



The Impact of the Economic Growth and Economic Development on Population Growth

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Abstract. It is common sense that China made a miracle of the speed in GDP. In 2021, the growth rate of GDP was 8.1% in China compared with America in which only 2%. The GDP per capita was from 1000 dollars in 2000 to 10500 dollars. Also, the Chinese total population is over 1.4 billion, which is a grandiose number. However, there are some crises behind the shining. From 1977 to 2020, the fertility rate was dropping at a fast speed from 2.7 kids per woman to 0.3 kids per woman! Although there are many analyses of the reason that caused these problems, these are just from one perspective. As we know that society is a connection among others so that there is no such only one specific perspective that causes the fertility rate to decrease. Thus, in this paper, I will summarize the opinions and perspective from a huge macro perspective, which is the increase of living cost. In this paper, I will split this huge concept into three components, which are consumption, government spending and investment, and each of them will be introduced with details by sub-topics. The reason that I exclude the net exports is because it is irrelevant to the fertility rate. This summarized paper will give policymakers a direction and analyze from many perspectives the reason that fertility rate decreased.

Keywords: Fertility rate · investment on education · house price

1 Introduction

In 21st century, it is common sense that the total GDP in China is grandiose in recent years, it even reached 70 percent of GDP in the United States and will keep increasing in the future. Meanwhile, the economic growth of China was relatively faster than other countries, approximately the growth is 8.1 percent in 2021, United States is about 2 percent per year constantly. GDP per capita is also an amazing number in China. In the beginning of the 21st century, the GDP per capita was around 1000 dollars, however, this number increased fastly till 2020 to 10500 dollars. Also, The total population will reach over 1.4 billion in China, and this number is still increasing by a relatively fast rate. The population in China is equivalent to 18.47% of the total population in the world. Compared with other countries and institutions, such as the United States is 4.25%, the EU is 9.78%, the large population could help a country to create more scientists and a

cheaper labor force. The economy of China received large demographic dividends in the past few years, however, some potential crises of the population came out behind the scenario of the fast economic growth. In 2020, the fertility rate is around 0.3 percent. The growth rate has been decreasing since the 1970s, dropping from 2.7% to 1.2% in 1992s, which was already below the low-fertility line [1]. It is even more exaggerated that the fertility rate had kept decreasing below the low fertility line for more than 20 years! Unfortunately the Chinese government did not realize this serious problem because the growth of population was very impressive. The Chinese government even set serious policies to restrict the fertility such as the one child policy, which caused the fertility rate to decrease seriously. Even though the Chinese government issued a two child policy in 2016s, it did not pull the fertility rate back to expectation, it became even worse. In this paper, I will discuss the elements that will cause the fertility rate to decrease. It was divided into three parts, which are the impact of education investment to fertility rate, the impact of the women working ratio to the fertility rate and objective factors that might affect the fertility rate. In the part of education investment, I will discuss two sub-factors which are household expenditure on education and government expenditure on education. In the past few years, many researchers expressed different perspectives of the reason which caused population growth rate to decrease. I will combine these points to give a reason from many perspectives. This paper aims to help governors to notice and find the problems that China probably has to overcome and give the government some basic direction that society and policies should change to in the later discussion.

2 Education Investment and Economic Growth

In 2020, the average household expenditure in China has reached more than 3000 dollars, compared with the last century, which was only around 200 dollars. However, the average GDP per capita is only around 15000 dollars in 2020, which means the parent of the family has to pay one of three that they earned for education. Meanwhile, Government spending on education even though is increasing by a stable rate around 2 percent, the whole spending on education is 4 percent to the whole GDP. In this part, I will analyze the impact of household expenditure and government on education to the fertility rate based on other people's research.

2.1 Household Expenditure on Education to the Fertility Rate

Since more and more young children were born in the past ten years, the crucial competition among students has become common sense to talk about in China. Based on the data, in the 2020s, students who received bachelor degrees reached 4.2 million and many of them were taking the graduate test to be graduate students. Besides that, the battle has expanded from university students to the elementary students and even preschool kids! Each level of education has different slopes and curves to represent.

