Dynamics of Family Households and Elderly Living Arrangements in China, 1990-2010

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Abstract

This article presents analysis on dynamics of family households and elderly living arrangements in China based on micro data of 2010, 2000 and 1990 censuses. We demonstrate the trends and rural-urban differentials of largely declined household size, quickly increasing one-person and one-couple-only households, substantially increased proportions of elderly living alone or with spouse only. We also present two unique/interesting findings. First, proportion of three-generation households increased by 18.9 percent in rural area, while decreased by 23.7 percent in urban areas in 1990-2010, due to socioeconomic/attitude changes and different rural-urban demographic effects of fertility decline. Second, increase in number of households is much larger than population growth, and increases in numbers of elders(especially oldest-old) who live alone or with spouse only are dramatically larger than the corresponding increase in the proportions, due to joint effects of rapid population aging and increase in proportions living alone or with spouse only.

Rapid socioeconomic transformations have taken place in China over the last several decades. Under the largely changed and more developed economic and social environments, how have the Chinese family households and living arrangements for the elderly changed since 1990? How can we better understand these dynamic changes? This paper sheds light on such questions concerning the dynamics of family households[1] and elderly living arrangements based on the micro data files of the 2010, 2000, and 1990 censuses (the sample fraction was one-per-thousand of the total population for 2010 and 1990 censuses and one-per-hundred for 2000 census), in combination with the officially published 100% censuses cross-tabulations. We integrate the analysis of elderly living arrangements with the family household dynamics in this article because Chinese population has been aging rapidly (Banister, Bloom, and Rosenberg, 2010) and family is the most important institution for old-age support in Chinese society (Pei and Pillai, 1999; Chen and Silverstein, 2000; Yeung and Xu, 2012).

The introduction section presents a brief literature review of selected previous studies on the dynamics of family households and elderly living arrangements in China, focusing on the periods after 1980 when economic reform started and China began to open its door to the world. The second section outlines the data sources and estimates used for the present study. The third and fourth sections present the general patterns and dynamic changes of family household sizes and types as well as the living arrangements of the elderly since 1990. The fifth section discusses the rural-urban differentials since 1990. While mainly presenting a

1. The concept of family household (Jia Tin Hu) used in this paper refers to a private household unit that consists of co-residing persons related through marriage, blood or adoption, and also includes co-residing non-relatives. We could not include detailed analysis on institutional households which consist of persons who live in various types of institutions, such as long-term care units, military installations, dormitories of universities, religious institutions and so forth, since the census micro datasets could not adequately represent the institutional populations, and even contain no information about types of the institutional households.

demographic analysis, we will also discuss socio-economic and cultural explanations on the patterns and dynamic changes in Chinese family household and elderly living arrangements.

1. Introduction

Our previous studies based on the one-per-thousand micro sample data from 1982, 1990 and 2000 censuses of China have shown that, during the period of 1982-2000, the one-person and one-couple-only households have been increasing quickly; average household size decreased significantly; the proportions of elderly-couple only households and elderly who did not live with children substantially increased (Zeng and Wang, 2003). Other studies also had similar findings and concluded that the family transformation in China during the period 1982-2000 was caused by factors including the tremendous fertility decline, rapid industrialization, increasing migration, rise in women's education, and the significant changes in social attitudes and economic mobility related to co-residence between old parents and adult children (Wang, 2006; Guo, 2008; Fan, 2002; Cheung and Yeung, 2013).

The most recent census of China in 2010 reveals that the trends outlined above have continued. For example, although the total number of households continues to increase in China, the average household size reduced from 3.44 in 2000 to 3.09 in 2010; in particular, small-sized households with only one or two household members have increased rapidly (Zhou, 2013). With regard to the household structure, Wang (2013) found that the nuclear households, the three-generation stem family households, and the one-person households make up the majority of the Chinese household in 2010. Among these three major types of households, the proportion of three-generation stem family household remain stable in recent decades, whereas the proportions of the nuclear family has significantly decline in 2010 as compared to 2000 due to the rapid increase of the one-person household. Hu and Peng (2014) and Cheung and Yeung (2013) point out that the young rural immigrants to urban areas could have contributed to the growth of one-person households in both rural and urban: the inflow of young immigrants increase the solo-living household in cities; simultaneously the left-behind elderly parents in rural area contribute to the increase of one-person elderly household in the rural regions. With

regard to elderly living arrangements, the increase in the proportion of China's elderly aged 65 or over who live alone or only with their spouse the decrease of the proportion of elderly living in three-generation stem family households from 1982 to 2010 are very substantial (Wang, 2014; Zhang, 2013).

Based on our own and others' previous studies, this article intends to make some unique contributions to better understanding of dynamics of households and elderly living arrangements in China, through comparative analysis across three censuses years 1990, 2000 and 2010 as well as rural and urban areas. We will also investigate the trends and patterns based on not only dynamics of proportion distributions of the household types/size and elderly living arrangements but also their absolute numbers' changes. To our knowledge, this is the first innovative attempt to integrate the analysis of dynamic changes in proportion distributions and absolute numbers in one article, which is meaningful as changes in both proportion distributions and the numbers of households by types/size and elders by living arrangements are especially useful for socioeconomic planning and business/market analysis.

2. Data sources and Estimates

As indicated earlier, the analyses presented in this article are mainly based on the micro sample data of the 2010, 2000, and 1990 censuses with a sample size of 1.34, 12.6 and 1.14 million persons, respectively.[2] Coale (1984) analyzed the 1953, 1964, and 1982 censuses data and the 1982 one-per-thousand fertility survey data. He concluded that the data passed a series of stringent tests of accuracy and consistency. Other scholars who have analyzed Chinese censuses and survey data have reached similar conclusions (Kannisto 1986; Lavely 2001; Cai 2013). Underreporting of births has, however, become a problem in recent decades contributing to underestimation of family household size. Based on sophisticated demographic analysis

2. Because of the huge sample size of the micro censuses data and we only use the aggregate measures in this article, we believe that it is not necessary to perform statistical tests for evaluating the differentials across times, sex, broad age groups of younger elderly and the oldest-old and rural-urban sectors.

using the censuses and various other kinds of data, many scholars demonstrated that the overall fertility in China (especially in urban areas) has been far below the replacement level since the late 1990s (Zhang and Zhao, 2006; Zhao and Chen 2011), and thus the effects of underreporting of births on statistics of family household size may not be serious as compared to that before late 1990s. Statistical officers and scholars in the field generally believe that census enumerations had become more difficult in the process of radical market economic reform mainly because many more people were moving around and the administrative system was not yet adapted to the tremendous changes. For example, based on post-census sampling surveys, the officially published net undercount rate of the 2000 census was 1.81 percent, in contrast to 0.6% percent in the 1990 census. However, the officially reported net undercount rate in the 2010 census was 0.12%, largely reduced compared to 2000 and 1990, perhaps due to the more mature administrative system adapted to the market economic system (Cui, Xu, and Li 2013). Nevertheless, the undercount rates in the contemporary Chinese censuses are not very high as compared to other countries (Zhao 2011). Nevertheless, we must keep the issue of undercount rate in mind, although it may not significantly affect our analysis on family household types and living arrangements of elderly who usually do not move around.

