The Impact of the Two-child Policy on the Regional Economy

Yunqi Fang[1,*]

[1] RenHe high school, Hangzhou, Zhejiang,310008, China

*Corresponding author. Email: 15372093330@163.com

Abstract. The implementation of the comprehensive two-child policy will have a profound impact on China's demographic structure in the long term, and will stimulate the growth of demand in related economic fields and bring vitality to economic development in the short term. In this paper, by constructing a multiple linear regression model, taking eleven prefecture-level cities in Zhejiang Province as an example, we found that the implementation of the comprehensive two-child policy will make the GDP grow by 0.191 trillion yuan after regression analysis, and the higher the initial GDP of different provinces and cities, the greater the impact of the two-child policy on them.

Keywords: Two-child policy, GDP, Eleven cities in Zhejiang Province

1 Introduction

As a large country with a large population, China's population is aging, and as of 2014, the proportion of 60- and 65-year-olds in the total national population had reached 15.53% and 10.6%, an increase of 5.2% and 3.06%, respectively.

In the "Proposal of the Central Committee of the Communist Party of China on the National Economic and Social Development is the thirteenth five-year plan" (hereinafter referred to as the "thirteenth five-year plan proposal") China proposed a policy that a couple can have two children (comprehensive two-child policy). The National People's Congress passed the amendment to the Population and Family Planning Law on December 27 2015 and the comprehensive two-child policy was

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officially implemented on January 1, 2016. The new policy will undoubtedly have a profound impact on our economy. As society develops, the aging society intensifies making progress in many aspects of China's development slow, our labor force decreases sharply, the pressure on each family and even society to support increases, and many problems make the road ahead more and more difficult for China. One of the main causes of China's aging society is the one-child policy, which was implemented in 1978. "The implementation of the One-Child Policy accelerated the aging process of the population, reduced the size of the labor force, lowered the total fertility rate and the newborn population (i.e., the low fertility rate), and led to an increase in the aging of the population.

In addition, the growth rate of the working age population in China has been declining. the absolute value of the working adult age began to decay in 2015, leading to a structural labor shortage. Today's family planning policy can no longer adapt to a rapidly evolving society. In order to weaken the negative effects of the aging population and improve the current economic development of China, China has proposed to fully open the two-child policy to increase the total fertility rate and alleviate the aging of the population. In the "Opinions of the Central Committee of the Communist Party of China on Several Major Issues of Comprehensively Deepening Reform" released on November 15, 2013, a new policy that allows one spouse of a one-child family to have two children was proposed, marking the implementation of the "selective two-child" policy. The total fertility rate (TFR) is expected to rise in the short term, which will have a significant impact on the size and structure of the population in the long term, and these changes in fertility policy will also have potential impacts on fertility, population aging, sex ratios, and health systems. China's birth rate has increased since the implementation of the two-child policy， , and while some studies have argued that China's two-child policy can effectively contribute to the country's economic growth, others have shown the limited impact of the two-child policy on the economy. As of the end of May 2015, only 1.45 million couples applied to have a second child out of the 11 million couples who met the above requirements.

It can be seen that strict or lax implementation of the fertility policy has a negative impact on economic growth, while moderately lax implementation of the fertility policy has a positive impact on economic growth. In this paper, we briefly discuss the economic impact of the comprehensive two-child policy on GDP, pension insurance, and real estate in each of the ten cities in Zhejiang from 2010 to 2020.

From the perspective of the two-child policy, the opening of the two-child policy has not saved the downward trend of the fertility rate. On the one hand, the proportion of the two-child population in the total birth population has increased from 40 % to 60 %. On the other hand, the birth population in China has declined rapidly after a short period of growth. In 2020, China 's new birth population will be 12 million. In addition to the impact of the epidemic, the more critical factor is the low fertility desire of young people. The three-child policy introduced this time is mainly aimed at stimulating people born between 1980 and 1995 who are willing to give birth. This group of population has a relatively large base due to the impact of the baby boom, and the fertility period is basically about to end while maximizing potential.With the development of society, the intensification of the aging society has made China 's development and progress in many aspects slow. The aging of the population development, making the sharp decline in China 's labor force, each family and even the community 's dependency pressure increases, the long-term economic downturn, many problems make our country more difficult on the road ahead. Starting from the overall situation of the country, the implementation of the universal two-child policy, first of all to meet the people who want to give birth to promote the happiness of each family, social harmony, followed by helping to optimize the population structure, reduce the pressure of aging, to increase the supply of labor, and finally long-term economic health and sustainable development. This paper will briefly discuss the economic impact of the universal two-child policy on GDP in ten cities of Zhejiang from 2010 to 2020.

