Asian Journal of Social Science Studies; Vol. 8, No. 1; 2023
ISSN 2424-8517 E-ISSN 2424-9041
Published by July Press

Analysis of Birth Rate and Regional Economic Influencing Factors in Western China

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Received: January 1, 2023 Accepted: January 25, 2023 Online Published: January 28, 2023

doi:10.20849/ajsss.v8i1.1325 URL: https://doi.org/10.20849/ajsss.v8i1.1325

Abstract

Excluding the effect of the epidemic, the factors influencing the birth rate in western China were studied based on a VAR model through the analysis of time series data from 2011-2019. And on this basis, realistic explanations and policy recommendations are given.

Keywords: birth rate, western region, regional economic influencing

1. Overview of the Demographic Situation in the West

1.1 Western Region Profile

Western China includes 12 provinces, cities and autonomous regions, namely five provinces and cities in southwest China (Chongqing, Sichuan, Yunnan, Guizhou, and Tibet), five provinces and regions in northwest China (Shaanxi, Gansu, Qinghai, Xinjiang, and Ningxia), and Inner Mongolia and Guangxi. The total area is about 6.86 million square kilometers, accounting for about 72% of the total area of the country. It also shares borders with 12 countries and has a land border of more than 18,000 kilometers, accounting for about 91% of the country's land border. It is across the sea from many countries in Southeast Asia and has a mainland coastline of 1,595 kilometers, accounting for about 1/10 of the country's coastline.

Figure 1. Western Region Location

1.2 Population in the West

In terms of population, the western region of China has a total population of about 380 million, accounting for about 29% of the country's total population. Although the region is quite vast, the population density is relatively sparse. This is due to the poor topographic and climatic conditions in the western region, where 42% of the land resources are plains, less than 10% are basins, about 48% are deserts, Gobi, rocky mountains and alpine areas above 3000 meters above sea level, and the average annual temperature is low, with most provinces and cities below 10 degrees Celsius, and nearly half of the areas have annual precipitation below 200 mm, making the western The average population density in the western region is below 50 people per square kilometer, far below

the national average of people per square kilometer, and this rule is consistent with the Heihe-Tengchong population division theory proposed by Hu Huanyong back then.

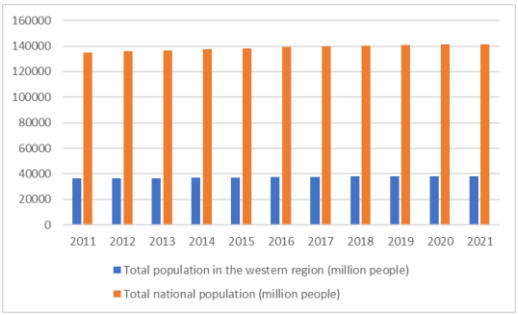

Figure 2. Total Year-End Population, National and Western Regions, 2011-2019

1.3 Birth Rate in the West

Using population as a weight for each province and comparing the weighted average birth rate for the whole country and the west, it can be found that the birth rate in the west has hardly fluctuated from 2011 to 2019, and has maintained a slow growth trend in the first five years. The reason for this phenomenon is most likely related to the country's special fertility policy for ethnic minorities.

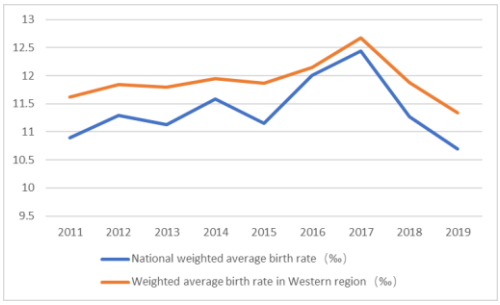

Figure 3. Weighted average birth rate of national and western regions, 2011-2019

For a long time in the past, the state allowed residents of minority areas with small populations to have more than one child, so that ethnic minorities have long enjoyed a more lenient fertility policy than Han Chinese. Yunnan, for example, is a multi-ethnic, mountainous border province, where minority populations account for more than one-third of the province's total population, making it the second most populous minority province in the country after Guangxi. During the period of family planning, Article 20 of the Regulations on Population and Family Planning of Yunnan Province reads: The agricultural population of ethnic minorities, on the basis of the implementation of the provisions of Article 19 of these Regulations, may have another child if one of the following circumstances is present: (a) both husband and wife are ethnic minorities living in the border villagers' committee area; (b) If both or one of the spouses is a Dulong, De'ang, Kinuo, Achang, Nu, Pumi, or Brown.

Most of Yunnan's ethnic minorities have a traditional culture with an element of respect for nature, believing that pregnancy and childbirth is a reward from heaven, and therefore as many as are pregnant should be born (e.g., Hui, etc.). In addition, many minority populations have religious beliefs, and all three major world religions encourage childbirth from a divine gift perspective. For example, Christianity and Islam are against birth control and abortion (Luo, C., & Luo, H., 2013).

