

Impacts of Population Aging on Economic Growth and Structure Change in China

The feature of Chinese demographic structure is changing from a high fertility rate, high death rate and low life expectancy to low fertility rate, low death rate and high life expectancy, and the phenomena of ageing population in coming future will become more serious. The data of Sixth National Population Census show that the ageing rate of the population is higher than expectations, the share of population with age 60 years and above is 13.26%, the share of population with age 65 years and above is 8.87%; average number of members of each household is 3.10 persons, this figure is 0.34 person less than 3.44 persons of Fifth National Population census in 2000. This demographic change has not only increased the burden of social security pension and reduced the active labor force; it will also influence the saving rate and consumption structure and further affect the economic structure and sustainability of China's economic development.

CGE has been applied to many research areas, but the papers considering the population age structure factors in the CGE model are not a lot. With the aging of the population received extensive attention, some foreign scholars began to use the CGE model studying the aging of the population, such as Sang Gyoo's Yoon, Geoffrey J.D. Hewings (2006), Euijune Kim, Geoffrey J.D. Hewings Heedeok Cho (2011), Seryoung Park, Geoffrey J.D. Hewings (2010). But CGE model study considers more about the size of the labor supply, the homogeneity of the representative consumer assumption, but does not take into considering that the aging will affect the economy from consumption aspect.

In fact, with the economic development, the growth of life, and the higher levels of education, it results in the extension of the retirement age, which may make the labor force did not declined as imagined, especially as a country with a large population. At the same time, changes in consumer behavior of people of different ages may be larger and more important, Hewing (1982, 1989) pointed out that the household sector and consumer behavior in the CGE model is very important, the family of different age structure generally have different consumption patterns.

Therefore, by improving the DRC-CGE model and introducing variables to characterize the structure of household consumption patterns in the demand side, the paper study different population policy and the family demographic changes on economic growth and industrial structure, to provide policy recommendations on population policy orientation. This paper starts the study to analyze change of consumption structure of household of various age structure based upon survey data (2003-2007) of CHIPS (Chinese Household Income Project) to explore the changing relationship between China's demographic structure and consumption structure. Then according to the head of household age and family size of the household, we divided the households in the CGE model into 12 groups (six groups in rural and urban areas respectively) to capture the relation between consumer behavior and demographic structure, and analyze the impact of demographic change under three different

population policies scenarios on the China's economic growth and structure change using DRC dynamic recursive CGE model.

I. Relationship between demographic structure and consumption structure

It is a common thought that aging population will not only effect the relative ratio between consumption and saving, but also it may affect directly the consumption structure, for example, the demand of medical and health care service of the elders will far exceed that of the youth. But there is nearly no domestic quantitative data which reflects directly the relationship between population structure and consumption structure. The National Bureau of Statistics of China generally announces only the data of consumption structure based upon income groups, there is no information related to population structure in correspondence. Currently, there is only one available database to be substitute, i.e. survey data of CHIPS (Chinese Household Income Project). This database includes data of household consumption and age of head of household, and the variation of age of head of household of different household can be used to reflect the change of population age structure. This study used the survey data of the year 1995, 2002 and 2007 of CHIPS (Chinese Household Income Project) to analyze the changing relationship between household with head of household of different ages and consumption structure.

The following content lists the statistical results of grouping of urban Result of analysis of rural household is basically similar to urban household. Concrete results are shown in appendix of this paper. This study classifies the households with age structure of house holder in 25-70 years into 9 groups with interval of age of five years; in addition, two groups of household with age of house holder below 25 years (25 years included) and age of head of household above 70 years (70 years included), there are 11 groups all together.

In order to compare the change of consumption structure in the year 1995, 2002 and 2007, diagrams showing the change of share of consumption of 8 categories to total consumption with the change of age of house holders is prepared in this paper (Please see the attached appendix).

