EXTREMELY RAPID AGEING AND THE LIVING ARRANGEMENTS
OF THE ELDERLY: THE CASE OF CHINA

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Populations are ageing, with changes in the living arrangements of the elderly occurring in most countries,

century is definite！ the proportion of the elderly population aged 65+ in 2050 will be more than four times higher than in 1990. The annual rate of increase in the proportion of the elderly population between 1990 and 2050 is 2.3 per cent.

In European societies, the ageing transition has been spread over one century or more. In China, however, this change will take place within a few decades and will reach more or less the same level of population ageing as in most of the developed countries by the the middle of the twenty-first century. The proportion of the elderly in China will increase much faster than in almost all other countries in the world. It will take about 20 years for the elderly population to increase from 10 to 20 per cent in China (2017-2037), compared to 23 years in Japan (1984-2007), 61 years in Germany (1951-2012), 64 years in Sweden (1947-2011) and 57 years in the United States of America (1971-2028) (United Nations, 1999b). Japan is regarded as a country with very rapid population ageing, but the ageing process of the Chinese population will be even faster than that for Japan (Ogawa, 1988). Table 1 gives the percentage of elderly persons aged 65 and above in 1990, 2030 and 2050 in selected countries. Figure I shows the average annual growth rates of the proportion of elderly persons between 1990 and 2050 in China and in selected developing and developed countries with large population sizes. By the middle of the twenty-first century, the proportion of elderly persons in China will be higher than that in the United States by 0.9 percentage points, and the average annual increase between 1970 and 2050 in China will be 2.6 times as high as in the United States. The anticipated proportion of the elderly population in China in 2050 is somewhat lower than in Canada, France, and the United Kingdom of Great Britain and Northern Ireland, and substantially lower than in Germany, Italy and Japan. But the annual increase of the percentage of the elderly population between 1990 and 2050 in China will be much higher than in the above-mentioned European countries and 44 per cent higher than in Japan.

(TABLE 1 HERE)

(FIGURE I HERE)

It is interesting to note that China is not alone with respect to extremely rapid population ageing among the developing countries. The proportion of elderly persons in the Republic of Korea will climb to a higher level with a larger annual increase rate than in China. Mexico and India, two developing countries with large population sizes, will also undergo very rapid population ageing at annual increase rates of 2.6 and 2.1 per cent, although their proportion of elderly persons in 2050 will be substantially lower than in China. The annual increases in the proportion of the elderly between 1990 and 2050 in China, India, Mexico and the Republic of Korea are all much higher than in European and North American countries. This fact deserves

serious attention, not only in those developing countries, but also from international organizations and developed countries as well (Kinsella, 1988; Kinsella and Suzman, 1992; Martin and Kinsella, 1994).

Huge numbers of elderly persons

The very large size of the elderly population is another unique characteristic of population ageing in China. In 1990, there were 63 million elderly persons aged 65 and over. By 2030 and 2050, there will be 232 million and 331 million elderly people in China, respectively, under the medium mortality assumption, based on our projection (Zeng and Vaupel, 1989; Zeng, 1994). The most recent revision of the United Nations population projection forecasts that there will be 234.5 million and 333.6 million elderly persons in China in 2030 and 2050, respectively, under the medium mortality assumption (United Nations, 1999b, p. 273). Again, the surprising consistency of the projected total numbers of the elderly in China in the twenty-first century, produced independently by different scholars at different times, 10 years apart, following substantially different approaches, confirms the anticipated huge number of elderly persons in China in the twenty-first century.

Table 1 also gives the numbers of elderly persons in other selected countries, projected by the Population Division of the United Nations Secretariat (1999a, 1999b) under the medium variant. Under the medium mortality assumption, China's elderly population will be fairly close to the total population size of the United States, and 4.4 times as large as the United States elderly population by the middle of the twenty-first century. China's elderly population will outnumber India's by 103 million in 2050, while its total population size will be smaller than that of India by 51 million.

