

The Relationship between China's Population Structure Change in Minority Areas, Economic Growth and Demographic Dividend—Based on an Empirical Analysis of Time Series Data from 1992 to 2012

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Abstract

Because the sustainability of the economic development model has drawn much attention recently, the academic circle and the government have begun to focus on the population of minority areas. In past literature, due to the lack of the positive analysis of the relationship between minority population transition and economic development, and due to sample limitation and other factors, the research result is not very convincing. This paper used the economic convergence theory to establish a theoretical model, and selected the panel data in eight minority-concentrated provinces from 1992 to 2012 to analyze the impact of population transition in these provinces on economic growth. The result reveals a significant positive correlation between investment, human capital, the growth rate of labor and per capita GDP growth, a significant negative correlation between children's dependency ratio and per capita GDP growth, and an uncertain relationship between elderly dependency ratio and per capita GDP growth. To maximize the demographic dividend, it is necessary to speed up the development of educational undertakings in minority areas, and to accelerate the industrial structure transition of minority areas. It is also important to perfect institutional improvement of minority areas.

Keywords

Population Transition, Demographic Dividend, Economic Development, Minority Areas

1. Introduction

Economic growth is the eternal theme of economics in the world [1]. Since the reform and opening up, Chinese economy has realized the leapfrog development, which is usually called the “Chinese miracle”. A number of factors have contributed to this miracle, among these factors, the demographic variables are quite prominent. Hongbin Li and Junsen Zhang (2007) analyzed the data of 28 provinces in China and found that the increase in birth rate was not conducive to economic growth, and it was the population control policy implemented since the late 1970s that played an important role in the rapid economic growth for nearly 30 years in China [2].

Demographic variables have a significant influence on economic growth, because the demographic transition is related to the sustainability of economic growth and the change of population policy. Firstly put forward by a French scholar Landry A., the theory of demographic transition came into being at the beginning of the 20th century. The use of demographic transition variable to explain economic growth dates back to Bloom etc [3]. He first proposed the concept of “Demographic Gift”, namely demographic dividend, when studied the promotion effect of demographic structure shift on economic growth in East Asia. Afterwards, many scholars take the demographic variables into account when analyzing China’s economic growth. Cai and Wang introduced the variable of total dependency ratio that represented the demographic dividend into the steady economic growth model [4] [5]. Wang and Ni (2013) established space panel econometric model based on the theory of economic convergence, and examined the population structure change influence on economic [6]. Che and other scholars used provincial data in 1978-2008 to analyze and estimated the demographic dividend of China [7].

China also has a number of studies exploring the relationship between the minority population and economic growth. By analyzing the development trend of the western region’s population, Zeng (2011) drew the following conclusion: the relative easy minority population birth policy had caused the western minority population to grow too fast, and then might brought many problems to the development of ethnic areas [8]. The big proportion of minority population to the total population in the western region, the complexity of ethnic composition, the variety of ethnic groups, the differences of language, religion, ideas among different ethnic groups all contribute to the complexity of the relationship among different ethnic groups and the complexity of the environment for economic and social development. This situation will to some extent affect investment, development, talent introduction in minority areas. Zhang (2009) analyzed the demographic dividend period formation in Xinjiang on the basis of demographic dividend theory; this study showed that the demographic dividend in Xinjiang had a big influence on Xinjiang’s economic growth [9]. Gui (2003) analyzed the sustainable development status in the five ethnic minority autonomous region (Tibet, Xinjiang, Inner Mongolia, Guangxi, Ningxia) of and other four provinces (Qinghai, Yunnan, Guizhou, Gansu) and found that the relatively low quality of minority population had a negative effect on the sustainable development of economics and society [10]. Adili·Nuer (2012) analyzed the relationship between population growth and economic development in the minority areas in Xinjiang from the perspective of their mutual influences and restrictions. The result showed that labor supply exceeded the actual demand in minority areas in Xinjiang because of rapid population growth [11]. Tian (2007) analyzed the features of population change in the minority area, pointed out that the realization of demographic dividend was faced with four big problems. Only when these problems were solved, the demographic dividend in minority areas could be maximized [12].

As can be seen from these researches, there are still a lot of things to investigate in this field. First of all, the researches of relationships between population change and economic growth in minority areas still stay at the level of description, empirical analysis, especially quantitative comparison analysis, is seriously lacked. Secondly, ethnic minority is an important component of the population in China, and the research conclusion is not convincing if the samples are limited in a province. We can only provide valid suggestions for the Chinese government to make and implement population and development polices when we overall analyze the status of population and economic development in key minority areas.