Note that the governmental socioeconomic planning and private business market trends analysis need not only detailed proportions distributions but also absolute numbers of households by types/sizes and elders by living arrangements. In some circumstances, the dynamic changes in absolute numbers may be of more practical meanings than that of proportions. For example, as to be discussed in section 4.3, the numbers of Chinese oldest-old aged 80+ living alone in 2010 increased by 200,0 percent compared to 1990, in contrast to 9.7 percent for the increase in the proportions in the same period.

The statistical offices publish cross-tabulations of both proportions and absolute numbers based on the 100% census data, but these cross-tabulations normally only contain certain limited rather broad categories and do not have detailed proportions and absolute numbers of households by types/sizes, and usually contain very little information about elderly living arrangements. Thus, scholars rely on the excellent data source of micro samples of the

censuses to estimate the proportion distributions by detailed types of family households and elderly living arrangements, which are very useful for academic research and general studies for the governmental socioeconomic planning and private business market trend analysis. However, the census micro sample data could be routinely used by the standard software to estimate the accurate proportion distributions, but it is not straightforward and no standard software to be used to accurately estimate the absolute numbers by detailed categories of family households and elderly living arrangements. This is because the sampling fractions for detailed categories may vary each other and substantially differ from the known overall sample fraction, and they are unknown unless one can access to the 100% census database, which is impossible for almost all of the analysts. Consequently, almost all of the previously published studies on family households and elderly living arrangements based on the micro census data included only detailed proportion distributions, but did not contain detailed information about the cross-sectional and dynamic changes in absolute numbers. Our present study intends to contribute to this research field by estimating and discussing both detailed proportions and absolute numbers of family households by types/sizes and elderly population by living arrangements, based on integrated usages of the micro census samples data and the official 100% census data cross-tabulations.

Note that it is not valid to simply multiply the detailed distributions derived from the census micro sample data by the ratios of the officially published summary measures based on the 100% census data to the corresponding summary measures derived from the census micro sample data, as it would produce results which are not internally and logically consistent, such as the sum of the proportions of households with various sizes are not equal to 1.0. Therefore,

We apply the “BasePop” module of the ProFamy extended cohort-component model/software program for households and elderly living arrangements projection, based on both of the micro census samples data and the official 100% census data cross-tabulations. The “BasePop” module consists of the ProFamy multi-state accounting model and a few associated technical procedures. The ProFamy multi-state accounting model transforms the marital/union statuses and co-residence with children and parents statuses of members of a population in the baseline

year of the projection (normally a census year) and future years into the households distributions by types, sizes and age/sex of the reference persons. The associated technical procedures ensure accurate total population size and age/sex/marital statuses distributions and total number of households by size and major types based on the published 100% census cross-tabulations in the census year, while using the census micro sample dataset to provide detailed information of the status distributions. The ProFamy multi-state accounting model and a few associated technical procedures were described, numerically evaluated and discussed elsewhere (ref. Zeng, Vaupel and Wang, 1998; section 2.2, Appendices A2.1, A2.2 and A3.1 in Zeng, Land et al. 2014), and thus no need to be detailed here.

3. Changing Family Households, 1990-2010

3.1. Chinese family household size is steadily decreasing

In 1990, four-person households constituted the largest share of all household categories by size, but it became the second largest in 2000 and third in 2010. In 1990, the five-or-more-person households account for 33 percent of the total family households but sharply declined to 22 percent in 2000 and to 17 percent in 2010. Three-person households constituted the largest percentage share in both 2000 (30%) and 2010 (27%); whereas the two-person household became the second largest group of household in 2010 (23%). Large households were no longer popular, namely, the six-or-more-person households constituted 15.4 percent in 1990, and decreased to only 8.1 percent in 2000, and further down to 6.6 percent in 2010 (see Figure 1).

--- Figure 1 about here---

The average family household size in China was 5.6 in 1930-40 and 4.36 in 1982; it was reduced to 3.94 in 1990; further decreased to 3.45 in 2000 and then to 3.10 in 2010. Note that the average family household sizes include the so-called floating population, who left home for less than half a year for job-related reasons and were counted as home-household members not in their current residence. Therefore, the actual average household size in China today would be even smaller than the published figures, if those who left home for less than half a

year for finding a permanent job elsewhere were excluded in being counted as a household member. It is clear that Chinese family household size is steadily and substantially decreasing due to dramatically decreased fertility, the rapid industrialization, rise in education, and changes in people's attitudes, which tend to favor smaller family households.

Although Chinese family households maintain the typical Asian characteristics, namely, the three-generation extended family households remain a relatively large proportion of the household types (to be detailed in section 3.5), Chinese family households in 2000 were already substantially smaller than those of many large Asian developing countries. For example, the average family household size in India and Indonesia in 2010 was 4.91 and 3.90 (per the Indian and Indonesian censuses), which is 58.9% and 26.2% larger than that in China in the same year.

3.2. Dramatically increased proportion of one-person and one-couple only households

One-person households in 2010, 2000 and 1990 accounted for 14.5, 8.3 and 6.3 percent of all households, respectively, representing a 31.7 percent increase in the period between 1990 and 2000, and a 57.5 percent increase from 2000 to 2010.

The one-couple only family households accounted for 17.7 percent of all households in 2010, which was 2.7 times that in 1990, and 1.44 times that in 2000 (see Table 1). The average annual rate of increase in the percent of one-couple only households was 8.6 percent in the period between 1990 and 2010. This dramatic increase is likely due mainly to considerably more elderly couples living without their children (to be discussed later) and some urban couples delaying childbearing in 2010 as compared to 2000 and 1990; the increasing number of young couples in the cities who choose to remain childless (i.e., the "Double Income and No Kids": "Ding-Ke Jia Ting") may also be a contributing factor. For example, based on the famous "Zero point index" surveys, the proportion of "Double Income and No Kids" family households in the largest Chinese cities of Beijing, Shanghai, Guanzhou and Wuhan increased from 1.1% in 1997 to 10.5% in 2004, and the average proportion among 20 Chinese cities (including middle and smaller size ones) was 6.5% in 2008.

--Table 1 about here--

However the dramatically increased increasing percentages Chinese one-person and one-couple only households are still much lower than those in Western countries. For example, the one-person and one-couple only households in the United States in 2010 constitute 26.7 and 27.2 percent of the total number of households, being 1.84, and 1.54 times as high as the Chinese ones, respectively. The main reasons why the percentages of one-person and one-couple only households in China are still much lower than those in Western countries are threefold. First, many fewer Chinese remain never-married for life. Second, most Chinese couples, especially about half of the population who live in rural areas, had their first birth earlier than their Western counterparts and much fewer couples remain permanently childless. Third, as discussed in greater detail later, unlike the elderly in the Western countries who mostly do not live with their adult children, most Chinese elderly, especially those who have no spouse, live with their children, and such a tradition remains although it is declining.