Even more extremely rapid increase of oldest old persons after 2020

Most younger elderly persons (less than 80 years old) are relatively healthy, but the oldest old usually need help. The oldest old consume amounts of services, benefits and transfers far out of proportion with their numbers. For example, in 1988, about a quarter of the Medicare payments to hospitals in New York City were on behalf of the oldest old patients (Suzman, Manton and Willis, 1992, p. 6). According to a German study, 1.7, 3.2, 6.2, 10.7 and 26.3 per cent of the elderly aged 65-69, 70-74, 75-79, 80-84 and 85+, respectively, regularly need health-care services (Schneekloth and others, 1996). It is the oldest old who are most likely to need help. However, in China and in almost all other developing countries, very little is known about the oldest old, and almost all published statistics, based on census data, are truncated at age 65 or so. The Population Division of the United Nations Secretariat has taken a groundbreaking step forward by revising the United Nations population estimates and projections to extend the open-ended age interval from 80+ to 100+ (United Nations, 1999b). In the present paper, we examine the projected oldest old population in China in the

twenty-first century based on our study and compare it to the most recent projections by the United Nations Population Division.

Table 2 provides the projected numbers and percentage distributions by various age groups for the elderly population in China. There were about 8 million oldest old (aged 80 and over) in 1990. As compared with the increase of all elderly persons aged 65 and above, the number of the oldest old will climb much faster, to about 13 million, 32 million, 76 million and 114 million in 2000, 2020, 2040 and 2050, respectively, under the medium mortality assumption. The average annual increase rate of the oldest old between 1990 and 2050 will be 4.2 per cent. The percentage of the oldest old among the elderly population will be nearly tripled from 1990 to 2050. From 1990 to 2040, the share increases by approximately 2.5 percentage points per 10 years. But in the 10 years from 2040 to 2050, the share increases by 10.6 percentage points. The main reason for the number of oldest old to climb so quickly after 2040 is that the population born during China's baby booms in the 1950s and the 1960s will fall into the category of oldest old at that time.

(TABLE 2 HERE)

As shown in table 2, the numbers of elderly persons aged 65+ projected by Zeng and Vaupel (1989) are

of biomedical advances and breakthroughs and better personal health practices, such as healthy diets, not smoking and exercise. We therefore have made another optimistic scenario, namely, life expectancy for both sexes combined is assumed to approach 84.9 years by 2050 (Ogawa, 1988), a level that is about 4.5 years

Zhejiang, Jiangsu, Heilongjiang, Shanxi, Shananxi, Shichun, Guangxi, Guizhou and Hubei), only 5.9 per cent of the rural elderly aged 60 and over were pension recipients, in contrast to 73.7 per cent in the urban areas. Some 66.6 per cent of the urban elderly had their medical expenses paid entirely or in part by the Government or collective enterprises in 1991. However, this figure was only 9.5 per cent for the rural elderly. In another survey, carried out in 1987, a relatively small proportion (32.5 per cent) of the elderly in urban areas reported that they had difficulties in obtaining medical care, while a large majority (94.8 per cent) of the rural elderly had such difficulties. About 21.3 per cent of the urban elderly reported that their nutrition status was poor; for the rural elderly, the percentage was as high as 53.3 (Population Reasearch Institute of China Academy of Social Sciences, 1988).

It is also important to note that the extremely rapid and large-scale population ageing in China is accompanied by a per capita gross national product that is considerably lower than that of many other developing countries, especially in rural areas. Thus, resources for addressing the serious problems caused by rapid population ageing are very limited.