Therefore, this paper will combine economic convergence theory to construct a theoretical model, and then select panel data of eight provinces and ethnic minority autonomous regions (Tibet, Xinjiang, Inner Mongolia, Guangxi, Ningxia, Qinghai, Yunnan, Guizhou) from 1992 to 2012 to analyze the effects of demographic transition on economic growth. By that, we offer a whole picture of population development and realization of demographic dividend in the eight provinces.

2. Status Quo of Population in the Minority Areas in China

Ethnic minority areas in China refers to the five autonomous regions (Xinjiang, Ningxia, Guangxi, Inner Mon-

golia, Tibet), and three provinces (Yunnan, Guizhou, Qinghai) where live many people of ethnic minorities. 52 of the 55 ethnic minorities are mainly distributed in these eight provinces and autonomous regions. At present, the population of the eight provinces mainly has the following features.

1) Minority population grows fast

Minority population in our country grew by 21.2% from the year 1990 to 2010, compared with the Han by 9.5% at the same time. The growth rate of minority population in ethnic minority areas was twice more than Han in the past 20 years. Especially when it came into the first decade of the 21st century, the ratio growth rate of ethnic minority a minority population is 9 times as many as the Han.

Table 1 reveals the situation of population in ethnic minority areas. The population of ethnic minorities declined in Guangxi and Guizhou, but it had been in the stage of growth in the other six regions. Compare the growth rate of minority population and the growth rate of total population in these eight areas from the year 1990 to 2010, we will find that the growth rate of ethnic minority population is slightly lower than that of total population in Xinjiang and Tibet, the growth rate of minority population is lower than the growth rate of total population in Guangxi, and the growth rate of minority population is greater than that of the region's total population in five other areas.

2) Population structure is relatively young in the ethnic minority areas, demographic window of opportunity is opened relatively late

The different population structure in minority areas has a great influence on the population development in the future. Tian (2007) argued that because demographic transition in minority areas was late than the other areas, age structure of population in minority areas as a whole was more “young” than the other areas [12]. The 6th National Population Census also confirmed this conclusion that was compared with the population age structure of the Han, the population age structure of the minority tended to be more young.

“Demographic window of opportunity”, also known as the demographic dividend period, refers to the population burden coefficient is less than or equal to 50%. Summarizing the time node of entering the “demographic window of opportunity” in each province, we will see that minority areas entered the “demographic window of opportunity” relatively late. Guangxi, Guizhou, Yunnan and Tibet all entered “demographic window of opportunity” after the year 2000. Inner Mongolia entered the window earlier than those four, maybe due to the geographical position of it, which stretch across China's eastern, central and western areas, making Inner Mongolia has more advantages on population mobility and economic development.

3) Population quality of the western minority is relatively low

Xu (2010) estimated the inventory of cultural quality in China, and found in the eight provinces and autonomous regions of minority, except Xinjiang, Inner Mongolia and Guangxi, the others' inventory of population culture quality was low, and Tibet's inventory was only a third of Beijing's [13] The two indicators to reflect the quality of population was listed in **Table 2**. On one hand, the average life expectancy of the minority areas was below the national average level in both 1990 and 2000, and after 10 years' development, the western region had made great improvement on life expectancy, 5 provinces' life expectancy was above the national average

Table 1. Population in ethnic minority areas.

Province	The population of ethnic minorities (The 6 th National Population Census, 10 thousand)	The population of ethnic minorities (The 5 th National Population Census, 10 thousand)	The population of ethnic minorities (The 4 th National Population Census, 10 thousand)	The annual population growth rate from 1990 to 2010 (%)
Inner Mongolia	506	493	416	0.69
Guangxi	1711	1721	1651	0.42
Guizhou	1255	1334	1124	0.34
Yunnan	1534	1433	1234	1.07
Tibet	276	246	211	1.55
Qinghai	264	236	188	1.15
Ningxia	223	194	155	1.5
Xinjiang	1307	1143	946	1.8

Note: From the sixth census bulletin published by national bureau of statistics.

Table 2. Index of population quality in the minority areas of west China.

