

An empirical study on the effect of child dependency ratio on household consumption—Focusing on the “two-child policy” from 2016

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Abstract: *With the new normal development model proposed, China is exploring a paradigm shift from investment-driven economic growth to domestic demand-driven economic growth. At the same time, in response to the aging process of the population, the Chinese government introduced a universal two-child policy in 2016. This paper analyses the impact of the two-child policy on the average propensity to consume in the household sector. In conclusion, the young-age dependency ratio inhibits the household's consumption, which is inconsistent with the implications of the life-cycle hypothesis. The reason is that Chinese families have a strong propensity to save, aiming for house purchasing and children's education in the future.*

Keywords: *two-child policy, population composition, life-cycle theory*

1. Introduction

1.1. Demand-driven growth

Since the reform and opening up in the 1970s, China has been entering international trade and introducing foreign capital actively. Over the 30 years from 1978 to 2010, China has achieved a high annual growth rate of 10%, credited with a large number of orders from overseas. However, the economic growth rate has been declining since 2010. For that, President Xi Jinping said in 2014 that the Chinese economy has already entered the "new normal", since the high-speed economic growth slowdown. The economic growth pattern begins to shift from extensive growth which prioritizes scale and speed to intensive growth which prioritizes quality and efficiency.

Against this background, China's New 'Dual Circulation' Strategy firstly appeared at the Politburo Standing Conference on May 14, 2020. According to the newsletter of "People's Daily" the next day, a new development pattern which will be formed mainly by the domestic general circulation and mutually promoted by the international general circulation was published, called the 'Dual Circulation' Strategy. Then, at the conference for entrepreneurs on July 21, President Xi announced that, centering on the domestic general circulation, China will demonstrate the superiority of the domestic market, and aim for a new development pattern in which the domestic and international dual circulation promotes each other. Specifically, the most significant part of it was recognized as how to stimulate the consumption of households.

In fact, the topic of how to stimulate consumption is no longer fresh. In 2007, the Chinese economy was compared to a "burnt frozen fish", as commented by Justin Yifu Lin. Whereas, with the 7th Population Census held until the end of 2020, China's population structure has changed significantly. According to the analysis by the Chinese government, it can be summarized as following three points: A decrease in the population growth rate and an increase in the quality of the population; An improvement in the dependency ratio and a decrease in the average number of households; A coexistence of a declining birthrate and an increase of aging. It is necessary for China, as a country defined as the new normal, to consider how to stimulate economic growth through consumer activity in fluctuating demographic conditions.

1.2. Two-child policy

With the experience of a rapid population increase during the two decades after the construction of New China, the Chinese government implemented a "one-child policy" in 1979 to curb the rapid growth of the population based on Malthus's theory of population. The main contents were "marriage later", "gravid later", "fewer birth" and "better birth". However, various factors, such as policy restrictions and soaring house prices, have decreased fertility aspirations until now. Both the decrease in population growth rate and the declining birthrate, population aging rapidly increasing problem in China. According to a recent survey, China's fertility rate dropped to 7.52 ‰ in 2021, and the natural population change was only 0.34 ‰. According to this data, Chinese society can be called an old-age society worldwide. Since 2016, China has taken several steps to liberalize its long-standing population restriction policy.

On January 6, 2010, the National Population Development "Twelfth Five-Year Plan" (Draft for Comments) issued by the National Population and Family Planning Commission, mentioned that it is necessary to prudently carry out the implementation of a new policy, which means that provided both of the married couples are the only child in each family, they would have official permission for a second child, named as separate two children policy. In November 2011, the separate two children policy went into effect in all of the provinces. The Chinese government released the restriction continually in December 2013. At that time, provided just one of the spouses is only children, they could deliver the second child. Since January 1, 2016, the government had implemented the universal two-child policy, and all couples, regardless of ethnicity, urban or rural, were permitted to have a second child.

Begin with Fair and Dominguez (1991), empirical studies about demographic changes rose in the 21st century. Obviously, the two-child policy will also lead to more spending on the second child, and thus contribute to economic growth. However, although various studies have been conducted on the effectiveness of the policy, the consumption activities of the household still go down. From the perspective of the life-cycle theory developed by Modigliani (1970), this paper discussed the impact of the 2016 two-child policy on households' consumption behavior.