2.1.1 Preschool Education Level

Academically, preschool is not included in the studying system which includes elementary school, middle school, high school and university degree. Preschool system is

separated from this system, which means preschool education and teachers working in school was not in the range of government education spending. In other words, there are no direct policies for educational applications. What is out of expected is that even though preschool is out of system, its demand is higher than elementary school! In 2014, the number of preschool kids was over 40000000, and preschool institutions had over 2000000 in 2014s [2]. The law of the market operation is always demanding to pull up the supply, which means parents want their kids to go preschool to study earlier before elementary school. The reason that parents are willing to pay money for preschool is that they will have less stress to take care of kids and also their stress will decrease, also, learning earlier means their kids will have advantages to compete with their classmates. There is a popular old saying in China: “Do not let your child lose in the starting line.”

2.1.2 Elementary Education Level

However, in the time of elementary education level, the curve is decreasing by relatively stable rate, the number of students decreased from 25000000 in 1997 to 17000000 in 2014, the reason that this number is decreasing because of the fertility rate is decreasing year by year, however, we can notice that the household expenditure is increasing since the fertility rate was decreasing. This is because the price of the education institution is increasing, parents have to pay these fees to let their kids contain the advantages. Compared with the years of 2007 to 2011, each family paid triple times in 2011 than in 2007. We can distinguish these two types of the classes: one is related to what students learned at school and one is extracurricular classes. The expenditure on the previous one is much more than the latter one because parents believe getting a good grade in school class is more important than cultivating a hobby. Also, the rate of teachers and students was decreasing from 1997 to 2015, there were 24 students per teacher in 1997, however, in 2015, this number decreased to 17 students, which means the quality of teachers improved. All the factors such as the number of students and quality of schools will motivate the competitions among students.

2.1.3 Middle School Education Level

In the beginning of 2004, the number of students who passed the high-school entrance test dropped by 3 million in contrast to the number in middle school. This ratio was similar in the later ten years. The line is down-ward sloping from 2004 to 2015, this was caused by the decreasing of the fertility rate, however, the expenditure of households on education is relatively high since there was high-school entrance test, and in this period, parents tended to weight their investment on school classes more than hobby cultivation. One belief that was really infectious and wild in China is that when you pass the high-school entrance test, then you will have a position in the university, then earning higher wages to console ancestors. Thus, we can see how important it is to get a good grade for that test from a parent’s perspective.

2.1.4 High School Education Level

This period is the time that both parents and their kids put in a lot of effort because the university entrance test was really crucial. For example, there were 13 million students in

the 2004s, one point that you lost in the test would drop the rankings down for thousands behind. This problem happened especially in 2015 when there were over 17 million students taking the test. Parents would pay more expenditures for out-of-school classes to improve their children's performance. Also, out-of-school is less intended to calculate in the human investment accumulation because it was not covered in the school system.

2.1.5 College Level

In the beginning of 1977s, since the college entrance exam was resumed, more than 5.7 million students registered for the test but only 270000 students would be admitted, the ratio is only 4.8%. However, since a series of policies evaluated, there are more than 7 million positions for students in college and 9 million students to compete. The admission rate is over 74%, and parents' expenditure on education dropped greatly for two reasons. Firstly, parents believe that a bachelor's degree is the guarantee to get a job as long as their kids are admitted by college. Secondly, there is no such out-of-school institution for college students. Even if it does have, the price would be so high to be barely unacceptable.

In total, from the age of preschool to college, the total expenditures are increasing yearly, especially the time close to the entrance test. On the other hand, the majority of the residents in China belong to the middle-income level groups. As the competition is more and more fierce in the future, the middle-income family would suffer a lot of burden to support their kids to build an advantage over others. In these years, the government has put much effort on how to minimize the middle-income trap and enlarge the share of the middle-income family in the country. However, if it was out of control, such as the fees of out-school learning is more expensive, the kids of richer families have more advantage then. Middle families may lose confidence and invest less in human capital accumulation, which might become a serious problem to China in the future [3]. Also, unexected out-school learning fee might lower the life expectancy of the middle-income family and then cause the fertility problem because they cannot bear the higher price.