--- Table 2 is about here—

3.3. Much faster increase in number of households than in population size

Figure 2 and Table A1 in the Appendix show that the number of Chinese family households increased by 45.1 percent from 1990 to 2010, while the corresponding e population growth during this period was 17.9 percent. Thus, he increase of number of family households during this period is 2.5 times that of the population growth. Figure 2 also demonstrates that, while the percentage points of the increases in both the number of family households and population size declined in the period 2000-2010 than that in 1990-2000, the relative difference between the increase of households and population size in later period (2000-2010) was much larger than that in earlier period (1990-2000). More specifically, the relative increase in the number of households was 3.7 times that of population size increase in 2000-2010, in contrast to the corresponding relative difference of 1.8 times in 1990-2000. The data shown in Figure 2 and Table A1 clearly indicate that while population growth in China has slowed down substantially, the number of households is increasing rapidly because many Chinese people are

forming one- or two-person or other kinds of small households. Such trends and pattern certainly have important implications in the current and future market demands/potential for products and services of which households are the consumption units, such as housing, home-energy use, TV, refrigerators, washing machines, furniture and family-use vehicles.

3.4. Substantially decreasing percent of two-generation nuclear family households

The proportion of the two-generation nuclear family households has been continuously decreasing since 1990. The proportions of nuclear family households of one-couple & children and single-parent & children households decreased by 28.9 and 56.10 percent respectively, from 1990 to 2010 (see Table 1). This substantial decrease in nuclear family households is due to the large increase in one-couple only and one-person households. In particular, the decreasing percentage of single-parent family households while the divorce rate in China is increasing[1] may be occurring because most divorces involve couples who have no children or whose children have already left home, and because of increased remarriage rates and the decreasing widowhood rate.

3.5. Changes in proportion of three-generation family households

While nuclear family households are the mainstream in Chinese society today, extended family households with three generations also constituted a relatively large proportion: 18.41, 18.98, and 18.00 percent in 1990, 2000, and 2010, respectively (see Table 1). The three-generation family household was the second largest family household type in 2010, while the most popular one was the two-generation nuclear households, and the third and fourth were one-couple-only and one-person-only households.

Note that the proportion of three-generation family households in rural and urban combined in 2000 increased by 0.57 percentage points as compared to 1990. This was due to the fact that the proportion of three-generation households in rural areas has increased by 0.92 percentage points while it has decreased by 3.73 percentage points in the urban areas in the period of 1990-2000. In Section 5.1, we provide explanations of such rural-urban differentials.

4. Dynamics of Elderly Living Arrangements, 1990-2010

Analysing the changes of elderly living arrangements would more directly and accurately reveal the changes in intergenerational co-residence between old parents and adult children than looking at only the proportions of three-generation versus nuclear family households (ref. to sections 3.3, 3.4 and 3.5). Furthermore, we must pay special attention to the living arrangements of oldest-old aged 80+, who most likely need help of care in daily life and are increasing much faster than that of any other age group. We, therefore, devote a substantial portion of this paper to analysing the dynamic changes in elderly living arrangements since 1990 and break down the elderly population into two broad groups of younger elders aged 65-79 and the oldest-old aged 80+.

4.1. Co-residence between old parents and adult children declined substantially

As seen in Tables 2, 3 and 4, although the majority of Chinese elderly lived with their children ("children" includes grandchildren hereafter, unless otherwise specified) because children are currently the major source of old age security and care in Chinese society, the proportions of elderly living with children declined substantially in both periods 1990-2000 and 2000-2010. Note that the decrease among the young-olds (Table 3) were faster than that among the oldest-olds (Table 4). More specifically, as compared to 1990, the proportions of younger male and female elderly aged 65-79 who co-resided with children in 2010 was lower by 28.6 and 21.3 percent respectively; and the corresponding figures of decrease among male and female oldest-old (aged 80+) were 19.7 and 12.5 percent. Among the male and female elderly populations aged 65+, the proportion of those living with children dropped by 27.1 and 19.1 percent respectively in 2010 as compared to 1990. These data indicate that the prevalence of the traditional co-residence between elderly parents and adult children has declined substantially from 1990 to 2010, and the decrease was considerably more profound among young-olds than among the oldest-olds, and the decrease was substantially faster among males than females. Such trends and patterns may be due to younger and healthier elderly parents'

increasing preference to live independent of their adult children, and to more adult children having migrated away from their elderly parents for job-related reasons. It is clear that the female elderly (either young-olds or oldest-olds) are much more likely to live with their adult children (see Tables 2, 3, and 4) than males; and this gender differentials have increased in 2000-2010 as compared to 1990. This is because elderly women are more likely to be widowed and economically dependent and they are also more likely to be requested by their children to live together to take care of grandchildren.

---Tables 2, 3, and 4 are about here ---

4.2. Proportion of living alone and living with spouse only among Chinese elderly substantially increased

The proportion of elderly aged 65+ who live alone has declined by 6.7 percent from 1990 to 2000, but increased by 33.2 percent in 2010 compared to 2000. In the 20-year period from 1990 to 2010, the proportion of elderly living alone has increased by 24.3 percent (Table 2). The relative increase of young-olds who lived alone was substantially faster than that for the oldest-olds, and the relative increase of females young-old and oldest-old who lived alone was substantially faster than that of their male counterparts (Table 3 and 4).

The proportion of elderly aged 65+ who live with spouse only increased by 78.6 percent in 2010 compared to 1990. The relative increase in the proportion of elderly who lived with their spouse only for the oldest-olds (113.8%) in the period of 1990-2010 was much faster than that for the young-olds (82.2%), especially so for the female oldest-olds (167.1% increase) versus female young-old (86.6% increase). The large increase in the proportion of elderly who lived with their spouse only in 1990-2010 was likely due to the substantial decline in the proportion of elderly who lived with their adult children due to either the elderly's preference for independent living or the increased mobility of their children, a decline in mortality of elders' spouses, and a rise in remarriage rates among the elderly. The increase in remarriage rates among the elderly is a result of social reform and the progress of mate-matching services in the last two decades in China. The reform aimed to protect elders' rights, including the right to remarry, which in

traditional Chinese society were often violated by the intervention of children and other family members. Rapid economic development accompanied by substantial improvements in the standard of living has led to a decrease in mortality rates in old ages. While the proportion of the elderly who live with a spouse only in China has increased substantially in the past two decades, it is still much lower than those in the Western countries. The proportion of Chinese elderly who live with children is much higher than that in the Western countries (Zeng et al., 2013).

Note that both younger elderly women and oldest-old women are much more likely to be widowed and thus to live with children, without a spouse, or even to live alone (see Tables 3, 4 and 5). On the other hand, elderly women are economically more dependent. Therefore, the disadvantages of women in marital life and independent family household living arrangements are substantially more serious than those of men at old ages, and the gender differentials tend to increase with age.