2 Literature and Review

2.1 The Impact of the Two-Child Policy on the Demographic Structure

In terms of the two-child policy, the opening up of the two-child policy did not save the fertility rate from falling, on the one hand because the share of two children in the total births increased from 40% to 60%, and on the other hand because the births in China fell rapidly again after a brief increase.

By simulating the change of urban population under different one-child fertility policies in the next 15 years, Wang Jinying (2000)[1] concluded that fertility policies have an impact on the total population development in China and explained that the reason for the overwhelming concentration of one-children in urban areas is the

difference in fertility policies between urban and rural areas, and argued that the benefits of adjusting fertility policies outweigh the disadvantages. Chang Lei (2018) [2] believes that the government should weigh the pros and cons, improve the social pension system and child foundation and improve the medical service guarantee system, which can appropriately increase the number of pediatricians in hospitals, improve medical standards and service education policies, and formulate appropriate compensation policies for problems such as pensions for families who have lost their children in this age group, so as to compensate for the inequitable reproductive opportunities brought about by the new policy. By following the laws of population development and optimizing the population structure, China maintains the vitality of economic and social development.

2.2 Two-Child Policy Promotes Economic Growth

Both strict and lax implementation of fertility policies have a negative effect on economic growth, while moderate relaxation of fertility policies has a positive effect on economic growth.

By analyzing the rate of technological progress, capital growth rate and economic growth rate on the equilibrium growth path and simulating the future trend of each economic indicator and economic growth under the current fertility policy, Wei Jianping(2019)[3] concludes that fertility policy affects economic growth by influencing the rate of technological progress and capital growth rate, fertility policy relaxation positively affects the rate of technological progress by increasing the growth rate of labor force, and fertility policy relaxation is unfavorable to human capital accumulation fertility policy relaxation is favorable to the increase in the number of labor force and unfavorable to human capital accumulation, which ultimately has a negative impact on technological progress and economic growth in the current period. Sun Qiong, Tan Zhiyong, Wang Xiaofang (2017)[4] from the perspective of population policy, the Lesiue model is established to conclude that the number of labor force population will have a direct impact on economic growth, the teenage and elderly population will have a direct impact on the growth of the economy, and the fixed asset investment will have a direct impact on the growth of the economy, and the sharing coefficient is at a low level. In the long and short term respectively, the two-child policy has different impacts on GDP. In the short term, GDP growth will not be boosted, but rather will be pulled down. In the long run, GDP

is expected to grow significantly by 2045 due to the growth of the labor force. Cheng Wanjing (2020) [5] used the Leslie model of racial structure and built a structural vector autoregressive model (SVAR), and then built a panel structural vector autoregressive model (PSVAR) using panel data of Chinese provinces and cities and regions to conduct an empirical, empirical analysis and found that in addition to the important roles of total factor productivity and capital, the age structure of the total population in China has a significant effect on economic growth and cyclical In addition to the important role of total factor productivity and capital, we find that the age structure of the Chinese population has a significant effect on economic growth and cyclical fluctuations. Fluctuations in the share of children aged 0-14 in the total population have a lagged positive impact on China's economic growth and cyclical fluctuations, while fluctuations in the share of the elderly population aged 65+ in the total population have a continuous negative impact on China's economic growth and cyclical fluctuations; fluctuations in the share of the prime age labor force aged 30-45 have a positive impact on economic cyclical fluctuations; fluctuations in the share of the elderly near-retired labor force aged 46-64 have a negative impact on economic cyclical fluctuations; and fluctuations in the share of the young labor force aged 15-29 have a positive impact on economic cyclical fluctuations with the development of the tertiary sector.

2.3 Two-Child Policy to Stimulate Consumer Market

Economic growth is driven by a combination of factors, including not only the basic factors of labor, capital and land, but also many other factors, such as technological progress and institutions.

China Association of Asset Appraisal Zhou Jie, Sun Xiaoming (2020) [6] analyzed the impact of the two-child policy in the medical industry, pharmaceutical field, mother and child services and supplies industry, education industry, cultural and entertainment industry, and other industries (real estate, automobile, etc.) respectively, and it can be seen that the two-child policy can stimulate the consumer market and promote economic development, but at the same time, the government needs to strengthen market guidance and adjust China's fertility policy in a timely manner according to the changing trends of China's population size and structure. Zhai Zhenwu (2022) [7] uses data from the National Population Sample Survey to project the size of only children in China and estimate the target population for the

immediate full liberalization of the "two-child policy" from the perspective of only children, and then measures the change in the annual birth size. It is found that women's willingness to have a second child remains at a high level and the annual births in China will increase sharply after the policy change. Hong Xinxing (2022) [8] describes and analyzes the impact of the implementation of the "two-child policy" on related listed companies, taking the capital market as the entry point, and concludes that it will be beneficial to related listed companies. Ding Yiwen and Yang Xinyu (2017) [9] analyzed the relationship between the opening of the two-child policy and the market volume of mother and child medicine, and concluded that the growth of the gross domestic product can lead to a significant increase in the market volume of mother and child medicine, and the opening of the two-child policy system can also lead to an increase in the market volume of mother and child medicine.