LIVING ARRANGEMENTS OF ELDERLY PERSONS

It is clear that Chinese population ageing will be extremely rapid and the size of the elderly population will be exceptionally large in the first half of the twenty-first century. Population ageing is accompanied by

children or grandchildren or other relatives, or in an institution? How many elderly live with a son or a daughter and his or her spouse? What are the gender and rural-urban differences? What are the changes in living arrangements in the recent past? What are the implications of those changes on future trends? Based mainly on the data from the one-per-thousand microdata files of the 1990 and 1982 censuses, the present section addresses questions such as these, which are important for elderly caregiving and health-related policy-making.

and 100+ are 15.4, 18.8 and 18.1, respectively. These figures show that, on the one hand, most of the oldest old live with adult sons and, on the other hand, a considerable portion of them live with adult daughters.

Based on 1990 census data, among the modest old who live with offspring, a majority (66.8 per cent of men and 79.6 per cent of women) live with both children and grandchildren. A larger majority (82.6 per cent of men and 83.2 per cent of women) of the very old who live with offspring live with both children and grandchildren. The corresponding figures for the extremely old men and women are 79.5 per cent and 77.1 per cent, respectively (see table 3). In the cultural context of Chinese society, multigeneration family households are one of the main living arrangements for the elderly, especially for the oldest old.

Slightly more than 2 per cent of the modest old men and women live with grandchildren without a son or a daughter present. The corresponding figures are 2.1 and 1.5 per cent for very old men and women, and 2.7 and 1.3 per cent for extremely old men and women (see table 3). This kind of two-generation household, consisting of grandparents and grandchildren, indicates that, in Chinese society grandchildren may care for their grandparents when the middle generation is not available (perhaps owing to job location or death); another scenario is that not very old grandparents may take care of young grandchildren.

Living with a spouse

Among the modest old men and women living with children, 36.8 and 69.7 per cent do not have a spouse present. Among the very old who live with children, a large majority (69.5 per cent of men and 94.6 per cent of women) do not live with a spouse. The corresponding figures are 80.7 and 98.9 per cent for the extremely old men and women. The proportion of elderly men who live with a spouse only is 21.6, 16.0 and 8.0 per cent at ages 65-69, 80-89 and 90+, respectively, in contrast to 15.2, 4.0 and 0.5 per cent for their female counterparts (see table 3). The proportion of the elderly not living with a spouse increases tremendously with age, owing to high rates of widowhood at old ages (divorce rate in China is extremely low). Many more elderly women are widowed than are men because of the gender differential in mortality at advanced ages.

Living alone or with other relatives or non-relatives

The proportion of the modest old men and women living alone is 8.0 and 10.2 per cent, in contrast to 13.2 and 15.2 for the oldest old men and women, respectively (the difference in the proportion living alone between ages 80-89 and 90+ is very small) (see table 3). It should be noted that elderly women are much more likely to be widowed and thus live alone. On the other hand, elderly women are economically more dependent. Therefore, the disadvantages of women in marital life and living arrangements are substantially more serious than are those of men at advanced ages.

traditional son preference in China may be reversed if urbanization is accompanied by appropriate social programmes that aim at increasing women's status and encouraging old persons to live with their daughters.

The proportion of those modest old, very old and extremely old men and women who live with both children and grandchildren is higher in rural than in urban areas (see table 3). This confirms the fact that the multigeneration family household is more popular in rural areas than in urban areas in contemporary China.

The proportion of the modest old, very old and extremely old who live with grandchildren, without a son or a daughter present, is about two to five times higher in urban areas than in rural areas (see table 3). This suggests that job location (rather than death) of the middle generation is the main reason for these special two-generation households, consisting of grandparents and grandchildren.

Slightly more of the modest old men and women in urban areas than in rural areas live with a spouse only. However, among the very old and extremely old, there is no clear pattern of rural-urban differences in living with a spouse only (see figure II and table 3).