2.2 Government Expenditure on Education to the Fertility Rate

In 2021, the total government expenditure on education was 3762 billions yuan in China. This number has been increasing since 2011s, but flatter in these three years. The ratio of the expenditure between middle and higher school education based on the expenditure on primary education was 1. It decreased in recent years. In 2009, the government paid more attention to higher education than primary and secondary education, the ratio is around 1: 2.54. However, 2019s, this ratio has decreased to 1: 1.96. The government has put more attention on the primary school in recent years. Xinyu Zhan believed that the expenditure and policy on education is very significant to measure the education to economic development [5]. Also, the contribution rate to GNP for public education has been relatively high in recent years. Some studies even believe that increasing the compulsory education can decrease the distance between low-income families and high-income families.

In the last century, the Chinese government emphasized higher levels such as high school education and college degree instead of primary education [4]. Thus, parents

suffered burden for paying money to out-of-school because there were poor-quality teachers at school. Plus, the ratio of teacher and students was relatively high for which students barely had a chance to ask questions or customize their disciplines. Parents had to pay more money to train their kids to be more competitive. Based on the solow model, if the government did not supply the money which is equal to the cost, the rest of the fees such as extra time and money to the out-of-school has to be paid by their parents. Then, the human capital accumulation could be lower than the average level, it would have negative effect on economic growth and fertility rate because the output would be lower and people faced more burden from life, their motivation to have kids could be decreased.

Fortunately, in the 21th century, especially in recent decades, the government started to weight the fiscal investment on primary school and middle school to decrease parents' burden. Parents did not have to pay more money than in the last centuries, and fertility rate went back to the normal line in some cases. On the other hand, fiscal investment on secondary schools has a positive effect on economic growth. Compared with the economic growth in 1997, which weighted on higher education, the contribution of higher education was only 0.48%. However, the economic growth in the recent ten years has increased 8.84% due to heavy investment on secondary education.

3 The Increase of House Price to Fertility Rate

In the past few years, the economy of China has increased at a really high speed, however, the living cost was still increasing at a horrible rate. If we set the Consumer price index in 2010 as 100, this number would be 128.09 in 2020 [7]. However, compared with the curve of GDP increasing, I notice that this curve is downward sloping, which means that the increase of CPI does not fit the speed of GDP. Residents in China were not rich enough to buy more stuff, they had more pressure to buy stuff instead. There might be a question of what are the problems that caused the house price increase? And, the relations of house price to fertility rate. Based on these topics, we might figure out how to increase the fertility rate of China.

3.1 The Reason that House Price Increased

In the last century, few people cared about the problem of house price because the Chinese government contributed houses for many people, and there were not many crowds in China in the 1990s. Since the population crossed 1.4 billion, we can notice that the house prices were increasing at a more exaggerated rate. In 1999s, the average price for the house per square meter was around 2000 RMB, which was a relatively acceptable price. However, this number had increased to 6000 RMB in 2013s and the average wage in 2013s was only around 2000 RMB per month. More specifically, the median family had to work for three months to pay for a one square meter floor. For example, if the average square of a house would be 100 square feet in China, a family had to work 300 months to buy all the squares, which would be 25 years on average. Compared with the United States, the average square feet for a house would be 230 square meter and the price was 370000 dollars. Meanwhile, the average wage was 52000 dollars, then we get a number

that the average American only needs to work 3 years to buy a 100 square meter house. Since GDP is incredibly increasing in recent years, the house price is increasing as well. Miller and Peng finally figured out that house price has a positive relationship to the national wealth effect, which means that when GDP growth is on the trend, the house price will also increase on the trend line [9]. There are also other factors that affect the house price such as unemployment rate.

In the past decade, the house price expressed a tendency of increasing. There was a hypothesis that house prices would cause a bubble in the next few years in China, and many people deeply believed that. However, Ting indicated that China has not faced rationally bubbly because the house price would be influenced by the policy makers. Also, political development would have a significant impact on market volatility and returns, and the house price would go up or drop temporarily by the change of the policies. Ting also mentioned some advice that the government can control the house price by increasing the interest rate when the house price is high and decreasing the interest rate when the house price is low [8]. In the meanwhile, Ren, Xiong and Yuan found the similar results. They searched the data in 35 different cities, and barely showed the evidence that there is a bubble in the future [10].