3 Methods

3.1 Assumptions

3.1.1. Assumptions of the Classical Linear Regression Model.

Assumption 1 The linearity assumption (linearity) overall model is

$$y_i = \beta_1 + \beta_2 x_{i2} + \ldots + \beta_k x_{ik} + \varepsilon_i (i = 1, \ldots n) \tag{1}$$

Assumption 2 Strict exogeneity overall model is

$$\mathrm{E}(\varepsilon_\mathrm{i}|\mathrm{X}) = \mathrm{E}(\varepsilon_\mathrm{i}|\mathrm{X1}, \ldots \mathrm{xn}) = 0(\mathrm{i} = 1, \ldots \mathrm{n}) \tag{2}$$

Strict exogeneity implies that the conditional expectation of the raking movement is 0 for a given data rectangle X

Assumption 3 There is no strict multicollinearity (strict multicollinearity) i.e., the data matrix X is full column rank (full column rank) The lattice vectors of the data matrix are linearly independent, i.e., there is no situation where one explanatory variable is a multiple of another explanatory variable or can be linearly tabulated by other explanatory variables, and there are no redundant variables in X.

3.1.2. The Spherical Disturbance Term (Spherical Disturbance) is A Term That Satisfies the Property of "Homoskedasticity" and "No Autocorrelation".

The main diagonal elements of the covariance matrix Var (ε|X) are equal, that isσ^2, they satisfy the "conditional homoskedasticity" , or "homoskedasticity" for short.

If they are not exactly equal, then there is "conditional heteroskedasticity" . The abbreviation is "heteroskedasticity".

The non-major diagonal elements of the covariance matrix Var (ε|X) are all zero, so there is no "autocorrelation" or "serial correlation" between the perturbation terms of different individuals If the correlation is zero, there is no autocorrelation between the perturbation terms of different individuals.

3.2 Functional Form

The purpose of the multiple linear regression model is to construct a regression equation that uses multiple independent variables to estimate the dependent variable so as to explain and predict the value of the dependent variable. Things are linked in many ways, and the factors that influence the development of things party are diverse, and the optimal combination of multiple independent variables together to estimate the dependent variable is more effective and more realistic than a single dependent variable prediction.

In this paper, we construct a multiple linear regression model with the annual GDP of eleven prefecture-level cities in Zhejiang Province as Y and the implementation or not of the two-child policy as a dummy variable X. We consider city fixed effects, which contain unobservable factors or biases that do not vary over time with individuals, and time fixed effects, which contain unobservable factors or selection biases that do not vary over time with individuals.

$$GDP_{city,year} = Secondchild_{it}\beta + \alpha_{city} + \delta_{year} + \mu_{city,year} \quad (3)$$

where city is the name of ten prefecture-level cities in Zhejiang Province.

year represents different years from 2010 to 2020

$GDP_{city,year}$is the annual GDP of each city in different years

$Secondchild_{it}$refers to the dummy variable of whether or not the two-child policy is implemented in each city in different years, with a value of 0 when it is not implemented and a value of 1 when it is implemented.

α_{city} refers to individual city fixed effects.

δ_{year} refers to time fixed effects.

$\mu_{city,year}$ refers to the error term.

3.3 Data

The sample set of this study is eleven prefecture-level cities in Zhejiang Province (Hangzhou, Ningbo, Wenzhou, Jiaxing, Huzhou, Shaoxing, Jinhua, Quzhou, Zhoushan, Lishui, and Taizhou), and the GDP data of each prefecture-level city from 2010 to 2020 are obtained from the Zhejiang Provincial Statistical Yearbook.The two-child policy was proposed by the Fifth Plenary Session of the Eighth Central Committee of the Communist Party of China and became effective on January 1, 2016.

4 Results

After the regression according to the above model, the results are shown in the table below. The coefficient of the two-child policy is 0.191, P<1 and *** indicates the most significant, which can indicate that the coefficient is valid and has real significance, and also indicates that the opening up of the full two-child policy has a positive impact on regional economic development, and will have an increment of about 0.191 trillion yuan, which plays a role in promoting GDP growth.

Table 1. Basic model regulation result

GDP	Coefficient	P>|t|
Second child	0.191	0.000^{***}
Constant	0.333	0.000^{***}

According to the chart results show as three stars significant, it can be seen that after the implementation of the two-child policy, the GDP reached the effect of 0.19% annual growth.

