used for the study, sourced from the Anhui Provincial Statistical Yearbook and the National Bureau of Statistics.

3.3. Model Construction

Based on the growth trend of the independent and dependent variables, a multiple linear regression model was constructed as follows.

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \mu$$

where Y represents the explanatory variable, i.e. the total fertility rate in Anhui Province, β_i (i=1, 2, 3) are the bias regression coefficients of the explanatory variables: social security and employment expenditure, health expenditure, and education expenditure intensity respectively, and μ is a random error term that contains the interference of other influencing factors other than the above three explanatory variables, which is generally assumed to be uncorrelated with the explanatory variables, and it represents the uncertainty of y being explained by them.

4. Empirical Analysis and Testing

4.1. Parameter Estimation and Descriptive Analysis of Variables

Based on the positive increasing trend of the independent and dependent variables together, the least squares method was used for multiple linear regression estimation. The regression results are shown in Table 1.

Table 1. Least squares estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.541764	0.160929	-3.366473	0.0083
X1	1.631522	0.547263	2.98124	0.0154
X2	2.902508	0.462728	6.272602	0.0001
X3	2.586749	1.1013	2.348813	0.0434
R-squared	0.859983	Mean dependent var		0.340223
Adjusted R-squared	0.813311	S.D. dependent var		0.045909
S.E. of regression	0.019836	Akaike info criterion		-4.754975
Sum squared resid	0.003541	Schwarz criterion		-4.581145
Log likelihood	34.90734	Hannan-Quinn criter.		-4.790705
F-statistic	18.426	Durbin-Watson stat		1.180931
Prob(F-statistic)	0.00035			

It can be seen that the standard deviation of the dependent and independent variables is small, i.e. the range of variation is narrow and within a reasonable range. Further combining with the trend of data changes, it shows that the fiscal expenditure on people's livelihood has been increasing steadily and slowly over the past 13 years, and the marginal effects of the independent variables on fertility intention are all between 1-2. Based on the OLS regression estimation results, satisfying the t-test and F-test, the least squares method initially inferred the model expression as

$$Y = -0.5418+1.6315x_1 +2.9025x_2 +2.5867x_3 +\mu$$

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4.2. Model Testing

In order to verify the reliability of the model results by satisfying the criteria of economic significance and significance judgement, the econometric test is applied in steps and the model is treated with a correction.

4.2.1. Multicollinearity Test

In order to avoid linearity between the independent variables, which would increase the variance of OLS estimation, reduce the reliability of t-test and make the prediction meaningless, this paper adopts the variance inflation factor method to obtain the VIF values of the independent variables are less than 10, i.e. the model is free of multicollinearity.

Table 2. Multicollinearity test

	Coefficient	Uncentered	Centered
Variable	Variance	VIF	VIF
C	0.025898	855.6681	NA
X1	0.299497	182.5346	1.700183
X2	0.214117	48.83528	1.14237
X3	1.212863	1073.701	1.566118

4.2.2. Heteroskedasticity Test

As there were also differences in other factors at the sample points for several explanatory variables, a heteroskedasticity check was required to confirm whether the model needed to be revised. The heteroskedasticity of the model was tested using white and the results indicated that nR^2 = 9.383231 at the 95% significance level, which is outside the critical range and no heteroskedasticity exists.

4.2.3. Autocorrelation Test

As the sample data is based on years, there may be serial correlation. The data are tested for serial correlation below and the model is adjusted by adding an AR term.

Sequence correlation vis-ualisation

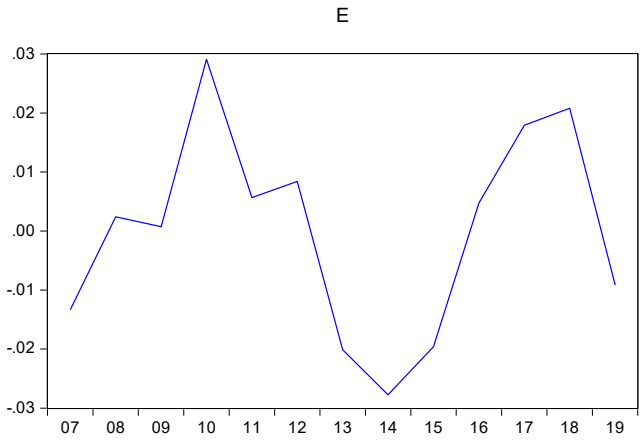

Figure 1. Trend graph of residual terms

Based on the trend plots of the residual terms and versus time, it can be seen that the residual data points show positive and negative fluctuations, indicating that the model may be autocorrelated.

Biased regression coefficient tests and corrections

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A partial regression coefficient test for serial correlation was performed on the regression equation to obtain residuals et with et1,et2 ..... .et12 for each period and the partial correlation coefficient, as shown in the figure, it can be seen that the model has 3rd order negative autocorrelation.

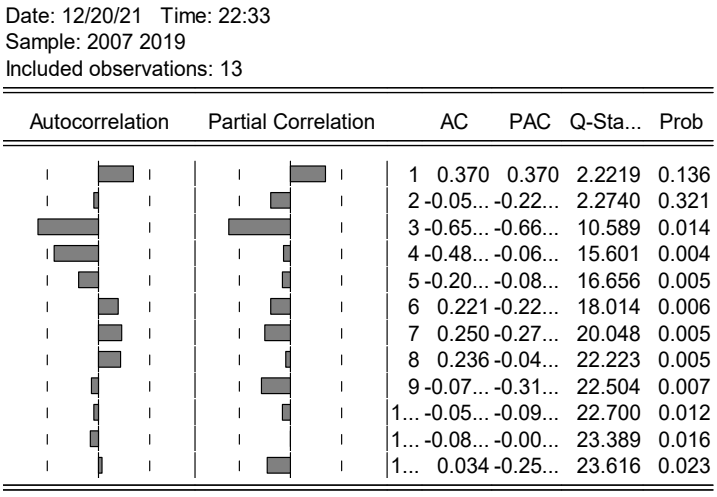

Figure 2. Biased correlation coefficient test

Common methods for autocorrelation include the Cochran-Ocott iterative method, which uses loops to find more accurate autocorrelation coefficients with estimated coefficients. Therefore, by adding AR (3) to the grand regression model for a new round of parameter estimation and further generalised differencing, the final results obtained are shown below.