4.3. The relative increases in absolute numbers versus proportions of elderly by living arrangements

It is interesting to note that, while the proportions of elderly who live alone and live with a spouse only among elders aged 65+ in 2010 has increased by 24.3 and 78.6 percent since 1990 respectively (see Table 2), the absolute numbers of elders aged 65+ who lived alone and lived with a spouse only have increased by 134.7 and 237.3 percent in the same period (see Table A1). It is even more remarkable to note that the numbers of oldest-old who lived alone and lived with a spouse only have increased by 233.2 and 484.7 percent from 1990 to 2010 (see Table A3), in contrast, the increase in the proportions in the same period was 21.8 and 113.8 percent (see Table 4). The much larger relative increases in the absolute numbers of the elderly (especially the oldest-old) who live alone or with spouse only than the corresponding proportions are due to the joint effects of a substantial increase in the proportions living alone or with spouse only among the elderly and the rapid population aging in China characterized by a rapid increase of the number of elderly especially the oldest-olds (ref. discussions in Section 2).

The policy makers and business managers may need to draw attentions to such trends of dramatic increase in the number of elderly (especially the oldest-olds) who live alone and who live with spouse only in their analysis so as to plan for the social service programs and commercial market activities.

5. The Rural-Urban Differentials

5.1. Rural-urban differentials in family household structure and its dynamic changes

The average sizes of family households in Chinese urban and rural areas in 2010 were 3.3 and 2.8, respectively. The average household size in urban area dropped by 25.6 percent from 1990 to 2010, in contrast to the 19.9 percent decrease in the rural area in the same period. As shown in Figure 3, the major difference of the percentage distributions of households by size between rural and urban areas is that the percent of small households of 1 or 2-3 persons in urban area are much higher than those in rural areas, while the opposite was true for the larger household of 4-5 and 6+ persons. The rural-urban differences tend to be larger in the later years of 2010 and 2000 compared to 1990. The main factors for such substantial differentials of family household sizes between the Chinese urban and rural areas include the much lower fertility in urban than in rural areas, and the large rural-urban family structural differentials discussed below.

The one-person only households and one-couple only households were substantially less prevalent in rural areas than in the urban areas as revealed in all three censuses conducted in 1990, 2000 and 2010 (see Table 1). The proportion of one-person only households has increased by 149.7 percent in the urban areas from 1990 to 2010, as compared to 112.1 percent increase in the rural areas. The higher and faster increase of one-person households in the urban areas may be a result of a higher divorce rate and that more not-married elderly prefer to have independent living or have to live alone (due to shortage or mobility of children) in the cities than that in the countryside.

The proportion of one person and other(s) households in the urban area more than tripled in 2010 (3.2%) compared to 1990 (1.0%), while it has increased by 34.3 percent only in the rural

areas. Data (not shown) indicate that almost all of the tremendous increase in proportion of households with one person and other(s) in 1990-2010 were from households with a reference person aged less than 65. Thus, we believe that this is mainly due to the fact that much more young or middle-age urban residents who do not live with spouse and children but share an apartment with the roommate(s) in the past a couple of decades.

The three-generation family households constituted 22.7 percent in the rural areas, in contrast to 13.6 percent in urban areas in 2010. The prevalence of three-generation family households in rural area was 1.7 times as high as that in the urban areas (see Table 1). It is interesting to note that the proportion of three-generation family households has increased by 18.9 percent in rural area, while decreased by 23.7 percent in the urban areas between 1990 and 2010.

Was the family household structure in the rural areas in China in 2010 more traditional than that in 1990? This seems unlikely because it is contradictory to the expected attitudes/behavior changes induced by the rapid socioeconomic development and the opening door to the outside world that have been occurring in China including rural and urban areas in the past three decades or more. Moreover, as shown in Table 2, the co-residence between old parents and adult children in rural areas has declined substantially during the period of 1990-2010. Therefore, we believe that, while the proportion of two-generation nuclear family households has dropped substantially in rural areas (see Table 1), the considerable increase in the proportion of the three-generation family households in the rural areas in 2010 compared to 1990 was mainly due to the demographic effects of a sharp declined in fertility. More specifically, given that most rural elderly parents still live with one married child (although declining), the adult children who were born after the early 1970s and have much fewer siblings due to a large decline in fertility (though still slightly above or around replacement level in rural areas) have a smaller chance of moving out of the parental home to form an independent nuclear family household (Zeng, 1986; 1991), and thus resulted in the considerable structural increase in the proportion of three-generation households in rural China in 1990-2010. However, fertility level in Chinese urban area declined to below replacement level in late 1970s

and continued to decline or sustained at a very low level since then. As modeled and numerically simulated in Zeng (1986; 1991), if fertility continues to fall after reaching the replacement level, a further reduction in the birth rate will reduce the proportion of three-generation households because it will be impossible for some elderly parents to live with their married child even if they wish to do so due to the shortage of children. Of course, in addition to such impacts of far-below-replacement fertility level in the urban areas, changing attitudes concerning intergenerational co-residence and increasing job mobility of adult children are also the major factors contributing to substantially decreased proportion of three-generation households in urban China in 2010 compared to 1990.

Clearly, while family households have been radically changing in both rural and urban areas, rural Chinese family households are more traditional than are their urban counterparts, because the socio-economic development level and changes in people's attitudes about multi-generational co-residence is substantially slower in rural than in urban areas, and the different demographic effects of fertility decline between rural and urban areas.

5.2. Rural-urban differentials in elderly living arrangements and its dynamic changes

The proportions of elderly men who live with children in rural and urban areas in 2010 were 49.7 and 45.1 respectively, and the corresponding figures for women were 62.8 and 55.4, respectively (see Table 2). Obviously, the rural elderly are more likely to live with their children than their urban counterparts do. Moreover, the proportion of elderly who lived with children has declined at a slower speed in rural (20.8%) than in urban areas (25.0%) from 1990 to2010.

The proportion of urban elderly women who lived alone is higher than that in rural areas by 4.6 percentage points. But the proportion of urban elderly men who lived alone is 2.6 percentage points lower than that in rural areas (see Table 2). In the urban area, there was a 25.6 percent increase of male oldest-old who lived alone, in contrast to 18.0 percent of increase of rural male oldest-old who lived alone between 1990 and 2000.. In 2010, about one-fifth of female oldest-old living alone, representing a 58.4 percent increase compared to that in 1990 in the urban areas, in contrast to 15.4 percent of female oldest-old living alone with a 10.9

percent increase in the rural areas in the same period (Table 4). The rural-urban and gender differences in the proportions of oldest-old living alone are enormous, and the largely increased female oldest-old living alone may deserve attention from the government and society.

The proportions of urban elderly men and women who lived with only a spouse in 2010 were higher than those of their rural counterparts by 6.9 and 4.6 percentage points respectively, and the higher widowhood rates and lower remarriage rates in rural areas than in urban areas may have contributed to this phenomenon.