Table 1: The Consumption Structure of urban household according the age of the head of household in 2007 (%)

Age of Head	Consumption Structure (%)								total
	Food	clothing	residence	Equipment and daily necessities	Health care and medical services	Transportation and communication	Education, culture and recreation service	Others	
25-29	38.00	11.95	15.73	8.20	5.41	9.59	6.88	4.25	100
30-34	39.00	11.53	11.60	7.52	5.75	9.48	10.93	4.19	100
35-39	39.12	10.61	9.44	7.11	5.84	11.30	12.03	4.56	100

40-44	41.13	10.03	8.09	5.71	6.17	8.89	15.50	4.47	100
45-49	40.61	9.21	7.80	5.66	5.39	10.23	17.28	3.82	100
50-54	41.94	9.82	11.86	6.30	6.90	9.36	9.69	4.14	100
55-59	45.38	9.31	7.83	6.39	8.12	9.47	9.62	3.88	100
60-64	47.67	8.38	9.76	5.99	10.00	7.74	6.54	3.92	100
65-69	50.35	7.86	7.84	4.94	13.31	6.39	5.53	3.77	100

With reference to the data of consumption structure of 2007, the following facts are shown.

(1) Average share of food consumption is above 40%; there is increase of share of food consumption post retirement because of decrease of their income.

(2) The share of consumption of clothing, residence, transport and communications shows a declining trend with the growth of age.

(3) The share of expenses on health care and medical services increases with the increase of age, and it raises relatively faster post the age of sixty.

(4) The share of expenses on education, culture and recreation service varies with changing age in the shape of inverted U, peak appears in households with the age of the head around 45-49 years.

Therefore, the consumption structure of the old people is different explicitly with the young people, the age of the head of households has important impact on consumption structure, with the consumption of health care and medical service within the eight large categories of consumption of urban household, the share of health care and medical service is around 5.41% for the group with age of the head of households around 25-29 years, while this figure is 13.31% for the group with age of the householder around 65-69 years.

The major features of change of consumption structure from 1995 to 2007 are shown in the following:

(1) There are nearly no significant changes of share of expenditure on food and clothing of urban household, the relationship with the age of house holder is basically similar from 1995 to 2007; the share of expenditure on clothing has a declining trend with increasing of age, while the expenditure on food is in rising with the increasing of age.

(2) There are relatively large changes of share on expenditure of residence, health care and medical service, transport and communication from 1995 to 2007. The share of expenditure on residence is around 2% in 1995, it is risen to above 8% in 2002 and 2007. The share of expenditure on health care is around 3% in 1995, and there are no significant changes in accompanying the change of age. It is increased to above 6% in 2007, it shows a rising trend in accompanying the increasing of ages. The share of expenditure of transport and

communication is around 2% in 1995, and it has nearly no change with the change of ages, it is risen above 9% in 2002 and 2007, and it has a declining trend in accompanying the increasing of ages.

(3) There are relatively large changes of share of expenditure on education, culture and recreation in the year of 1995, 2002 and 2007, the share of expenditure on education, culture and recreation is the lowest in the year 1995 while it is the highest in 2002. It may be questioned why it is declined in 2007? This may be related to exemption of education cost around that year. In addition, the share of expenditure on education, culture and recreation has an inverted “U” structure with the age of head of household, the peak value appeared in the same age group, i.e. in the household with age of house holder from 45-49 years old.

It can be seen that there is significant relationship between the age structure of house holder and consumption structure of household from previous analysis, or to express the fact in different way, there are significant differences of consumption structure of household with different age groups. In short, the following rules are existed either from the cross section data or panel data: consumption of food increases with the increase of age of house holder; share of consumption of clothing, transport and communication decreases with the increase of age of house holder; the share of consumption of health care and medical services increases rapidly in accompanying the increase of age of the house holder; the share of consumption of education, culture and recreation has inverted “U” shape with the change of age.

II. CGE model description and scenario design

2.1 Main Assumption of Module of CGE

In the original DRC-CGE model the household demand sector only divides into urban households and rural households, so this could not reflect the impact of population aging from the consumption demand. In order to reflect the impact of population aging on consumption, we divide the household sector into 12 groups according the age of the head and size of the family. The following content mainly describe the household demand sector in CGE, other module referred to the related literature (Li Shan tong and He Jianwu (2010)).

