Background

Nowadays, the world population still keeps on expending and the fertility rate keeps on declining which lead to the continuous changing on age structure of the world. The distribution of population aged 60 and over living in different regions showed in different period showed that, one half of ageing population lived in developed countries while the other half lived in developing countries from 1950's to 1970s'; in 2000, there were almost 60% ageing population lived in developing countries. As the result of the prediction by UN, it will increase to 70% and 80% in 2025 and 2050 respectively. The total population of China accounted for 21.88% of the world population, and population aged 65 and over accounted for 18.94% of total ageing population in the world in 1950. In future 50 years, the ageing population size of China will keep on expending. Because of the rapid declining of fertility rate, the percentage of working-aged population will increase, and before the percentage of ageing population reaching to the peak, there will be a "demographic dividend" which lasted from 2005 to 2025. Based on this background this paper aims to comprehend the development and changing tendency of ageing population in China and its impact on world ageing population where the size, degree, and growth and ageing of the aged population in China were investigated. In this regard this paper explores the development and developing modes of world ageing population, the development and characteristics of population ageing in China, population projection and changing tendency in the future, the impact of migration and education on population age structure.

Data and Methods

In this study the data comes from the 4^{th} and 5^{th} National Population Census in 1990 and 2000 contained important population information of China, for example, population migration status, population size, educational level and employment status, etc. Combine with the data of ageing population of the world published by UN TFR population projection has been applied. Only TFR and mortality rate were concerned in the model where TFR, mortality rate, net amount of migration between urban and rural area, and education transition rate were concerned as the main parameters. The Scenarios for PDE model by using the data of 2000 census and Scenarios for TFR method by using the data of 1990 and 2000 censuses have been shown and also tested for the results of population projection.

Results and Discussions:

Scenarios for TFR method by using the data of 1990 and 2000: According to the census data of 1990, the medium variant scenario of TFR was assumed to reduce from 2.31in 1990 to 1.8 in 2000, then, increase to 2.0 in 2050. Mortality at based year was the number of population who were died at that year divided by average population at same year. Data of mortality of starting population comes from short table data of "National Population Census, 1990". Here we assume that the life expectancy will increase 3 years for the male and 5 years till 2000, and increase to 76 and 80 in 2050 respectively. According to the census data of 2000, the medium variant scenario of TFR was assumed to maintain 1.8 till 2030, then, increase to 2.0 in 2050. Here we assume that the life expectancy will increase 5 years for the male and 7 years for the

female in 2050 compare with 2000.

Scenarios for PDE model by using the data of 2000: Data of starting population comes from long table and short table data of "National Population Census, 2000". The starting population divided by 1 year's age, each age is sex, education status and urban-rural specified. Consider about education status, in which non-education means the population who were never been to school plus the population who were just joined eliminating illiteracy classes, primary level means the population who has just attended primary school, middle school means the population who has earned middle school and high school education, and college and above means the population who was attending or has got the college and above degree.

3 scenarios for fertility and 1 scenario for mortality are as follows: (Table 1 and Table 2).

Table 1 Scenarios of fertility

TFR	**2000**	**1.66**	**1.8**	**2.0**
Urban	1.28	1.28（2000-2050）	1.37（2000-2050）	1.53 (2000-2050)
Rural	1.95	1.95（2000-2050）	2.11（2000-2050）	2.30 (2000-2050)

Table 2 Scenarios of life expectancy（years）

LE	Urban（male）	Urban（female）	Rural （male）	Rural （female）
2000	73.5	77.39	68.89	72.09
2010	74.55	78.86	69.87	73.46
2020	75.60	80.34	70.86	74.84
2030	76.65	81.81	71.84	76.21
2040	77.70	83.28	72.82	77.58
2050	78.75	84.76	73.81	78.96

Data of migration involved in much more factors, such as sex, age, education level and the direction of migration.The formula to calculate net migrants divided by urban-rural and sex as:

$M_n = M_i - M_e$ M_n-Net immigrants； M_i- Immigrants； M_e- Emmigrants。

Net immigrants of urban area: $Mu_n = \left(Mr_i + Mo_i\right) - \left(Mur_e + Muo_e\right)$

Education data of starting population comes from short table data of "National Population Census, 2000", and divided by the transition rate of no education of primary at 5～9 age group and 10～14 age group, transition rate of middle school to high school at 10～14 age group and 15～19 age group, and transition rate of high school to college at 15～19age group and 20～24 age group。

In reality, transition rates do not exist. This can be best done with precise enrolment data by age, sex and chosen level of education. However this information is seldom available therefore we use some more rude estimation procedures and this based on the existing highest level of education attained of the population which is most likely available from the census data. From the share of the population between education categories, one can assume that this represents the present transition along cohort lines.