Tables A1, A2, A3, and A4 in the Appendix demonstrated the rural-urban differences in relative increases of absolute numbers of households by types and old adults by living arrangements, which are dramatically larger than the rural-urban difference in changes in the proportions of the different households types and living arrangements of elderly.

6. Discussions and Conclusions

This article presents analysis on dynamics of family households and elderly living arrangements in China based on micro data of 2010, 2000 and 1990 censuses. We demonstrate the trends and rural-urban differentials of largely declined household size, quickly increasing one-person and one-couple-only households, substantially increased proportions of elderly living alone or with spouse only. We also present two unique/interesting findings. First, proportion of three-generation households increased by 18.9 percent in rural area, while decreased by 23.7 percent in urban areas in 1990-2010, due to socioeconomic/attitude changes and different rural-urban demographic effects of fertility decline. Second, increase in number of households is much larger than population growth, and increases in numbers of elders(especially oldest-old) who live alone or with spouse only are dramatically larger than the corresponding increase in the proportions, due to joint effects of rapid population aging and increase in proportions living alone or with spouse only.

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Appendix

Table A1. Numbers of elderly aged 65+ by living arrangements (unit:10,000), 1990-2010, China

	Rural and Urban combined				Rural				Urban			
	1990	2000	2010	2010 vs. 1990	1990	2000	2010	2010 vs. 1990	1990	2000	2010	2010 vs. 1990
Age 65+, Males												
Living alone	230	325	560	+145.3%	184	219	350	+89.8%	45	106	210	+366.5%
With spouse only	672	1,394	2,321	+243.9%	473	835	1,204	+154.6%	199	559	1,117	+459.8%
Sub Total of not living with children	902	1,718	2,881	+218.7%	658	1,053	1,554	+136.3%	244	665	1,327	+442.7%
Married, with children	1,217	1,585	1,937	+59.1%	916	1,077	1,075	+17.4%	301	508	862	+186.5%
Not-married with children	674	784	789	+18.2%	544	575	519	-4.5%	130	208	270	+107.8%
Sub Total of living with children	1,891	2,369	2,726	+44.5%	1,460	1,652	1,595	+9.2%	431	717	1,132	+162.8%
Institutionalized	32	32	50	+53.4%	16	16	18	+6.3%	16	16	33	+109.9%
With others, not with spouse/child	41	52	63	+55.3%	34	41	42	+26.4%	7.6	11	21	+169.4%
Age 65+, Males total	2,866	4,171	5,721	+99.6%	2,168	2,762	3,209	+48.0%	698	1,409	2,512	+259.6%
Age 65+, Females												
Living alone	363	450	830	+127.7%	270	270	433	+60.0%	93	180	397	+327.6%
With spouse only	487	948	1,604	+228.1%	369	579	828	+124.8%	118	369	775	+554.8%
Sub Total of not living with children	850	1,398	2,434	+185.2%	639	849	1,261	+97.4%	211	549	1,173	+455.1%
Married, with children	783	1,329	1,628	+108.2%	597	898	931	+56.0%	186	431	697	+274.6%
Not-married with children	1,754	1,889	2,047	+17.2%	1,354	1,348	1,239	-8.5%	400	541	807	+101.6%
Sub Total of living with children	2,537	3,218	3,674	+45.2%	1,951	2,246	2,171	+11.3%	586	972	1,504	+156.4%
Institutionalized	13	14	29	+115.0%	6.5	5.6	7.9	+20.8%	6.5	7.7	21	+221.0%
With others, not with spouse/child	33	27	35	+7.0%	24	17	19	-19.8%	10	9.2	16	+72.7%
Age 65+, Females total	3,433	4,657	6,172	+79.8%	2,620	3,119	3,458	+32.0%	814	1,537	2,714	+233.5%
Age 65+, Both sexes												
Living alone	592	774	1,389	+134.7%	455	488	783	+71.9%	138	286	607	+340.0%
With spouse only	1,160	2,342	3,927	+237.3%	842	1,414	2,033	+141.6%	318	928	1,893	+495.7%
Sub Total of not living with children	1,752	3,117	5,316	+202.6%	1,296	1,902	2,816	+117.2%	456	1,214	2,500	+448.6%
Married, with children	2,000	2,914	3,566	+78.3%	1,513	1,975	2,007	+32.6%	487	939	1,559	+220.3%
Not-married with children	2,428	2,673	2,834	+17.3%	1,898	1,923	1,758	-7.4%	530	750	1,076	+102.9%
Sub Total of living with children	4,428	5,587	6,399	+44.9%	3,411	3,898	3,764	+10.4%	1,017	1,689	2,635	+159.1%
Institutionalized	45	45	79	+72.9%	23	22	25	+10.7%	22	24	54	+142.9%
With others, not with spouse/child	74	79	98	+33.1%	57	58	61	+7.8%	17	20	37	+116.4%
Age 65+, Both sexes total	6,299	8,827	11,893	+88.8%	4,788	5,881	6,667	+39.3%	1,512	2,947	5,225	+245.6%

Table A2. Numbers of young-old aged 65-79 by living arrangements (unit: 10,000), 1990-22010, China