Table 2. Household sectors in urban or rural area in CGE

size of the family	The age of the head of household below 40 years old	The age of the head of household between 40 and 60 years old	The age of the head of household above 60 years old
1-3 persons	(age140, small)	(age4060, small)	(age60, small)
Above 3 persons	(age140, large)	(age4060, large)	(age60, large)

Through the detailed description of household sector in CGE model, the changes of the ratio of each household group to the whole population, reflected demographic changes. This paper use ELES consumption function to describe the demands of each group.

$$U = \prod_i (C_i - \theta_i)^{\mu_i} (Save)^{\mu_s}$$

$$s.t. \sum_i P_i * C_i + Save = Y$$

$$\sum_{i=1}^n \mu_i + \mu_s = 1$$

P_i :Consumer commodity prices; Y:disposable income;

U :utility function; C_i :quantity of consumption goods; $Save$:household saving;

θ_i :survival consumption of goods; μ_i :the marginal consumption tendency.

Using CHIPS date, we estimate budgets share parameter and income elasticity of different family group in basic year 2007. However, to maintain the balance of SAM table with a base period of consistent data, we use least squares method to calibrate budgets share parameter.

2.2 Scenarios design

The domestic academic hold different views on whether the existing fertility policy should be adjusted, and how to adjust the fertility policy. They Can be roughly divided into three types: to maintain the existing policy(to maintain the existing low level of fertility),to impose the strict "one-child policy" (the fertility policy enforcement should be strengthened, the fertility rate can be further reduced, such as Li Xiaoping (2007), Ye Wenzhen(2010), Zhang Yong (2006)) and the relaxation of existing policies (advocates adjusting or relaxing the existing fertility policy, such as Li Jianxin (2005), Liang Zhongtang(2006)).So how the Different population policy will impact on China's future economic growth and structure, and what is China's population policy orientation? Researching the problem is significant. In order to study the impact of structural change of the population, it is necessary to design the possible scenarios of structural change of the population. By the mean time, in order to combine better this study with China's reality, the scenario of China's Population Projection under conditions of various birth rate policies done by Zeng Yi and Jiang Laiwei in 2009 is used to be the basis of design of this study. It is necessary to point out that the projection done by Zeng Yi and Jiang Laiwen (2009) is projection based on households, i.e. projection of

change of future number of households and average number of persons per household with house holder of different age groups.

According to population forecast of Zeng Yi, Jiang laiwen (2009), we set up 3 scenario, with low fertility scenario, medium fertility scenario(baseline scenario), and high fertility scenario.

Table 3 Scenario assumptions

Scenarios	Assumptions
Medium Scenario	<ol style="list-style-type: none"> 1. The total population trends and age structure is exogenous, which is from the medium population forecast in Zeng Yi Jiang Leiwen(2009) -Promoting “Two children for couples either one is only children” and “Two children with late childbearing”. 2. The supply of labor is exogenous, The supply of agricultural land is exogenous. 3. The tax rate and transfer is exogenous. 4. Balance of payments will gradually achieve balance from 2010 to 2050. 5. Government consumption is exogenous. 6. TFP is exogenous, the growth rate of TFP is about 2%
LOW Scenario	<ol style="list-style-type: none"> 1. The total population trends and age structure is exogenous, which is from the LOW scenario of population forecast in Zeng Yi Jiang Leiwen(2009) --Maintain the existing family planning policy ,only one child per family except both couple are only child 2.Others assumption is the same as that of Medium scenario.
HIGH Scenario	<ol style="list-style-type: none"> 1. The total population trends and age structure is exogenous, which is from the HIGH scenario of population forecast in Zeng Yi Jiang Leiwen(2009)-- Completely release the two-children policy, the fertility rate surged) 2. Others assumption is the same as that of Medium scenario.

Furthermore, following content lists the key variables change in the demographic changes under the three scenarios.