The size of ageing population: The total population of China accounted for 21.88% of the world population, and population aged 65 and over accounted for 18.94% of total ageing population in the world in 1950. After fifty years, those two indicators became 20.74% and 20.60% (UN,2006). According to the result of our prediction, in 2050, the estimated percentage of total population in China of the world population will decrease to 15.33%, and the percentage of population aged 65+ in China of total ageing population in the world will increase to 26.85%.

The degree of population ageing: In 2002, 68 countries entered "ageing society" among 186 countries and regions in the world. In 2005, there was one old people of every 10 people. And in 2050 it was estimated that there would be one old people of every 6 people. In 2000, there was one old people of every 14 people in China, and in 2050, it was estimated that there would be one old people of every 4 people. According to the result of population projection, the world ageing population size will increase 2 times from the middle of last century to the middle of 21st century, while China will increase 5 times during the same time period. Before 2000, the percentage of ageing population in China on the average (about 4.8%) was lower than the average level of the world (about 5.6%); in 2000 it (about 7%) was close to the average level of the world (about 7%); from 2005 to 2050, the percentage in China on the average (about 16.7%) was estimated that much higher than the average level of the world (about 11.4%)

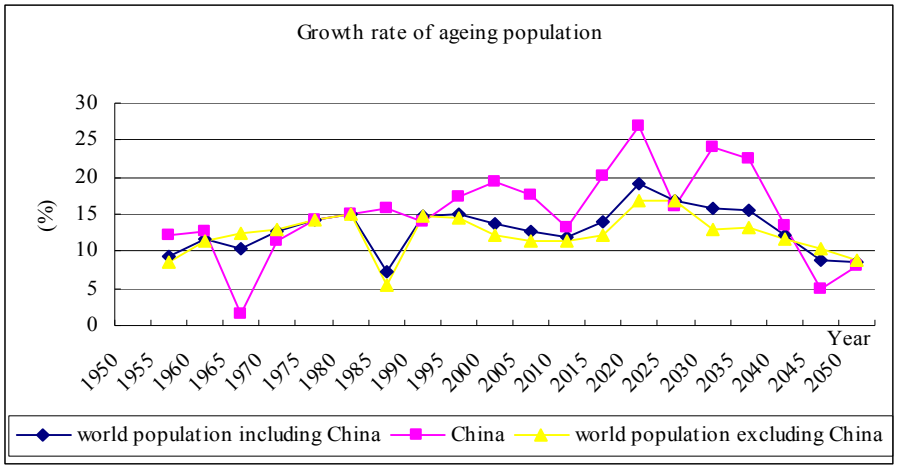
The growth rate of ageing population: According to the result of population projection, and combined with the data published by UN, the result of comparison showed that the amount of population changed every 5 years was keeping on expending. In the year of 1950 to 1995, within the world ageing population increment of every 5 years, China accounted for 18.79% on the average. In time period of 2000 to 2015, the increment of ageing population in China was estimated growing much faster, the percentage in China of the world increment will be 21.70% on the average, and will be 25.91% during the period from 2015 to 2050.

Ageing of the aged population: With the speeding up of population ageing process, the aged population becomes ageing. The number of population aged 80 and over in 2000 was 5 times of that in 1950. In 1950, the whole world had 14 million people aged 80 and over, which 6% of the total population, and 11% of the population aged 65 and over. In 2000, the world had 70 million people aged 80 and over, 17% of the population aged 65 and over. In 2050, the world was estimated that 0.42 billion people aged 80 and over, and more than one fourth of the population aged 65 and over.

China had the largest population in the world, it also had the huge amount of ageing population, and it definitely will be the country with largest population of oldest old. In 1950, China had 2million people aged 80 and over, which accounted for 0.3% of the total population, 6.3% of the ageing population (65+)in China, and 14.3% of the total population aged 80+ in the whole world. Those three percentages became 0.9%, 13.3% and 16.5% in 2000, and they were estimated reaching to 8.4%, 37.5% and 29.5% in 2050.

Fig. 1 showed the percentage of population aged 80+ in Asia and the world (including

China and excluding China). For the population aged 80 and over of the world, the percentage including China will reach to 3% in 2035, but reach the same percentage in 2040 excluding China. The impact on population aged 80+ on the world population aged 80+ will deepen since 2035. For the population aged 80 and over in Asia, the percentage including China was higher than that excluding China early in 2000. In 2050, the percentage including China will 1.4% higher than that excluding China.



Conclusion:

From this study it has been revealed that the process of population ageing in China had experienced several phases with variation since 1950s. Around 2000, China became “ageing type society”. Thus after the development of more than half a century, the size of ageing population in China expanded and became an irreversible outcome. According to the result of our prediction, in 2050, the estimated percentage of total population in China of the world population will decrease to 15.33% from the previous situation but and the percentage of population aged 65+ in China of total ageing population in the world will increase to 26.85%. It was estimated that in nearly half a century till 2050, development inertia of ageing population, would cause enormous influence on the size of the ageing population in the world, and bring China itself a heavy social burden like, social security and health care for the ageing population.