	Rural and Urban combined				Rural				Urban			
	1990	2000	2010	2010 vs. 1990	1990	2000	2010	2010 vs. 1990	1990	2000	2010	2010 vs. 1990
Age 65-79, Males												
Living alone	2,790	3,992	5,271	+89.1%	2,120	2,640	3,001	+41.5%	669	1,352	2,270	+239.2%
With spouse only	626	1,300	2,062	+228.2%	441	779	1,085	+146.3%	186	520	977	+426.5%
Sub Total of not living with children	821	1,576	2,490	+202.9%	598	967	1,359	+127.3%	223	609	1,131	+407.0%
Married, with children	1,155	1,463	1,729	+49.7%	870	991	962	+10.7%	285	471	767	+169.1%
Not-married with children	555	604	531	-3.4%	452	445	356	-21.3%	103	160	175	+70.1%
Sub Total of living with children	1,709	2,067	2,260	+32.4%	1,321	1,435	1,318	-0.3%	388	631	942	+142.8%
Institutionalized	29	27	39	+33.4%	15	14	14	-4.1%	14	14	25	+78.4%
With others, not with spouse/child	36	46	54	+51.0%	30	36	36	+23.0%	6.6	10	17	+165.2%
Age 65-79, Males total	5,190	7,432	9,686	+86.6%	3,927	4,905	5,455	+38.9%	1,263	2,527	4,231	+235.0%
Age 65-79, Females												
Living alone	288	358	594	+105.5%	213	214	310	+45.8%	75	144	284	+278.1%
With spouse only	467	901	1,475	+214.5%	354	550	757	+114.2%	114	351	718	+532.2%
Sub Total of not living with children	755	1,258	2,070	+173.0%	567	764	1,068	+88.4%	189	495	1,002	+430.9%
Married, with children	757	1,238	1,493	+97.5%	577	839	851	+47.3%	180	400	643	+257.8%
Not-married with children	1,388	1,388	1,346	-2.7%	1,082	991	808	-25.3%	307	396	538	+75.4%
Sub Total of living with children	2,146	2,626	2,839	+32.7%	1,659	1,830	1,658	-0.1%	486	796	1,181	+142.7%
Institutionalized	9.4	8.2	17	+79.3%	4.7	3.7	5.3	+11.4%	4.7	4.7	12.0	+152.9%
With others, not with spouse/child	26	20	25	-5.0%	18	13	13	-29.3%	7.6	6.5	12	+55.4%
Age 65-79, Females total	2,937	3,912	4,951	+68.6%	2,249	2,610	2,744	+22.0%	687	1,302	2,206	+221.0%
Age 65-79, Both sexes												
Living alone	483	633	1,022	+111.9%	370	401	584	+57.8%	113	232	438	+288.7%
With spouse only	1,093	2,200	3,539	+222.6%	794	1,329	1,843	+132.1%	299	871	1,696	+466.8%
Sub Total of not living with children	1,576	2,834	4,561	+188.7%	1,164	1,730	2,427	+108.5%	412	1,104	2,134	+418.1%
Married, with children	1,912	2,701	3,223	+68.6%	1,447	1,830	1,813	+25.3%	464	871	1,410	+203.5%
Not-married with children	1,943	1,992	1,875	-3.0%	1,534	1,436	1,163	-24.2%	410	556	712	+73.7%
Sub Total of living with children	3,855	4,693	5,097	+32.5%	2,981	3,266	2,976	-0.2%	874	1,427	2,122	+142.7%
Institutionalized	38	36	56	+45.0%	19	18	19	-0.9%	19	18	37	+97.7%
With others, not with spouse/child	62	65	79	+28.1%	48	49	50	+3.2%	14	16	29	+105.7%
Age 65-79, Both sexes total	5,531	7,627	9,794	+77.1%	4,213	5,063	5,472	+29.9%	1,319	2,565	4,322	+227.6%

Table A3. Numbers of oldest-old aged 80+ by living arrangements (unit: 10,000), 1990-22010, China

	Rural and Urban combined				Rural				Urban			
	1990	2000	2010	2010 vs. 1990	1990	2000	2010	2010 vs. 1990	1990	2000	2010	2010 vs. 1990
Age 80+, Males												
Living alone	35	49	131	+278.3%	27	32	76	+177.9%	7.4	17	55	+646.5%
With spouse only	46	94	259	+454.2%	32	55	119	+266.6%	14	39	140	+904.9%
Sub Total of not living with children	81	143	391	+378.9%	60	87	195	+226.0%	21	56	196	+815.1%
Married, with children	62	123	209	+233.8%	47	86	113	+143.1%	16	37	95	+499.7%
Not-married with children	119	179	258	+118.2%	92	130	164	+77.5%	27	49	94	+250.7%
Sub Total of living with children	182	302	467	+157.9%	139	216	277	+99.5%	43	85	190	+343.1%
Institutionalized	3.3	4.0	11	+231.8%	1.8	1.7	4	+94.5%	1.4	2.3	7.1	+425.8%
With others, not with spouse/child	4.9	6.0	9.1	+86.1%	3.9	4.6	6.0	+52.3%	1.0	1.3	3.1	+210.7%
Age 80+, Males total	271	455	877	+223.7%	204	310	482	+135.6%	67	145	396	+494.4%
Age 80+, Females												
Living alone	75	92	235	+211.9%	57	56	122	+113.7%	18	36	113	+536.5%
With spouse only	20	48	130	+557.0%	15	30	71	+377.3%	4.7	18	58	+1131.8%
Sub Total of not living with children	95	140	365	+283.8%	72	86	193	+168.2%	22	54	171	+661.8%
Married, with children	26	91	136	+426.1%	19	59	81	+314.3%	6.4	31	55	+765.3%
Not-married with children	366	502	699	+91.7%	272	357	431	+58.6%	94	145	268	+185.5%
Sub Total of living with children	392	592	835	+113.7%	291	416	512	+75.7%	100	176	323	+222.5%
Institutionalized	3.5	5.1	11	+220.8%	1.7	2.0	2.7	+59.1%	1.8	3.0	9.1	+396.4%
With others, not with spouse/child	7.0	7.5	10	+49.6%	5.0	4.7	5.9	+17.1%	1.9	2.8	5.1	+136.4%
Age 80+, Females total	497	745	1,221	+145.9%	370	508	714	+92.8%	126	236	508	+301.9%
Age 80+, Both sexes												
Living alone	110	141	367	+233.2%	85	87	198	+134.5%	25	54	168	+568.3%
With spouse only	66	142	389	+484.7%	47	85	190	+301.6%	19	57	199	+961.9%
Sub Total of not living with children	176	283	756	+327.7%	132	172	389	+194.5%	44	110	367	+736.5%
Married, with children	88	213	344	+290.0%	66	145	194	+193.8%	22	68	151	+575.4%
Not-married with children	485	680	957	+98.2%	364	487	595	+63.3%	121	193	362	+200.1%
Sub Total of living with children	573	894	1,301	+127.7%	430	632	789	+83.3%	143	261	513	+258.7%
Institutionalized	6.7	9.1	23	+228.5%	3.5	3.8	6.2	+77.8%	3.2	5.3	16	+411.0%
With others, not with spouse/child	12	13	20	+64.6%	9.0	9.3	12	+32.4%	2.9	4.1	7.7	+162.7%
Age 80+, Both sexes total	768	1,199	2,099	+173.4%	575	818	1,195	+108.0%	193	381	904	+368.3%

Table 1. Percentage distributions of households by types, 1990-2010, China

	Rural and Urban combined				Rural				Urban			
	1990	2000	2010	2010 vs. 1990	1990	2000	2010	2010 vs. 1990	1990	2000	2010	2010 vs. 1990
One generation households												
One person only	6.27	8.30	14.53	+131.8%	5.87	6.93	12.44	+112.1%	6.60	10.50	16.49	+149.7%
One person & others	0.76	1.15	1.96	+158.4%	0.52	0.86	0.70	+34.3%	1.00	1.63	3.20	+219.6%
Married couple	6.51	12.25	17.69	+171.8%	5.86	10.43	16.63	+183.7%	7.00	15.14	18.63	+166.1%
Sub Total of one generation	13.53	21.70	34.18	+152.5%	12.25	18.21	29.77	+143.0%	14.61	27.26	38.32	+162.3%
Two generation households												
Married couple & children	58.56	52.75	41.63	-28.9%	59.49	52.86	41.67	-30.0%	57.78	52.58	41.61	-28.0%
Lone mother & children	3.45	2.65	3.34	-3.1%	3.09	2.74	3.39	+9.6%	3.73	2.50	3.29	-11.8%
Lone father & children	6.05	3.91	2.85	-53.0%	6.01	4.12	2.48	-58.8%	6.08	3.59	3.20	-47.4%
Sub Total of two generation	68.05	59.32	47.83	-29.7%	68.60	59.72	47.54	-30.7%	67.59	58.67	48.10	-28.8%
Three generation households(grandchildren & grandparents)												
Married couple (mid-generatio	15.89	16.09	14.25	-10.3%	16.94	18.84	18.07	+6.7%	15.04	11.70	10.71	-28.8%
Lone mother (mid-generation)	0.71	0.90	1.69	+138.5%	0.52	1.00	2.15	+316.9%	0.86	0.73	1.26	+46.5%
Lone father (mid-generation),	1.82	2.00	2.06	+13.4%	1.70	2.22	2.54	+49.8%	1.91	1.64	1.62	-15.2%
Sub Total of three generation	18.41	18.98	18.00	-2.3%	19.15	22.07	22.77	+18.9%	17.80	14.07	13.58	-23.7%
Average household size	3.46	3.46	3.07	-11.3%	4.13	3.67	3.31	-19.9%	3.80	3.11	2.83	-25.6%