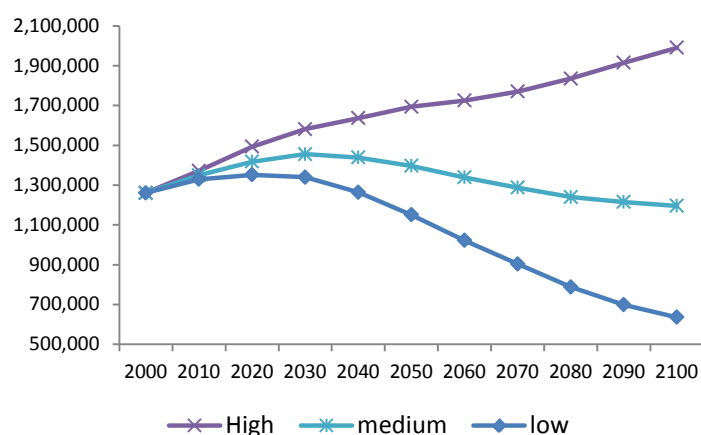


Figure 1: Total population forecast, Unit: thousand

Table 4 Labor Supply of 3 Scenarios Unit: 10 thousand

Scenarios	2010	2015	2020	2025	2030	2035	2040	2045	2050
Baseline	76176	76847	77517	76610	75703	73773	71843	69525	67206
LOW	74942	74402	73862	71792	69723	66471	63219	59009	54799
HIGH	77368	79487	81605	81916	82227	81922	81618	81857	82096
LOW relative to the baseline (%)	-1.62	-3.18	-4.71	-6.29	-7.90	-9.90	-12.00	-15.13	-18.46
HIGH relative to the baseline (%)	1.56	3.44	5.27	6.93	8.62	11.05	13.61	17.74	22.16

Table 5 Percentage changes of urban households of the three scenarios (%)

Type of household	Scenario	2010	2015	2020	2025	2030	2035	2040	2045	2050
Ratio of the age of head less 40 and scale of 1-3 persons	Baseline	25.25	19.91	15.54	13.24	11.23	10.83	10.47	10.56	10.64
	High	25.13	19.74	15.52	13.47	11.73	11.89	12.02	12.04	12.07
	Low	24.97	19.80	15.47	13.23	11.19	10.20	9.26	9.05	8.82
Ratio of the age of head above 60 and scale of 1-3 persons	Baseline	5.00	5.96	6.75	8.29	9.64	11.96	14.07	16.09	18.04
	High	5.04	6.04	6.82	8.33	9.61	11.53	13.19	14.56	15.80
	Low	5.09	6.06	6.88	8.36	9.71	12.25	14.65	17.27	19.98

2.3 Simulation results

2.3.1 Simulation results of baseline scenario

- **Economic growth rate**

Simulation results in baseline scenario show that: the economic growth rate gradually declines. The average growth rate from 2008 to 2010 is about 9.47%. The economic growth rate is expected to be around 6.83% from 2026 to 2030. The economic growth rate in the period from 2046 to 2050 is expected to be around 2.95%.

From perspective of the source of economic growth, the main driving force of China's economic growth still lies in the accumulation of capital. About 1.45 percentage points, accounting for 49.25% of the corresponding GDP growth rate is due to accumulation of capital. At the same time, labor contribution to economic growth is small before 2020, and becomes negative after 2020. The contribution to GDP growth from 2046 to 2050 is negative 0.33 percent.

In short, the accumulation of capital is still the engine of economic growth, but the

contribution of labor gradually becomes gradually negative.

Table 6 Economic growth rate from 2008 to 2050 (% , baseline scenario)

Baseline	2008~2010	2011~2015	2016~2020	2021~2025	2026~2030	2031~2035	2036~2040	2041~2045	2046~2050
Economic growth rate	9.47	8.53	7.36	6.83	6.40	5.71	4.81	3.85	2.95
Labor growth rate	1.06	0.18	0.17	-0.24	-0.24	-0.52	-0.53	-0.65	-0.68
Capital growth rate	13.12	12.20	10.52	8.52	6.99	5.89	4.88	3.85	2.86
Growth rate of TFP	2.40	2.58	2.24	2.88	3.19	3.15	2.71	2.27	1.83
Contribution to economic growth									
Labor	0.53	0.09	0.09	-0.12	-0.12	-0.27	-0.27	-0.33	-0.33
capital	6.54	5.86	5.03	4.07	3.34	2.82	2.37	1.91	1.45
TFP	2.40	2.58	2.24	2.88	3.19	3.15	2.71	2.27	1.83

Data source : Simulation result from CGE model.