2. Database

The data in this paper are panel data on the province level from 2007 to 2019, which are mainly based on the National Statistical Yearbook. Missing values are supplemented by the provincial statistical yearbook of each provincial administrative district (23 provinces nationwide, 5 autonomous regions, 4 municipalities, and 32 provincial administrative districts in total). However, since the 6th Population Census was conducted in 2010, the data on the demographic structure was not compiled in the statistical yearbook, so it was supplemented using the data of the 6th Population Census. Logarithmically convert all concrete numbers before use to reduce the dispersion of the variance.

3. Regression method

To verify the validity of the result, three regression methods are used for estimation in this paper. They are the OLS model, the time-fixed effects model, and the first-order difference model.

Fixed-effects models and random-effects models are two regression tools for dealing with panel data, while the random-effects model requires that the explanatory variable is uncorrelated with each period of the error term. The Hausman test can be used to determine which estimation method should be used. Considering the problems of autocorrelation and heteroskedasticity, we applied the traditional Hausman test and the robust Hausman test to know which method should be used. It can be found that all models can reject the null hypothesis, therefore the fixed effect model should be used.

Fixed effects can be divided into individual fixed effects and time fixed effects. Individual fixed effects are used to capture individual differences that do not change over time, such as the size of a province. Time-fixed effects are used to capture time differences that do not vary with individuals, such as changes in macroeconomic conditions. Through the F test, we can judge whether the model should use time fixed effects or individual fixed effects. According to the results, the F statistic of the individual fixed effect F test is 2.14, which is greater than the critical value of 2.077 at the 5% significant level, and the null hypothesis that the individual fixed effect is non-existent can be rejected. In the F test of the time fixed effect, the value of the F statistic is 20.56, and the null hypothesis can also be rejected. According to the results mentioned above, both the individual fixed effect model and the time fixed effect model can be used. Whereas, our paper also used the first-order difference method to estimate the individual

fixed effect model.

$$y_{it} = x'_{it}\beta + z'_i\delta + \mu_i + v_{it}$$

The first-order delay equation will be:

$$y_{i,t-1} = x'_{i,t-1}\beta + z'_i\delta + \mu_i + v_{i,t-1}$$

Subtract the two equations above to get the first-order delay differential equation:

$$y_{i,t-1} - y_{it} = (x_{it} - x_{i,t-1})'\beta + (v_{it} - v_{i,t-1})$$

Then, the individual fixed effect μ_i can be erased. By using OLS to estimate the above equation, we can get the first-order difference estimator, marked as $\hat{\beta}_{FD}$.

It can be proved that when $T=2$, the first-order difference estimator is the same as the within-group estimator, but under the condition of $T>2$, the within-group estimator is often preferred. But the first-order condition for the consistency of the first-order difference estimators is weaker than the first-order condition of the within-group estimators, which means the explanatory variables should be strict exogenous. Using the first-order difference estimator, the error term does not need to be uncorrelated with the explanatory variables in each period, but only needs to be irrelevant to the explanatory variable in the current period x_{it} , the previous period $x_{i,t-1}$ and the next period $x_{i,t+1}$. Therefore, it is often used in the analysis of dynamic panels.

$$\begin{aligned} conrate_{it} = & ratio15_{it} + birthrate_{it} + twop_{it} + ghealth_{it} + lgdp_{it} + gconrate_{it} \\ & + birthratetwop_{it} + \mu_i + \lambda_t + v_{it} \end{aligned}$$

The above formula is the regression equation used by this essay, and the statistics are shown in the following table. To reduce the degree of dispersion of the data, this paper uses the logarithm of GDP.