Other ethnic groups such as Manchu, Mongolian, and Naxi have accepted modern fertility culture to a greater extent, and thus the fertility rates of these ethnic populations are significantly lower than those of Han Chinese. This phenomenon is particularly evident in Xinjiang, where the birth rate exceeded 15‰ from 2011-2017, which was at a high level among the national provinces, but rapidly decreased to 10.69‰ and 8.14‰ in 2018 and 2019. This is because in recent years, with socio-economic development and improved education, more and more

ethnic minority compatriots realize that unreasonable "multiple births" can reduce the quality of family life, and ethnic minority women have taken corresponding contraceptive measures on their own.

2. Measurement Results

2.1 Model Setting

In this model, the current year birth rate $brate_{it}$ is set as the explanatory variable. The sex ratio $sratio_{it}$, log average sales price of residential property lhp_{it}, log per capita regional GDP $lpgdp_{it}$, log per capita disposable income $lincome_{it}$, log per capita general public service expenditure $lpservice_{it}$, and education level edu_{it} are used as explanatory variables.

The purpose of this model is to explore the causes that affect the birth rate in each region of the country. The VAR (1) model with a lag of 1 is used according to the recommendation of the software's FPE. Its mathematical expression is as follows.

$$(brate_{it},\ sratio_{it}, lhp_{it},\ lpgdp_{it}, lincome_{it}, lpservice_{it}, edu_{it})^T = A^{\begin{pmatrix}(brate_{i(t-1)},\ sratio_{i(t-1)},\ lhp_{i(t-1)}, lpgdp_{i(t-1)}\end{pmatrix}^T \\ , lincome_{i(t-1)}, lpservice_{i(t-1)}, edu_{i(t-1)})\end{pmatrix}} + (\varepsilon_{1it}, \varepsilon_{2it}, \varepsilon_{3it}, \varepsilon_{4it}, \varepsilon_{5it}, \varepsilon_{6it}, \varepsilon_{7it})^T$$

Where i represents the different provinces, t represents the year, A is the slope matrix, and ε_{it} is the residuals of each. The practical meaning of the expression is the interaction between the levels of each indicator and the levels of the previous year.

2.2 Model Results and Adjustments

Since many of the coefficients in the results for 2011-2020 show insignificance, we speculate that it is due to the epidemic in 2020, so we restrict the data added to the VAR model to 2011-2019 and re-run the model with the following data.

Table 1. Western Region and National Time Series Regression Results

Province	brate	sratio	hp	pgdp	income	pservice	edu	cons
Inner Mongolia	3.424564	2.093679	9.959443	-53.6161	-3.820656	-66.00583	22.95516	574.1901
Guangxi	0.0191519	0.0538144	-21.41095	20.40646	0.5460257	-1.396076	2.235891	-39.29174
Chongqing	1.325949	-0.2975338	2.754557	-6.044402	-6.807925	-3.758836	6.186503	106.9756
Sichuan	0.584872	0.0581699	4.884375	-2.230863	0.2424571	3.170705	-5.274145	0.7723255
Guizhou	1.534182	-0.0538121	1.018497	0.6307777	-2.150353	-1.292916	-1.925275	28.72977
Yunnan	1.385272	-0.0795944	0.8940728	0.478324	-1.30745	-1.150816	-0.435095	14.96316
Tibet	1.218124	0.7204633	4.200776	-4.526893	9.536776	3.588433	-3.5609	-168.8055
Shaanxi	-1.447999	-0.4675453	16.44505	-9.529233	0.0115719	-7.878545	-3.42597	121.6358
Gansu	2.104015	-0.2224912	0.6282256	0	-0.0810022	2.975964	-11.62562	81.91616
Qinghai	3.785148	0.015975	-0.1700012	-38.71985	1.123188	23.94446	4.493093	143.3435
Ningxia	-0.6886413	0.1407388	-5.376997	0.80797	0.1100727	7.120755	-0.1536488	-5.212944
Xinjiang	0.6633489	0.9000173	-10.13063	18.60973	6.71002	-8.702772	-12.079	-92.83702

All coefficients in the above table exhibit 95% significance, and several conclusions can be found by comparing them cross-sectionally and vertically. We will develop a specific analysis and discussion of the western regression results in the following.

3. The Study of Factors Influencing Birth Rate Based on Econometric Results

3.1 Birth Rate Rises With Rising House Prices in Several Western Provinces

As can be seen from the column of regional average house prices in the measured data, unlike the clear negative effect in the east and the center, in several western provinces, such as Inner Mongolia, Shaanxi, Sichuan and Tibet, rising house prices have a very strong positive effect on the birth rate. The reason for this is mainly twofold.