Table 2. Percentage distributions of living arrangements of elderly aged 65+, 1990-2010, China

	Rural and Urban combined				Rural				Urban			
	1990	2000	2010	2010 vs. 1990	1990	2000	2010	2010 vs. 1990	1990	2000	2010	2010 vs. 1990
Age 65+, Males												
Living alone	8.0	7.8	9.8	+22.9%	8.5	7.9	10.9	+28.2%	6.4	7.5	8.4	+29.7%
With spouse only	23.5	33.4	40.4	+72.3%	21.8	30.2	37.5	+72.0%	28.6	39.7	44.5	+55.6%
Sub Total of not living with children	31.5	41.2	50.3	+59.7%	30.3	38.1	48.4	+59.6%	35.0	47.2	52.8	+50.9%
Married, with children	42.5	38.0	33.8	-20.3%	42.3	39.0	33.5	-20.7%	43.1	36.1	34.3	-20.3%
Not-married with children	23.5	18.8	13.9	-40.8%	25.1	20.8	16.2	-35.5%	18.6	14.8	10.7	-42.2%
Sub Total of living with children	66.0	56.8	47.8	-27.6%	67.4	59.8	49.7	-26.2%	61.7	50.9	45.1	-26.9%
Institutionalized	1.1	0.8	0.9	-23.2%	0.8	0.6	0.5	-28.2%	2.2	1.1	1.3	-41.6%
With others, not with spouse/child	1.4	1.2	1.1	-22.2%	1.6	1.5	1.3	-14.6%	1.1	0.8	0.8	-25.1%
Age 65+, Males total	100	100	100		100	100	100		100	100	100	
Age 65+, Females												
Living alone	10.6	9.7	13.4	+26.6%	10.3	8.7	12.5	+21.2%	11.4	11.7	14.6	+28.2%
With spouse only	14.2	20.4	25.9	+82.5%	14.1	18.6	24.0	+70.2%	14.6	24.0	28.6	+96.3%
Sub Total of not living with children	24.8	30.0	39.3	+58.6%	24.4	27.2	36.5	+49.5%	26.0	35.7	43.2	+66.4%
Married, with children	22.8	28.5	26.4	+15.8%	22.8	28.8	26.9	+18.1%	22.9	28.0	25.7	+12.3%
Not-married with children	51.1	40.6	33.3	-34.8%	51.7	43.2	35.8	-30.7%	49.2	35.2	29.7	-39.6%
Sub Total of living with children	73.9	69.1	59.7	-19.2%	74.5	72.0	62.8	-15.7%	72.1	63.2	55.4	-23.1%
Institutionalized	0.4	0.3	0.5	+19.6%	0.3	0.2	0.2	-8.5%	0.8	0.5	0.8	-3.8%
With others, not with spouse/child	1.0	0.6	0.6	-40.5%	0.9	0.6	0.5	-39.3%	1.2	0.6	0.6	-48.2%
Age 65+, Females total	100	100	100		100	100	100		100	100	100	
Age 65+, Both sexes												
Living alone	9.4	8.8	11.7	+24.3%	9.5	8.3	11.7	+23.4%	9.1	9.7	11.6	+27.3%
With spouse only	18.4	26.5	32.9	+78.6%	17.6	24.1	30.5	+73.5%	21.0	31.5	36.2	+72.4%
Sub Total of not living with children	27.8	35.3	44.6	+60.3%	27.1	32.4	42.2	+56.0%	30.1	41.2	47.8	+58.7%
Married, with children	31.8	33.0	30.0	-5.5%	31.6	33.6	30.1	-4.8%	32.2	31.9	29.8	-7.3%
Not-married with children	38.6	30.3	24.0	-37.9%	39.6	32.7	26.4	-33.5%	35.1	25.5	20.6	-41.3%
Sub Total of living with children	70.3	63.3	53.9	-23.3%	71.3	66.3	56.5	-20.8%	67.3	57.3	50.4	-25.0%
Institutionalized	0.7	0.5	0.7	-8.4%	0.5	0.4	0.4	-20.5%	1.5	0.8	1.0	-29.7%
With others, not with spouse/child	1.2	0.9	0.8	-29.5%	1.2	1.0	0.9	-22.6%	1.1	0.7	0.7	-37.4%
Age 65+, Both sexes total	100	100	100		100	100	100		100	100	100	

Table 3. Percentage distributions of living arrangements of young-old aged 65-79, 1990-2010, China