Table 1: Descriptive statistics

Statistic	Mean	St. Dev.	Min	Max
conrate	0.74	0.05	0.63	0.91
ratio15	0.23	0.07	0.10	0.42
birthrate	10.28	2.21	5.48	15.00
twop	0.36	0.48	0	1
ghealth	552.08	351.69	117.58	1,772.99
gdp	44,526.94	25,980.92	1,697.58	110,760.90
gconrate	0.17	0.04	0.11	0.26

$conrate_{it}$ indicates the average propensity to consume, r refers to the annual per capita consumption of residents divided by the per capita disposable income of residents. $ratio15_{it}$ indicates the child dependency ratio, calculated by dividing the province's population aged 0-14 by the population aged 15-64. $birthrate_{it}$ indicates the birthrate in each province. And $twop_{it}$ indicates the two-child policy dummy, 1 means implemented, 0 means not implemented yet. $ghealth_{it}$ refers to the degree of importance that the local government attaches to medical and health construction, calculated by dividing the annual local financial medical and health construction expenditure by the general budgetary expenditure of the local government. $lgdp_{it}$ refers to the logarithm of the annual GDP in each province. $gconrate_{it}$ refers to the scale of local government fiscal expenditure, which is divided by the general budget expenditure of local finance by the GDP in the current year. In addition, in order to consider how the birth rate affects residents' consumption activities with the implementation of the general two-child policy, this paper adds the cross term of the birth rate and the two-child policy in the regression equation. The regression results of the three models are shown in table 2 below.

It can be found that in all regression models, the child dependency ratio and the dummy variables of the two-child policy are all significant at the 5% level. Moreover, the coefficient is negative, which means that the dependency ratio and the two-child policy are negatively correlated with the average propensity to consume. This result is consistent with previous studies. At the same time, we can see that the birth rate is positively correlated with the average propensity to consume, while it is not significant. In the

OLS model and the time fixed effects model, we find that the cross term of birth rate and the two-child policy is positive and significant at the 5% level. This means that children born after the implementation of the two-child policy have effectively stimulated the average propensity to consume the household sector. This is consistent with the life-cycle theory. Since the youth under 15 years old have no source of income and need financial support from their parents, the birth rate should be positively correlated with the average propensity to consume. However, the results estimated by the first-order difference model contradicted them. Although the coefficient of birth rate is positive in the FD model, it is not significant.

Table 2: Regression results

	OLS Model	FE Model	FD Model
(Intercept)	1.2047 *** (0.1836)		1.4401 *** (0.1787)
ratio15	-0.0026 *** (0.0006)	-0.0052 *** (0.0014)	
birthrate	0.0039 (0.0030)	-0.0040 (0.0028)	
twop	-0.1502 *** (0.0392)	-0.1090 ** (0.0417)	
ghealth	0.0001 ** (0.0000)	0.0000 ** (0.0000)	
lgdp	-0.0387 ** (0.0150)	-0.0992 *** (0.0174)	
gconrate	-0.4919 *** (0.1247)	0.1995 (0.2175)	
birthrate*twop	0.0098 *** (0.0035)	0.0092 ** (0.0038)	
fdratio15			-0.0025 *** (0.0006)
fdbirthrate			0.0016 (0.0032)
twop			-0.0924 *** (0.0336)
fdhealth			0.0001 *** (0.0000)
fdlgdp			-0.0582 *** (0.0148)
fdgconrate			-0.6536 *** (0.1137)
fdbirthrate*fdtwop			0.0048 (0.0029)
R ²	0.5911	0.8601	0.6312
Adj. R ²	0.5495	0.8316	0.5895
Num. obs.	384	384	384

Note 1. *** p < 0.01; ** p < 0.05; * p < 0.1.
Note 2. The robust standard error for non-uniform variance is in parentheses.

In terms of the other control variables' coefficients, it can be seen that the government's emphasis on public health and medical care has a significant effect on promoting consumption in the household sector, but the value of the coefficients is relatively small. At the same time, GDP, which measures the economic development level of a region, is negatively correlated with household average propensity to consume. Horioka and Wan (2007) believe that the consumption habits of Chinese residents are relatively stable, and food consumption is still the main consumption in both urban and rural areas. Kraay (2000) also found that the life-cycle hypothesis did not suit for Chinese. Because of this, cities with higher regional economic development levels will instead bring a lower average propensity to consume. Moreover, in the past 30 years, the average propensity to consume of Chinese residents decreased continually, which can also be explained by the facts mentioned above. In terms of the influence of the scale of government

fiscal expenditure, the coefficients are negative in both the OLS model and the first-order difference model and is significant at the 1% level. With the increase in government expenditure, such as an optimized medical insurance system, people's demands may be mitigated at the same time.