First, land supply and demand conditions are different. The land supply policy in the east cannot keep up with the influx of population into the province, resulting in an imbalance between supply and demand in the east, and therefore a rapid rise in house prices in the east, leading to a decline in the birth rate, while in the west the supply and demand relationship is basically reasonable. Second, the level of regional development is different. As women's education level and labor market participation rate increase as industrialization and urbanization progress, the birth rate decreases accordingly. In contrast, compared to the eastern regions, the social, economic and cultural development levels in the central and western regions are more backward, so the impact of rising house prices on the birth rate is dominated by the wealth effect (Yang, B., & Ding, L.-J., 2022). This implies that

rising house prices for these provinces are a signal of rising wealth levels of residents, so there is a greater tendency to consider having children.

3.2 Birth Rate Rises With Rising Per Capita Public Service Expenditure in Many Western Provinces

The previous study for the eastern region concludes that the better developed the social security sector is, the lower the birth rate in that region. However, the data for the western provinces, such as Qinghai, Ningxia, Gansu, Tibet, and Sichuan, show a clear positive effect of per capita public service expenditures on the birth rate. This is most likely due to the different levels of social security development in the east and west.

Compared to the level of medical care in the east, the west is generally characterized by a lack of human resources, imperfect disciplines, and patients traveling thousands of miles to seek medical care in the east. Therefore, when the Chinese government increased its investment in public health and basic medical care in the western region in the implementation of the Western Development Strategy, the level of medical care in border ethnic areas was rapidly improved. This, on the one hand, led to a decrease in the mortality rate due to various diseases, thus reducing the population mortality rate and extending the average life expectancy of the population; on the other hand, it can facilitate smooth deliveries and ensure the safety of mothers and infants, which also has a positive contribution to eugenics. Thus, increasing spending on public services per capita in the west can, on the contrary, increase the birth rate and reduce the population mortality rate (Li, Q., 2019).

3.3 Birth Rate Increases With Higher Education Level in Some Western Provinces

Education is one of the means to rationalize the population structure because it helps to change the gender structure of the population and ensure the natural balance of the gender ratio between men and women; it can change the cultural and occupational structure of the population; it helps to change the urban-rural structure of the population; and it facilitates the migration of the population. Considering the influence of population endowment in different regions, on the one hand, in the context of free migration and mobility of population, economically developed regions are relatively more advantageous in terms of the proportion of working-age population and years of education per capita; on the other hand, some provinces and regions are relatively more aged and may have relatively less economic vitality for future production and consumption (Xu, H.-D., & Zhou, H., 2022).

In the west, the education level has a strong positive effect on Chongqing, Inner Mongolia and Qinghai, indicating that the population numbers have not yet reached the most efficient level based on the demographic endowment conditions of the region; while in provinces such as Gansu, Xinjiang, Sichuan and Tibet, the education level has a negative effect on the population, indicating that the population in these regions has spilled over and can be considered for the population of the region to Chongqing, Inner Mongolia and Qinghai, which lack human resources mobility.

From 2011 to 2019, the average years of education in Tibet are all over 6, which is much lower than the average level of the national provinces, which has a considerable inhibitory effect on its economy and population in all aspects. Therefore, Tibet has made huge investments in the last decade in upgrading its education provision. According to the press conference of "Tibet this decade" held by Tibet Autonomous Region on October 9, 2022, Tibet has invested a total of 215.4 billion yuan to improve the level of education security in this decade. Up to now, there are 3,339 schools at all levels in Tibet, with a total of 922,000 students in and out of the region, and the average number of years of education for the working-age population has reached 10.2 years. Moreover, Tibet has continued to implement the targeted training program for teachers in high-altitude, difficult and remote areas, and the targeted training program for rural teachers, with 63,178 teaching staff in service at the end of 2021, an increase of 21,334 compared with the end of 2012. Meanwhile, a total of 7.486 billion yuan has been invested in preschool kindergarten construction, and a four-level kindergarten layout system has been established at the prefecture (city), county, township and village levels, with a total of 2,337 kindergartens at present, 4.87 times the number of kindergartens in 2012.

4. Policy Recommendations for the Western Region

Since the country has long been in a situation where the East is strong and the West is weak in all aspects, the West should take into account the different nature of the birth rate from the East in all aspects when it comes to improving the birth rate. For the West, according to the previous study, the main areas that need to be improved are public service expenditures for health care and education. Since the West is very weak in both areas, improvements in these two areas can significantly increase the birth rate without reaching a dampening effect in the short term. At the same time, considering the positive impact of rising housing prices, the west should also strengthen the development of towns and cities, promote the high-quality development of urban clusters and the

networking of large, medium and small cities, and foster the development of a number of small towns with special characteristics.

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