Indicator Region	Life Expectancy (year)			Illiteracy Rate (%)		
	2010	2000	1990	2010	2000	1990
Nationwide	74.83	71.4	68.55	4.08	6.72	15.88
Inner Mongolia	79.1	69.87	65.68	4.07	9.12	15.39
Guangxi	79.28	71.29	68.72	2.71	3.79	10.61
Guizhou	75.34	65.96	64.29	8.74	13.89	24.27
Yunnan	74.12	65.49	63.49	6.03	11.39	25.44
Tibet	72.99	64.37	59.64	24.42	32.5	44.43
Qinghai	73.74	66.03	60.57	10.23	18.03	27.7
Ningxia	75.21	70.17	66.94	6.22	13.4	22.06
Xinjiang	78.78	67.41	62.59	2.36	5.56	12.75

Note: From the sixth census bulletin published by national bureau of statistics.

level in 2010, but Yunnan, Tibet and Qinghai ranked at the end of the list of life expectancy for a long time. On the other hand, except Guangxi and Xinjiang, the illiteracy rate of the other minority region was far below the national average level.

3. Sample and Variables Selection

The sample of this study is population and economic data collected from eight minority nationality provinces. As for the selection of population variables, Bloom (1998) selected growth rate of population and growth rate of labor population as two main variables in his research [3]; Wang (2013) selected three variables that was the difference between the growth rate of labor force and growth rate of population, children's dependency ratio, elderly dependency ratio [14]. In this paper, we follow two principles to select variables: one is relevant data can be found in the published literatures; the other is the selected variables must have been confirmed by scholars that they have significant effects on economic growth. Finally, we selects GDP per capita, growth rate of labor force, growth rate population, investment, children's dependency ratio, elderly dependency ratio, human capital into the model. The basic information of these seven variables is shown in Table 3.

The data of GDP per capita of these eight provinces and regions is revised according to the CPI on the basis of GDP per capita in 1952. In this paper, the working age population is defined as the population of the 15 - 64 years old, and children's dependency ratio and the elderly dependency ratio was defined as the ratio of population of 0 - 14 years old and population of above 65 years old to working-age population respectively. Investment is represented by investment of fixed assets, and human capital is represented by the average years of education. All the data in the model are from *Compilation of Statistical Data and Materials on 55 Years of New China*, *China Population Statistics Yearbook*, *China Labor Statistics Yearbook* and *China Statistical Yearbook*. In order to eliminate the influence of heteroscedastic and exponential trend, we take the logarithm of GDP per capita, investment, human capital, children's dependency ratio and elderly dependency ratio.

Using data from 1992 to 2012, we set up a fixed-effect model and a random-effects model to examine the influence of demographic factors on economic growth. Considering that children's dependency ratio and elderly dependency ratio is not an exogenous variable of the model, and they may produce interference on the results, so we set two forms in both the fixed effect model and the random-effect model: one form includes children's dependency ratio and elderly dependency ratio, the other does not include these two variables.

Before analyzing the model, we carry out a stationary test on each variable by four methods-LLC test, IPS test, Fisher-ADF test, Fisher-PP test. Elderly dependency ratio and labor force growth rate of the two variables P value of elderly dependency ratio and growth rate of labor population is both less than 0.05, and P value of the first order difference of GDP per capita, growth rate of population, investment, children's dependency ratio and human capital is also less than 0.05. Therefore, we can reject the null hypothesis, that is to say, there is no unit root and the explanatory variable is smooth.

In order to determine whether there is cointegration relationship between those variables and avoid spurious

Table 3. Variables of the model.

Variable	maximum	minimum	standard deviation
LN GDP per capita	11.064	6.78	0.898
Growth rate of labor force	0.178	-0.099	0.028
LN children's dependency ratio	-0.049	-1.759	0.245
LN elderly dependency ratio	-1.943	-3.002	0.236
Growth rate of population	0.187	-0.147	0.027
LN human capital	2.278	0.889	0.277
LN investment	9.37	0.1	1.82

regression, this paper carries out a cointegration test with seven variables. The results shows that the statistics of Panel v, Panel rho, Panel PP, Panel ADF, Group rho, Group PP and Group ADF all reject the null hypothesis at the 5% significant level (that is, there is no co-integration relationship). Therefore, the setup of this regression model is appropriate.

4. Result and Discussion

4.1. Result

The result in **Table 4** shows that the investment has significant positive influence in all models, so does human capital. The coefficient of growth rate of labor force, and children's dependency ratio is significant in model 1; growth rate of labor force is significant in model 2; the growth rate of labor and children's dependency ratio is significant in model 3; growth rate of labor force is significant in model 4.