There is no clear pattern of rural-urban differences in the proportion of the modest old who live alone, but it is evident that the proportion of the very old and extremely old who live alone is higher in rural areas than in urban areas (see figure II and table 3). People generally speculate that the urban elderly are more likely to prefer privacy and independent living arrangements, and thus are more likely to live alone than are their rural counterparts. But Chinese census data do not support this hypothesis. Perhaps, other factors such as higher widowhood rates, lower remarriage rates and fewer long-term-care facilities in rural areas than in urban areas offset the effects of rural-urban attitude differences. One may also speculate that the preference for privacy and independent living arrangements, even among Chinese elderly in urban areas, is still not strong. More in-depth studies are needed.

The proportions of institutionalized modest old, very old and extremely old men and women were two to

of the Chinese elderly in the 1980s were not a return to tradition. We also believe that the custom of Chinese

on government resources, some people, including some policy makers propose an official statement that old-age support in rural areas should rely mainly on the family. We think that this policy is inappropriate for several reasons. First, mainly relying on the family for old-age support in rural areas may not be feasible in the twenty-first century, because ageing problems will be more serious in rural areas than in urban areas. The future rural elderly will have, on average two children, and many of the children may migrate to urban areas (in contrast to the rural elderly of the past and present who had about six children staying in rural areas). The joint survival of parents and children will increase substantially in the future, so that the burden of caring for old parents, per child, will be much larger than at present (Tu, Liang and Li, 1989). Secondly, relying mainly on family support without social security would largely limit the independence of the elderly in decision-making concerning their own lives. Family support plus social security would place the elderly in a much better position for happiness. Thirdly, couples in many less developed rural areas still bear three or more children. A popular idea and practical need for having more children, especially sons, is expressed in the old Chinese saying "having sons for old-age care" (*yang er fang lao*). When fertility is greatly reduced, the practical need for "having sons for old-age care" has led people to try to determine the sex of the child

well-being, in particular to continue to feel needed and productive. This is one of the important policy actions that should be considered in order to resolve the serious ageing problems in the twenty-first century.

Facing extremely rapid population ageing, we believe that China needs to embark on a smooth transition to a "two-child plus spacing" policy. This policy would promote later marriage, later first birth and appropriate spacing (four to five years) between the first and second child. Couples who voluntarily choose to have only one child should be rewarded. As shown in some limited experimental areas discussed elsewhere (Zeng, 1997), the two-child plus spacing policy can help reduce the still high fertility rate in many rural areas, because it better meets the practical needs of peasants and is thus more acceptable to rural couples. Couples who follows the current one-child policy in urban areas and the 1.5-child policy (e.g., if the first child is a girl, the couple is allowed to have a second child) in rural areas will have much less family support when they become old, as compared to those who have more children by ignoring the policy. This is unfair, but difficult to change because the one-child and the 1.5-child policy do not meet peasants' practical needs. The universal two-child plus spacing policy will better realize the principles of equality among citizens. Later birth and

migration rate; we did not. In our current research for preparing this paper, we performed a new exercise in which we combine rural and urban sectors, start our projection from 1995 and use the same life expectancy assumption and constant net international migration rate as the one used by the United Nations. In this new exercise, the only difference is the method for interpolating age-specific death rates. The United Nations Population Division used model life tables to interpolate the five-year age-specific death rates in future years. We followed an iterative procedure to alter the death rates proportionally at the same rate at all ages of single-year specifics, and the iterative procedure stops when the projected life expectancy at birth in the particular year is achieved (Wade, 1989; Ahlburg and Vaupel, 1990). The discrepancy between the results of our new exercise and the United Nations projection becomes even larger: our new exercise projected 125 million oldest old persons in 2050, in contrast to the 99.6 million projected by the United Nations. We therefore concluded that the discrepancy is mainly attributable to the different approaches in interpolating age-specific death rates in future years. The United Nations model life-table approach assumes that the age pattern of changes in death rates in the future is the same as what was observed in the past, namely, death rates decline faster at younger ages than at older ages. This approach has led to implausible values (almost zero) of projected death rates at some young ages when mortality level is very low (Buettner,1999, p. 8; United Nations, 1998, pp. 7-8; Lee and Carter, 1992, p. 666). The approach we employed assumes that changes in death rates at each age are proportional to the age-specific death rates, which implies a faster decline of mortality at advanced ages than at young ages when mortality level is low, and does not produce too low death rates at young ages. We compare the projected life tables with the same assumptions of life expectancies at birth but following the United Nations model life-table approach and our approach of proportionally reducing death rates, respectively. The shapes of the curves of the two sets of life-table survival probabilities look plausible, but the United Nations model life-table survival probabilities are slightly higher before age 75 and significantly lower after age 80.