4. Conclusion

This article discusses the impact of the universal two-child policy implemented in 2016 on the average propensity to consume in the household sector. The results show that from 2010 to 2016, the relationship between the youth dependency ratio and the per capita average propensity to consume is negatively correlated. The fewer children in the family, the greater the parents' investment in children's education, which goes against the life-cycle hypothesis. As a theory applied to developed countries, China has a large land area, there are obvious economic development gaps among regions, and households' consumption habits are also a great variety. Therefore, the applicability of the life-cycle hypothesis in China should be more explored. Since the two-child policy was implemented in 2016, China's per capita average propensity to consume has also continued to decline, so it cannot be easily determined that the two-child policy has a negative correlation with the per capita average propensity to consume. On the contrary, according to the Interaction term, the birth rate after the implementation of the two-child policy corrected the decline in household consumption after 2016. Therefore, the new population brought about by the two-child policy has a positive effect on consumption activity, which is consistent with the life-cycle hypothesis.

The calculation of young population dependency ratio was calculated by children aged 0-14, and the birth rate only selects the number of births in the current year. Therefore, it can be said that the investment of Chinese parents in their children's junior high school education is one of the reasons why the life-cycle hypothesis cannot be consistent with the situation in China. The medical expenditure on public health has a certain promoting effect on residents' consumption, and the government should strengthen social security. Especially, with the Covid-19 pandemic raging, it is more meaningful for the government to strengthen public health investment to encourage household consumption. Additionally, the budget constraint will also influence people's consumption, which was studied by Kohara and Horioka (2006) by Japanese evidence, which will be very inspired.

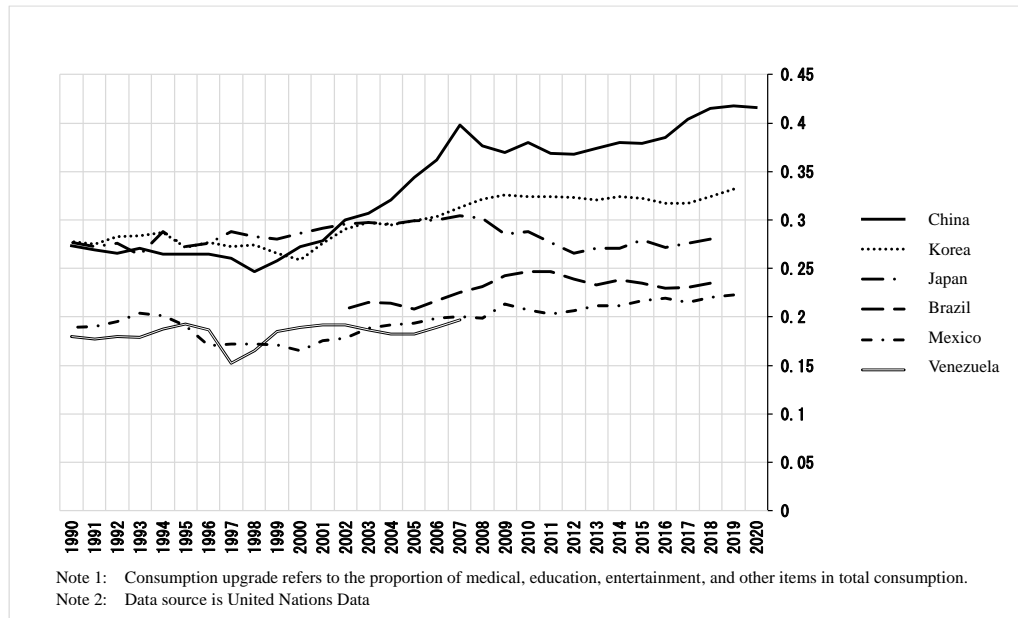


Figure1: Consumption upgrade condition in each country

In fact, under the topic of how to stimulate economic development with household consumption, the use of household average propensity to consume will be a bit rough. The household consumption structure should come to our attention. According to the Figure1, South American countries are trapped in the middle-income trap for a long time. But the average propensity to consume is very high, the ratio of the final consumption expenditure to GDP often reaches 80%, while the consumption structure is dominated by food. In contrast, in developed economies such as South Korea, Japan, and Hong Kong, residents are more inclined to spend on healthcare, education, and entertainment. However, this article

does not discuss the changes in residents' consumption structure, which will be a future topic.

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