In order to choose a better model in the fixed-effect model and random-effect model, we carry out the Hausman test for the two groups (model 1 and model 3; model 2 and 4). The null hypothesis is the random-effect model is reliable. Hausman statistic values of the two groups is 33.734 and 174.025 respectively, and the corresponding probability values are all 0.0000. Therefore, we reject the null hypothesis and believe the fixed-effects model is more appropriate. Main variables in the fixed-effects model are all significant, and the goodness of fit is higher than other models, so we confirms that model 1 is the most ideal among the four models.

4.2. Discussion

In the four models investment all has a significant positive influence on economic growth, revealing that the investment can spur the economic growth of minority areas. As one of the important driving force for modern economic growth, investment has a close relationship with economic development. This is indisputable. Ni and others (2014) pointed out that, the accumulation of physical capital is the first step and an indispensable step for China, world's largest developing country, in order to develop the economy [1].

In the four models human capital all has a significant positive influence on economic growth, revealing that human capital can spur economic growth in minority areas. Wang (2008) conducted empirical analysis on influencing factors of economic growth from 1987 to 2005. He found that during this period physical capital, human capital and technical progress have become the three major factors affecting China's economic growth [15].

In the four models the coefficient of labor force growth rate all show a significant positive impact, revealing that labor force growth rate can spur the economic growth in minority areas. Labor factor is a key factor in economic growth, Ni and others (2014) explained the average worker's contribution to the economic growth from two perspectives-the number of average workers and the quality of average workers [1].

Total population growth rate variables are not significant in the four models, revealing an uncertain relationship between total population growth in minority areas and economic growth. Li (2008) argues that in light of the population and economic theory, population growth can produce two economic effects: on the one hand population growth can help form economies of scale, under the condition of relatively abundant economic resources, population growth can contribute to economic growth. On the other hand population growth forms the pressure on economic resources which may impede economic growth if there is shortage of economic resources.

Table 4. Result of regression models.

Variable	Fixed-effect model		Random-effect model	
	Model 1	Model 2	Model 3	Model 4
Constant	3.7***	0.5	4.7***	3.6***
LN investment	0.05*	0.09***	0.05***	0.14***
LN human capital	1.89***	4.18***	1.04***	2.36***
Growth rate of labor force	1.66***	1.65***	1.48***	2.09***
Growth rate of total population	-1.35	-1.21	-1.33	-1.18
LN children's dependency ratio	-2.08***		-2.56***	
LN elderly dependency ratio	-0.31		-0.29	
R squared	0.88	0.82	0.84	0.59
Adjusted R squared	0.87	0.81	0.836	0.58
Log likelihood	-40.86	-75.38		
Goodness of fit value	0.0000	0.0000	0.0000	0.0000
Durbin-Watson	1.230564	1.039678	0.999421	0.459165

Note: 1) Model 1 is a fixed-effects model that contains all the seven variables; Model 2 is a fixed-effects model that removes 2 variables (elderly dependency ratio and children's dependency ratio); Model 3 is a random-effects model that contains all the seven variables; Model 4 is a random-effects model that removes 2 variables (elderly dependency ratio and children's dependency ratio). 2) ***, **, * , represents significant at 1%, 5%, 10% level respectively.

Therefore, in terms of the economic effect of population growth, population growth exerts both a positive influence and negative influence on economic growth [16].

In the four models children's dependency ratio variables are all significantly negatively correlated with economic growth, indicating that children's dependency ratio has a significantly negative influence on economic growth in minority areas, and that elderly dependency ratio variables have an uncertain relationship with economic growth because they are not significant in the four models. Theoretically, Coale and others proposed "dependency burden hypothesis" (DH) in the process of demographic transition in 1958 [17]. The hypothesis deems that the decline of infant mortality and ever high fertility rates leads to rapid population growth, rising burden of children rearing and a heavy burden of caring the old and raising the child on working age population. However, if fertility rate declines, population engaged in economic activities will increase dramatically, and the burden of children rearing will be reduced, thus speeding up the economic development. Finally, the shift of population age structure, manifested in heavy burden of caring the old, will slow down economic growth. In the sample period of our research, child raising in minority areas has a negative influence on economic growth, but can provide labor pool for future economic growth. Besides, during the sample period the development of minority areas only begins to enjoy a demographic dividend, so that the influence of the elderly dependency ratio increase on economic growth cannot be fully manifested, which means, the negative impact of ageing on economic growth is far from evident.