3.2 How House Price Affect the Fertility Rate

In 2016, the Chinese government issued the newest policy, which allowed a family to birth one more child without paying extra money, or, in general, called the “two-child policy”. The reason that the Chinese decided to change the policy was that the fertility rate has shrunk in the past 20 years, it even dropped to a dangerous level. Thus, to pull the fertility rate back to the trend, the government encouraged families to have children in recent years. Meanwhile, There’s a lot of studies showing that the upcoming aging problem could be a very serious problem in the following years [6]. Another policy that the Chinese government issued was extending the retirement age. It is a good way to alleviate the problem of a lacking labor force in the short term but it still cannot solve the problem from the root. Meanwhile, The labor force participation rate of females was dropping from 73.2% to 61.49% from 1990 to 2017.

In recent years, many researchers are obsessed with investigating the reason that caused the fertility rate to decrease. Many people agreed with one hypothesis: rising house prices was the main reason that distorted people’s belief to let them believe that having children was not worthy. Yi pointed out that a 1 percent increase in house prices will lead the fertility rate to drop 0.45 percent in Hongkong. Similar thing happened in Taiwan. Yi believed that the thing that happened in Hongkong and Taiwan would happen to cities in China because they share cultural similarities. Compared to the year between 2003 and 2011, the majority of big cities such as Beijing and Shanghai expressed 30 times the price increase on average in 2011 than 2003. Generally, based on the GDP per capita in China, most Chinese cannot pay all the money for the house, they applied the mortgage with interest rate to buy a house, which would increase their pressure of living and childbearing. Also, based on the fundamental model in Zhao’s research, house prices expressed a negative relation to the fertility rate.

4 Conclusions

This paper aims to figure out what kind of behaviors that will affect the fertility rate and economic growth. Specifically, we have tried whether household expenditure on education and house price have an effect on fertility rate. Besides that, I also summarize the conclusion of the bubble in China.

However, this summarized research only worked in the long run economic growth instead of short run. For example, in the section of household expenditure of education, the majority of parents would not change their beliefs on education, thus they need a long time, probably three years or even more to change their minds. In the macro perspective, parents' wages stayed relatively stable, that means that families would not pay extra money on their kids' education, the whole cost would stay the same in the short run. On the other hand, another limitation of this research was that this research only summarized the data in the past and predicted how the fertility rate would change in the long run based on the regular situation. However, some special periods like COVID-19 pandemic and great recession. The special period just like these two will cause the economy to go down shortly but would recover in the long run like 3 or 5 years. Third, some cities are still bubbles for some reasons just like Hongkong and Beijing, but in the macro perspective, these biased cities would not affect the results of research.

One of my findings is that parents turned their investment from middle school to primary school and high school. Because parents would not like to let their kids lose on the starting line and more high school education because parents have the expectation that graduating from universities would earn enough money to improve their lives. However even though the expenditure on middle school and university was decreased, the total expenditure on education still increased at an incredible rate. The fertility rate decreased in the opposite way because the increase of expenditure means that parents have to save money from other things to lower their quality of life qualities. The second finding is that house prices increased because of the interest rate and the GDP growth. House price is one of the biggest problems in China in present and future years because there is evidence that the increase of house price would let the fertility rate keep decreasing relatively.

In order to make house prices acceptable for residents and decrease the worry from parents about the fees of education, Tan suggested that the best way to control these problems is by controlling the inflation. For example, If the house price is increasing, the government can increase the interest rate because the the present discounted value in the future would be decreased since the interest rate increased, on the other hand, when the house price decreased, then the government can decrease the interest rate to let customers to consume their money on present instead of saving it to invest for future. Also, the decrease of the interest rate can make the fees of expenditure to decrease or relatively stable. However, the way that controlling the interest rate will not be discussed in this paper, this is another problem to analyze.

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