The implementation of the two-child policy and the separate two-child policy, as well as the roll-out of the comprehensive two-child policy, is another major adjustment of China's population policy since the founding of New China, which determines the development trend of China's population structure for a long time to come. To further explore the variability of the effects of the two-child policy, I run multiple regressions for each of the ten prefecture-level cities in Zhejiang Province, and the models are similar to the overall regressions described above.

The following regression results show that the higher the initial GDP of different provinces and cities, the greater the impact of the two-child policy on them. For example, Hangzhou city's GDP in 2010 is 0.6 and the coefficient is 0.584. 2020 Ningbo city's GDP in 2010 is 0.5263 and 2020 Ningbo city's GDP in 2020 is 1.2035 and the coefficient is 0.396. The coefficient of Hangzhou city is larger than that of Ningbo city, so the shadow line of two-child policy on Hangzhou city is larger than that of Ningbo city. It may be because cities with higher GDP have a larger population printed on each other, while the region is more economically and technologically developed, and therefore the demand and productivity per birth population will be higher.

Table 2. dispersion regulation result

		Coefficient	P>|t|	2010 GDP（trillion yuan）	2019 GDP（trillion yuan）
HangZhou	Secondchild	0.584	0.000	0.6	1.54
	Constant	0.83	0.000		
NingBo	Secondchild	0.396	0.001	0.5264	1.2035
	Constant	0.699	0.000		
WenZhou	Secondchild	0.215	0.001	0.2943	0.6608
	Constant	0.386	0.000		
JiaXing	Secondchild	0.182	0.001	0.2357	0.5423
	Constant	0.306	0.000		
ShaoXing	Secondchild	0.163	0.001	0.2811	0.5785
	Constant	0.375	0.000		
HuZhou	Secondchild	0.102	0.001	0.1385	0.3122
	Constant	0.182	0.000		
QuZhou	Secondchild	0.046	0.001	0.0775	0.1573
	Constant	0.1	0.000		
JinHua	Secondchild	0.142	0.001	0.2101	0.4569
	Constant	0.282	0.000		

ZhouShan	Secondchild	0.048	0.000	0.0609	0.1362
	Constant	0.078	0.000		
LiShui	Secondchild	0.042	0.003	0.0663	0.1476
	Constant	0.092	0.000		
TaiZhou	Secondchild	0.164	0.000	0.2451	0.5102
	Constant	0.306	0.000		

5 Conclusions

There are many factors that enable the two-child policy to boost GDP growth. Chang Lei [10] found that the full liberalization of the two-child policy can help optimize the demographic structure, increase the number of labor force, promote economic development, and raise the economic growth rate. At the same time, in conjunction with the full liberalization of the two-child policy, the newborn population is expected to see a significant rise in the coming years, and the increase in the young working population, together with technological advances, can greatly improve production efficiency and promote effective economic development. By constructing a continuous-time intergenerational overlap model and numerical simulation,Sui Lei [11] concluded that no matter what form of pension insurance system is adopted, although it helps to reduce the national financial burden and social risks, etc., it will be a challenge to China's infrastructure carrying capacity, environmental affordability, and social security system in the face of population growth and the increase in per capita life expectancy aggravates the pension gap, and people expect the government to raise premiums or lower pensions. As a result, people will reduce their consumption levels and the government should take measures to increase investment in education, improve human capital and moderate the economic effects of an aging population. According to Zhou Jie and Sun Xiaoming[6], the "two-child economy" is driven by demand, covering not only medical care, maternal and child products, and education, but also culture and entertainment, real estate, and automobiles, with a wide range of impacts. In the context of China's economic growth leveling off and entering a new normal, the comprehensive two-child policy is undoubtedly like a spring breeze, bringing new possibilities for economic development. Sun Qiong, Tan Zhiyong and Wang Xiaofang (2017) found that [12] the number of labor force

population would directly affect the economic growth, and the coefficient of contribution of the former to the latter basically remained at 4.86.The juvenile and elderly population would directly affect the economic growth, and the coefficient of contribution of the former to the latter basically remained at -3.06.Fixed asset investment would directly affect the economic growth, and the coefficient of contribution of the former to the latter The coefficient of contribution of the former to the latter remains at 0.40, which is a low level. In the short term, the number of children and the elderly will be significantly boosted and are not expected to contribute to GDP growth in the next decade, but rather to pull down GDP growth. It is only in the eleventh year after that that population growth will have a positive impact on the economy. Tang Chuhan [13] shows that a comprehensive two-child policy will effectively supplement labor resources, which will help improve economic development in the long run, and will help reduce social dependency pressure and transform the economic structure to a consumption-driven one, while industries such as real estate, mother and child, education, and health care will flourish. Of course, a comprehensive two-child policy will also put pressure on family support burden, social public spending, and at the same time, reduce the amount of social resources available to each individual, thus driving GDP growth.

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