4.3. The Robustness Test

We use the same method to carry out robust tests of all models. Because Model 1 is the best model, we just present robustness test result of Model 1.

We change the time interval of the panel data from one year to three years, and find that the main dependent variables-investment, human capital, children's dependency ratio and growth rate of labor force are still significant, the sign of the coefficients are consistent with the original model, the absolute values change only a little, which confirms that the original model is robust.

5. Conclusion

This paper used the economic convergence theory to establish a theoretical model, and selected the panel data in

eight minority-concentrated provinces from 1992 to 2012 to analyze the impact of population transition in these provinces on economic growth. The result reveals a significant positive correlation between investment, human capital, the growth rate of labor and per capita GDP growth, a significant negative correlation between children's dependency ratio and per capita GDP growth, and an uncertain relationship between elderly dependency ratio and per capita GDP growth. One thing is certain that the economic growth in minority areas can be attributed to population dividend, and compared with other areas in China, the period of population dividend in minority areas closes later. To maximize the democratic dividend, to narrow the wealth gap among different regions and to build a moderately prosperous society in all respects, this paper argues that it is necessary to speed up the development of educational undertakings in minority areas to improve the quality of laborers, and to accelerate the industrial structure transition of minority areas so as to secure the employment of minority groups. It is also important to perfect institutional improvement of minority areas with a focus on removing institutional barriers to ensure the rational flow of minority population.

References

- [1] Ni, C. and Wang, Y. (2014) Strategic Talents and Economic Growth: Based on the Analysis of Time Series Data from 1978 to 2011 in China. *Inquiry into Economic Issues*, **2**, 1-8.
- [2] Li, H.B. and Zhang, J.S. (2007) Do High Birth Rates Hamper Economic Growth? *The Review of Economics and Statistics*, **89**, 110-117. <http://dx.doi.org/10.1162/rest.89.1.110>
- [3] Bloom, D. and Williamson, J.G. (1998) Demographic Transitions and Economic Miracles in Emerging Asia. *World Bank Economic Review*, **12**, 419-455. <http://dx.doi.org/10.1093/wber/12.3.419>
- [4] Cai, F. and Wang, D.W. (1999) The Sustainability and Labor Contribution of China's Economic Growth. *Economic Research Journal*, **10**, 62-68.
- [5] Wang, D.W., Cai, F. and Zhang, X.H. (2004) Saving and Growth Effects of Demographic Transition: The Population Factor in the Sustainability of China's Economic Growth. *Population Research*, **28**, 2-11.
- [6] Wang, Y. and Ni, C. (2013) Impact of Demographic Transition on Economic Growth in China. *Journal of Beijing Normal University (Social Sciences)*, **1**, 131-142.
- [7] Che, S.Y., Chen, W. and Guo, L. (2011) Demographic Dividend in China's Economic Growth. *Population & Economics*, **3**, 16-23.
- [8] Zeng, X.X. (2011) The Development Trend of Population and The Population Development Policy Adjustment in the West of China. *Journal of Yunnan Finance & Economics University*, **26**, 48-52.
- [9] Zhang, A.F. (2007) The Research of Demographic Dividend and Economical Growth in Xinjiang. Xinjiang University.
- [10] Gui, L.D. (2003) The Preliminary Study on the Population and Sustainable Development in the Western Minority Provinces. *Research on Development*, **2**, 29-31.
- [11] Nuer, A. (2012) A Research on the Relationship of the Growth of Minority Population and Development of Regional Economy. *Journal of Xinjiang University of Finance & Economics*, **2**, 29-35.
- [12] Tian, Y.B. (2007) The Realization of Population Dividend and Economic Development of the Minority. *Population and Family Planning*, **1**, 29-30.
- [13] Xu, G.H. (2010) A New Explanation of the Poverty in the Western Minority Areas. *China's Ethnic Groups*, **11**, 66-67.
- [14] Wang, Y. and Ni, C. (2013) The Influence of Demographic Transition on Economic Growth in OECD. *China Population, Resources and Environment*, **23**, 106-112.
- [15] Wang, H.W. (2008) Study on the Influence Factors of China's Economic Growth. *Statistics and Decision*, **15**, 78-80.
- [16] Li, Z.S. (2008) The Theoretical Analysis on Economic Development and Population Growth. *Journal of Capital University of Economics and Business*, **2**, 70-76.
- [17] Coale, A.J. and Hoover, E.M. (1958) Population Growth and Economic Development in Low-Income Countries. Princeton University Press, Princeton, 6-25.