- **Level of GDP per capita**

From economies of scale, at 2007 prices, China's total GDP in 2030 is likely to achieve 21380 billion dollar and exceed the total U.S. economy, the world's largest economy countries. As for the GDP per capita, it reaches \$ 35,683 in 2050, but it is still less than that of the U.S.A in 2009.

Table 7 GDP and GDP per capita in baseline scenario

Indicator	2008	2010	2015	2020	2025	2030	2035	2040	2045	2050
GDP (trillion yuan)	29.14	35.09	52.85	75.37	104.86	143.01	188.75	238.70	288.32	333.36
GDP per capita (10 thousand yuan)	2.19	2.60	3.82	5.32	7.30	9.82	13.04	16.59	20.33	23.87
GDP (trillion U.S. dollar)	4.36	5.25	7.90	11.27	15.68	21.38	28.22	35.69	43.11	49.84
GDP per capita (dollar)	3271	3887	5709	7947	10909	14685	19496	24801	30403	35683

Notes: constant prices at year 2007, Exchange rate: 1 dollar =6.6883yuan.

- **Economic structure**

Due to the aging of the population and declining saving rate, household consumption share of GDP gradually rise from 35.28 percent in 2010 rose to 42.66% in 2030 to 59.32% in

2050. At the same time, investment rate decreased from 47.78% in 2015 to 2050 23.47 %.

Table 8 Structure of GDP from 2007 to 2050 (% baseline scenario)

Structure of GDP	2007	2010	2015	2020	2025	2030	2035	2040	2045	2050
Household consumption	36.10	35.28	36.25	37.71	39.98	42.66	45.92	49.88	54.26	59.32
Governmental consumption	13.16	13.52	14.17	14.91	15.48	15.85	16.20	16.64	17.08	17.22
Capital formation	42.16	46.43	47.78	47.40	44.56	41.51	37.88	33.48	28.66	23.47
Net export	8.58	4.77	1.81	-0.01	-0.01	-0.01	-0.01	-0.01	-0.00	-0.00

The proportion of primary industry gradually reduces down to about 5.95% by 2030, a further decline to 0.74% by 2050. The proportion of secondary industry increased slightly from 2007 to 2010. Due to serious population aging, the proportion of secondary industry has been slowly decline from 50.10% in 2010 to 41.28% in 2050. At contrast, the proportion of the tertiary industry rise from 38.68 percent in 2010 to 57.98% in 2050.

Table 9 industry structure from 2007 to 2050 (% , baseline scenario, current price)

Baseline scenario	2007	2010	2015	2020	2025	2030	2035	2040	2045	2050
Primary industry	11.29	11.22	9.82	7.85	6.87	5.95	4.78	3.35	1.95	0.74
Secondary industry	49.96	50.10	49.92	49.51	48.76	47.94	46.91	45.40	43.50	41.28
Tertiary industry	38.75	38.68	40.26	42.63	44.38	46.11	48.30	51.25	54.55	57.98

2.3.2 Comparative analysis with the control scenario

In order to analyze the impact of population aging on the economy, we have also designed a control scenario that did not have aging problem. Total population growth in control scenario is the same as that in the baseline scenario. However, the population age structure in control scenario keeps with ageing structure in 2010, Therefore, there is no aging problem after 2010 in the control scenario.

- **Impact of population aging on economic growth rate**

With the deepening of population, the negative impact of population aging on the rate of economic growth increases. GDP growth rate of the control scenario in 2015 is 8.15%, 0.25 percentage points higher than that of baseline scenario (7.89%). GDP growth rate of the control scenarios in 2030 is 6.76%, 0.57 percentage points higher than that of baseline scenario. GDP growth rate of the control scenario in 2050 is 3.86%, 1.26 percentage points higher than that of the baseline scenario. Therefore, population aging has a greater negative impact on the china's GDP growth rate.