Since the early 1970s, female death rates in Japan have declined at annual rates of about 3 per cent for the elderly aged 80-89 and 2 per cent for those aged 90-99 (Vaupel and others, 1998, p. 856), which is

either, and further research on how to forecast age-specific rates of changes in mortality is imperative. Such research will be very useful to improve the accuracy of population projection, which may have major implications in ageing studies and socio-economic policy-making.

[1]The medium fertility variant assumes that the rural total fertility rate (TFR) would gradually decrease from 2.65 observed in the late 1980s to 2.23 in 2000, and reach the replacement level of 2.15 by the middle of the twenty-first century. The urban sector would have a total fertility rate of 1.64 in 2000 and 1.70 in 2050 (Zeng and Vaupel, 1989). These assumptions were made by us 10 years ago and seem quite plausible based on current information. The latest official figure of Chinese TFR in 1998 is 1.84 (*People's Daily*, 12 October 1999). But we believe that it is a substantial underestimation. Our estimates are that current

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[6]The 1998 health and longevity survey was carried out in 22 provinces: Liaoning, Jilin, Heilongjiang, Hebei, Beijing, Tianjing, Shanxi, Shananxi, Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Shangdong, Henan, Hubei, Hunan, Guangdong, Guangxi, Sichuan and Chongqing, covering 985 million people, 85.3 per cent of the total population of China. The survey

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TABLE 2. AGE DISTRIBUTION AMONG ELDERLY PERSONS AGED 65+

		Alone	Spouse	Living with spouse and child/grandchild or others					No spouse, living with child/grandchild or others					Institution	Total number
				Child	Grandchild	Child and grandchild	Others only	Subtotal	Child	Grandchild	Child and grandchild	Others only	Subtotal		
Ages 65-79															
Males	Rural	8.3	20.8	16.6	1.2	24.9	0.2	42.9	4.2	0.4	22.4	0.2	27.2	0.8	205 269
Males	Rural	13.8	15.3	4.0	0.5	15.7	0.1	20.3	5.8	0.6	43.1	0.2	49.7	0.9	20 227
	Urban	11.4	18.0	4.4	2.9	16.7	0.3	24.3	6.2	2.0	35.4	0.6	44.2	2.0	6 966
	Total	13.2	16.0	4.1	1.1	16.0	0.2	21.3	5.9	1.0	41.1	0.3	48.3	1.2	27 193
Females	Rural	15.5	4.1	0.7	0.1	3.5	0.0	4.4	11.1	0.6	63.8	0.1	75.6	0.4	36 334
	Urban	14.2	3.8	0.6	0.6	3.0	0.0	4.2	11.6	3.4	61.1	0.5	76.6	1.3	12 543
	Total	15.2	4.0	0.7	0.2	3.4	0.0	4.3	11.3	1.3	63.1	0.2	75.8	0.7	48 877

Ages 90+

Males	Rural	13.5		aA r	

TABLE 4. PERCENTAGE DISTRIBUTION OF LIVING ARRANGEMENTS OF THE ELDERLY IN CHINA (ALL 30 PROVINCES), RURAL AND URBAN AREAS COMBINED, COMPARISON BETWEEN 1990 AND 1982

	Alone	Spouse	Living with spouse and child/grandchild or others			No spouse, living with child/grandchild or others	Institution	Total number
			Child	Grandchild	Cchild and			