Table 3. Model estimation results with the addition of the ar term

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.579819	0.074253	-7.808711	0.0001
X1	1.766223	0.277912	6.355341	0.0002
X2	2.490153	0.148823	16.7323	0
X3	2.915871	0.584213	4.991107	0.0011
AR(3)	-1	0.384164	-2.603055	0.0315
R-squared	0.97874	Mean dependent var		0.340223
Adjusted R-squared	0.968111	S.D. dependent var		0.045909
S.E. of regression	0.008198	Akaike info criterion		-0.773317
Sum squared resid	0.000538	Schwarz criterion		-0.556028
Log likelihood	10.02656	Hannan-Quinn criter.		-0.817979
F-statistic	92.07518	Durbin-Watson stat		1.564367
Prob(F-statistic)	0.000001			

The results show that the estimation process converged after 88 iterations; the adjusted model estimation results were again tested for bias correlation coefficients, and it was found that the model no longer had higher-order autocorrelation, which shows that the generalized difference method successfully eliminated autocorrelation, and all variables passed the t-test, so the modified multiple log-linear regression model was

$$Y = -0.579819+1.7662x1 +2.49015x2 +2.9159x3 +\mu$$

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5. Conclusions and Recommendations

5.1. Analysis of Findings

By analysing the current state of fertility research and the trends reflected in the data, a basic understanding of the changes in fertility intentions and the factors influencing social livelihoods in Anhui Province has been obtained, and the following conclusions have been drawn by combining multiple linear regressions.

1. From the perspective of the data as a whole, China's total fertility rate has been increasing slowly year by year until 2018, with a precipitous decline in 2019. In terms of financial expenditure on people's livelihood, the overall financial expenditure on people's livelihood in Anhui Province is gradually increasing, with the most significant increase in the proportion of expenditure on basic livelihood protection represented by social security and employment, education and healthcare, and has become an important factor affecting the fertility rate. Therefore, it is imperative to promote the means of fertility promotion with the concept of livelihood finance and prevent social problems such as ageing and economic shrinkage.

2. From an economic theory perspective, the partial regression coefficient represents the marginal pulling effect of each livelihood expenditure intensity on fertility development. Combined with the current socio-economic situation in Anhui Province, the intensity of social security and employment expenditure has a low effect on fertility, while the intensity of health care and education expenditure has a greater marginal effect on fertility increase. In terms of the reasons for the data itself, due to the relatively complete social security system and the large provincial population base, social security expenditure in Anhui Province accounts for a high proportion of budgetary expenditure and has a relatively low marginal effect. In terms of the social environment, the grassroots health care system in Anhui Province, represented by villages and communities, is yet to be improved, and education, represented by college entrance examinations and higher education institutions, is heavily involuted, corresponding to the high marginal effect of both, in line with the fertility This further justifies the empirical results.

5.2. Recommendations for Countermeasures

Based on this study, the intensity of financial expenditure on people's livelihood, represented by the intensity of expenditure on social security and employment, health care and education, is a significant influencing factor on fertility intentions, and has a significant impact on the phenomenon of fertility slippage in the province at the present stage and on the future of fertility.

The following recommendations are made from the perspective of financial expenditure on people's livelihood in view of the social problems that can exist, such as the increasing ageing.

5.2.1. Optimising the Structure of Livelihood Expenditure

The stage of economic development and the basic contradictions of society are the starting and ending points of livelihood expenditure. Meeting people's good needs and improving the protection of fertility risks are the keys to improving the quality and efficiency of livelihood expenditure and addressing the problem of plummeting fertility. Based on the findings of this study, the livelihood expenditure system built by social security and employment, healthcare and education is only the tip of the iceberg in the framework of livelihood construction. The government should effectively fulfil its expenditure responsibilities, take into account the mobility and disparity of expenditure, provide fair and agreeable public services, and establish a comprehensive support and protection system for education, healthcare, culture, leisure and insurance.

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5.2.2. Promote Financially-led Investment

The government's vertical transfer payments alone cannot achieve comprehensive livelihood protection and people's satisfaction. Financial investment policies for people's livelihood, represented by tax concessions, have an important impact on expanding the financial resources for livelihood expenditure, promoting horizontal transfer payments, and bringing into play the government's role in regulating the market, thereby promoting the full use and rational allocation of resources, and helping to maximise the effectiveness of fertility investment and social stability.

5.2.3. Improve Financial Support Work

In addition to government-led financial investment in fertility intentions, an "inclusive" and "fertility-friendly" fertility environment is more socially desirable. Social security, employment, health care and education will reflect a deeper level of social phenomena, such as maternity subsidies, education mechanisms, housing issues and social prices, and it is often difficult to achieve an overall reduction of the burden with fiscal expenditure alone. The implementation of multiple protection mechanisms such as maternity reimbursement, childcare leave, education resource allocation, improvement of childcare institutions, and stable prices of goods and housing, to further liberate the pressure of the difficulty of having children, is a balanced, comprehensive and long-term initiative to guarantee the stability of the desire to have children.

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