Table 10 Supply of Labor and GDP growth rate Unit: 10000 person

	2010	2015	2030	2050
Labor supply of baseline scenario	76176	76847	75703	67206
Labor supply of control scenario	76176	78117	82216	78916
Labor supply margin (%)	0.00	1.65	8.60	17.42
Difference of GDP growth rate (%)	0.00	0.25	0.57	1.26

Table 11 ratio of household groups in the baseline and the control scenario

Household groups	scenario	2010	2030	2050
Below 40 year old and 1-3 persons	baseline	0.25	0.11	0.11
	control	0.25	0.25	0.25
above 60 year old and 1-3 persons	baseline	0.05	0.10	0.18
	control	0.05	0.05	0.05

- **Impact of population aging on level of GDP**

With the deepening of population aging, the adverse impact of population aging on the level of GDP is increasing. China's GDP in the control scenario is 153.29 trillion yuan in 2030, 7.13% higher than the baseline scenario's GDP (143.01 trillion yuan). Moreover, GDP in the control scenario is 416.08 trillion yuan in 2050, 24.81% higher than that of baseline scenario. Because the population of the control scenario is the same as that of the baseline scenario, the changes of GDP per capita is the same as that of level of GDP.

Table 12 GDP of baselin scenario and control scenario Unit: trillion renminbi yuan

Scenario	2008	2010	2030	2050
Baseline	29.14	35.09	143.01	333.36
Control	29.14	35.09	153.20	416.08
Difference	0.00	0.00	7.13	24.81

Note: constant price at 2007

2.3.3 Simulation results of different population policy scenario

- **Economic growth rate**

The result shows that In 2030 GDP growth rate of LOW scenario is 5.75%, 0.44 percentage points lower than the baseline scenario, and in 2050 LOW scenario of GDP growth rate of LOW scenario is 1.32%, 1.28 percentage points lower than the baseline scenario, low-amplitude up to 49.1%. In other words, if we maintain stringent population policy unchanged, in 20 or 30 years, the total population and changes in the structure of China's economic growth rate will have a greater adverse impact on GDP growth rate.

- **Level of GDP per capita**

Judging from the size of the economy, due to the largest population and the least degree

of aging of High scenario, total GDP of the high scenario is the most among the 3 scenarios. In 2050, the total GDP of the High scenario is 390.72 trillion yuan, 17.21 percent higher than that of baseline scenario. On the contrary, the LOW scenario's GDP is less than the baseline scenario, by 2050, Total GDP of the low scenario is 265.06 trillion yuan, 20.49% lower than that of the baseline scenario.

Table 13 :GDP of the 3 scenarios Unit: trillion renminbi yuan

Scenarios	2008	2010	2015	2020	2025	2030	2035	2040	2045	2050
Baseline	29.14	35.09	52.85	75.37	104.86	143.01	188.75	238.70	288.32	333.36
Low	28.91	34.66	51.52	72.49	99.08	132.47	170.60	209.63	242.51	265.06
High	29.25	35.27	53.82	77.87	109.78	151.71	204.04	263.41	327.23	390.72
Low scenario relative to baseline (%)	-0.80	-1.23	-2.51	-3.83	-5.51	-7.37	-9.61	-12.18	-15.89	-20.49
High scenario relative to baseline(%)	0.37	0.51	1.83	3.30	4.69	6.08	8.10	10.35	13.49	17.21

From the perspective of GDP per capita, per capita GDP of high scenario is less than the baseline due to the large population in high scenario. In 2030, GDP per capita of high scenario is 96000 yuan, 2300 yuan less than that of baseline scenario. In 2050, Per capita GDP of High scenario is 230700 yuan, 8000 yuan less than that baseline. For the Low scenario, due the less population in the Low scenario before 2035, per capita GDP of low scenario is 131000 yuan, a little more than that of baseline. However, owing to the negative impacts of aging, the per capita GDP is 8300 yuan less than that of baseline. All in all, if the population policy of baseline is implemented, it is conducive for China to cope with the aging of the population aging , and makes the highest level of GDP per capita.

Table 14 : GDP Per capita of the 3 scenario Unit: 10 thousand yuan

Scenarios	2008	2010	2015	2020	2025	2030	2035	2040	2045	2050
Baseline	2.19	2.60	3.82	5.32	7.30	9.82	13.04	16.59	20.33	23.87
Low	2.20	2.61	3.84	5.36	7.36	9.89	13.10	16.58	20.09	23.04
High	2.17	2.57	3.76	5.21	7.14	9.60	12.68	16.10	19.65	23.07
Low relative to baseline(%)	0.44	0.30	0.65	0.90	0.89	0.65	0.48	-0.03	-1.22	-3.48
Highr elative to baseline (%)	-0.93	-1.09	-1.62	-1.90	-2.13	-2.30	-2.73	-2.96	-3.35	-3.34

- **GDP expenditure structure and industrial structure**

The more serious of aging, the higher the share of household consumption to GDP , and the lower the share of investment to GDP, in 2050, the share of household consumption to GDP in Low scenario is 60.56%, 1.25 percentage points higher than the baseline scenario, 1.84 percentage points higher than in the HIGH scenario; the share of investment to GDP in the LOW scenario is 18.36%, 5.11 percentage points lower than the baseline scenario , 6.95 percentage points lower than in the HIGH scenario.

Table 15: GDP expenditure structure of 3 scenarios (%)

GDP expenditure structure		2007	2010	2015	2020	2025	2030	2035	2040	2045	2050
	baseline	36.10	35.28	36.25	37.71	39.98	42.66	45.92	49.88	54.26	59.32
Ratio of Household consumption	Low	36.10	35.26	36.30	37.84	40.19	42.98	46.40	50.54	55.18	60.56
	High	36.10	35.20	36.22	37.67	39.91	42.56	45.73	49.60	53.84	58.73
	baseline	42.16	46.43	47.78	47.40	44.56	41.51	37.88	33.48	28.66	23.47
Ratio of Capital formation	Low	42.16	46.21	47.29	46.64	43.36	39.84	35.62	30.55	24.71	18.36
	High	42.16	46.56	47.99	47.70	44.95	42.00	38.64	34.50	30.07	25.29

From the perspective of industrial structure, the more serious of the degree of aging of scenario, the share of the tertiary industry is higher. In 2050, ratio of the tertiary industry of Low scenario accounted for 60.38%, 2.4 percentage points more than the baseline, 2.96 percentage points higher than the High scenario.

On the contrary, the proportion of the added value of the secondary industry showed the opposite trend with tertiary industry. In 2050, the share of the secondary industry of the low scenario accounted for 38.9%, 2.38 percentage points lower than that of the baseline scenario, 2.95 percentage points lower than that of HIGH scenario.

Table 16 : Industrial structure of 3 scenarios (%)

Industrial structure	Scenarios	2007	2010	2015	2020	2025	2030	2035	2040	2045	2050
Ratio of the tertiary industry	baseline	38.75	38.68	40.26	42.63	44.38	46.11	48.30	51.25	54.55	57.98
	Low	38.75	38.80	40.45	42.94	44.91	46.87	49.34	52.62	56.40	60.38
	High	38.75	38.80	40.28	42.59	44.30	46.01	48.12	50.97	54.14	57.42
Ratio of the secondary industry	baseline	49.96	50.10	49.92	49.51	48.76	47.94	46.91	45.40	43.50	41.28
	Low	49.96	50.13	49.77	49.19	48.24	47.20	45.90	44.06	41.68	38.90
	High	49.96	50.27	50.01	49.59	48.85	48.03	47.09	45.67	43.91	41.85

III. main conclusions

Based on the above analysis, there are the following conclusions in this paper:

- (1) Population aging will have greatly negative impact on the economic growth. As the aging become serious, GDP growth rate reduces greatly. Simulation results show that in 2030, GDP growth rate of control scenario is 6.76%, 0.57 percentage points higher than the baseline scenario; in 2050 GDP growth rate of control scenario is 3.86%, 1.26 percentage points higher than the baseline scenario.
- (2) In the baseline scenario when Promoting “Two children for couples either one is only children” and “Two children with late childbearing”, the level of GDP per capita is highest. Simulation results show that In 2050, the GDP per capita of the High scenario is 230,700 yuan, 8,000 yuan lower than the baseline medium,

the amplitude is 3.34%; the GDP per capita level of LOW scenario is 230,400 yuan, 8,300 yuan lower than the baseline.