	Rural and Urban combined				Rural				Urban			
	1990	2000	2010	2010 vs. 1990	1990	2000	2010	2010 vs. 1990	1990	2000	2010	2010 vs. 1990
Age 65-79, Males												
Living alone	7.5	7.4	8.9	+18.7%	8.0	7.6	10.0	+25.5%	5.9	7.0	7.3	+22.8%
With spouse only	24.1	35.0	42.4	+75.9%	22.4	31.8	39.8	+77.3%	29.4	41.2	46.2	+57.2%
Sub Total of not living with children	31.6	42.4	51.3	+62.3%	30.5	39.4	49.8	+63.7%	35.3	48.2	53.5	+51.4%
Married, with children	44.5	39.4	35.7	-19.8%	44.3	40.4	35.3	-20.3%	45.1	37.3	36.2	-19.6%
Not-married with children	21.4	16.3	11.1	-48.2%	23.0	18.1	13.0	-43.3%	16.3	12.7	8.3	-49.2%
Sub Total of living with children	65.9	55.6	46.7	-29.0%	67.3	58.5	48.3	-28.2%	61.4	50.0	44.5	-27.5%
Institutionalized	1.1	0.7	0.8	-28.5%	0.7	0.6	0.5	-31.0%	2.2	1.1	1.2	-46.7%
With others, not with spouse/child	1.4	1.2	1.1	-19.1%	1.5	1.5	1.3	-11.4%	1.0	0.8	0.8	-20.8%
Age 65-79, Males total	100	100	100		100	100	100		100	100	100	
Age 65-79, Females												
Living alone	9.8	9.2	12.0	+21.9%	9.5	8.2	11.3	+19.5%	10.9	11.1	12.9	+17.8%
With spouse only	15.9	23.0	29.7	+86.6%	15.7	21.1	27.6	+75.5%	16.5	27.0	32.5	+97.0%
Sub Total of not living with children	25.7	32.2	41.7	+61.9%	25.2	29.3	38.9	+54.4%	27.5	38.0	45.4	+65.4%
Married, with children	25.8	31.7	30.2	+17.2%	25.7	32.1	31.0	+20.8%	26.1	30.7	29.1	+11.5%
Not-married with children	47.3	35.5	27.3	-42.3%	48.1	38.0	29.4	-38.8%	44.6	30.5	24.4	-45.3%
Sub Total of living with children	73.1	67.1	57.5	-21.3%	73.8	70.1	60.4	-18.1%	70.8	61.1	53.5	-24.4%
Institutionalized	0.3	0.2	0.3	+6.3%	0.2	0.1	0.2	-8.7%	0.7	0.4	0.5	-21.2%
With others, not with spouse/child	0.9	0.5	0.5	-43.6%	0.8	0.5	0.5	-42.0%	1.1	0.5	0.5	-51.6%
Age 65-79, Females total	100	100	100		100	100	100		100	100	100	
Age 65-79, Both sexes												
Living alone	8.7	8.3	10.4	+19.7%	8.8	7.9	10.7	+21.5%	8.5	9.1	10.1	+18.6%
With spouse only	19.8	28.8	36.0	+82.2%	18.9	26.3	33.7	+78.7%	22.7	34.0	39.2	+73.0%
Sub Total of not living with children	28.5	37.2	46.5	+63.1%	27.6	34.2	44.4	+60.5%	31.2	43.0	49.4	+58.1%
Married, with children	34.6	35.4	32.9	-4.7%	34.4	36.1	33.1	-3.5%	35.2	34.0	32.6	-7.4%
Not-married with children	35.1	26.1	19.2	-45.2%	36.4	28.4	21.2	-41.6%	31.1	21.7	16.5	-47.0%
Sub Total of living with children	69.7	61.5	52.2	-25.1%	70.8	64.5	54.4	-23.1%	66.3	55.6	49.1	-25.9%
Institutionalized	0.7	0.5	0.6	-18.1%	0.5	0.4	0.4	-23.7%	1.4	0.7	0.9	-39.7%
With others, not with spouse/child	1.1	0.9	0.8	-27.6%	1.1	1.0	0.9	-20.6%	1.1	0.6	0.7	-37.2%
Age 65-79, Both sexes total	100	100	100		100	100	100		100	100	100	

Table 4. Percentage distributions of living arrangements of oldest-old aged 80+, 1990-2010, China

	Rural and Urban combined				Rural				Urban			
	1990	2000	2010	2010 vs. 1990	1990	2000	2010	2010 vs. 1990	1990	2000	2010	2010 vs. 1990
Age 80+, Males												
Living alone	12.9	10.8	15.0	+16.8%	13.4	10.2	15.8	+18.0%	11.1	11.9	14.0	+25.6%
With spouse only	17.1	20.7	29.3	+71.2%	15.9	17.8	24.7	+55.6%	21.0	26.7	35.4	+69.1%
Sub Total of not living with children	30.0	31.4	44.3	+47.9%	29.3	28.0	40.5	+38.4%	32.1	38.6	49.4	+54.0%
Married, with children	23.0	27.0	23.8	+3.1%	22.8	27.8	23.5	+3.2%	23.9	25.4	24.1	+0.9%
Not-married with children	44.0	39.4	29.6	-32.6%	45.1	42.2	34.0	-24.7%	40.4	33.5	23.9	-41.0%
Sub Total of living with children	67.0	66.4	53.4	-20.3%	67.9	69.9	57.5	-15.3%	64.3	58.9	48.0	-25.4%
Institutionalized	1.2	0.9	1.2	+2.5%	0.9	0.6	0.7	-17.4%	2.1	1.6	1.9	-11.5%
With others, not with spouse/child	1.8	1.3	1.0	-42.5%	1.9	1.5	1.2	-35.3%	1.5	0.9	0.8	-47.7%
Age 80+, Males total	100	100	100		100	100	100		100	100	100	
Age 80+, Females												
Living alone	15.1	12.4	19.1	+26.8%	15.4	11.0	17.1	+10.9%	14.1	15.4	22.3	+58.4%
With spouse only	4.0	6.4	10.6	+167.1%	4.0	5.9	10.0	+147.6%	3.8	7.6	11.5	+206.5%
Sub Total of not living with children	19.1	18.8	29.7	+56.0%	19.5	16.8	27.1	+39.1%	17.8	23.0	33.8	+89.6%
Married, with children	5.2	12.2	11.1	+113.9%	5.3	11.7	11.3	+114.9%	5.1	13.3	10.9	+115.3%
Not-married with children	73.7	67.4	57.4	-22.1%	73.5	70.2	60.4	-17.7%	74.2	61.4	52.7	-29.0%
Sub Total of living with children	78.9	79.5	68.5	-13.1%	78.7	81.8	71.7	-8.9%	79.3	74.6	63.6	-19.8%
Institutionalized	0.7	0.7	0.9	+30.4%	0.5	0.4	0.4	-17.5%	1.4	1.3	1.7	+23.5%
With others, not with spouse/child	1.4	1.0	0.9	-39.2%	1.4	0.9	0.8	-39.3%	1.5	1.2	0.9	-41.2%
Age 80+, Females total	100	100	100		100	100	100		100	100	100	
Age 80+, Both sexes												
Living alone	14.3	11.8	17.4	+21.8%	14.7	10.7	16.6	+12.7%	13.1	14.1	18.6	+42.7%
With spouse only	8.6	11.8	18.4	+113.8%	8.3	10.4	15.9	+93.1%	9.7	14.9	22.0	+126.7%
Sub Total of not living with children	22.9	23.6	35.8	+56.4%	23.0	21.1	32.5	+41.6%	22.7	28.9	40.6	+78.6%
Married, with children	11.5	17.8	16.4	+42.6%	11.5	17.8	16.2	+41.2%	11.6	17.9	16.7	+44.2%
Not-married with children	63.2	56.7	45.8	-27.5%	63.4	59.6	49.8	-21.5%	62.5	50.7	40.1	-35.9%
Sub Total of living with children	74.7	74.6	62.2	-16.7%	74.9	77.3	66.0	-11.9%	74.1	68.6	56.7	-23.4%
Institutionalized	0.9	0.8	1.0	+20.2%	0.6	0.5	0.5	-14.5%	1.7	1.4	1.8	+9.1%
With others, not with spouse/child	1.6	1.1	0.9	-39.8%	1.6	1.1	1.0	-36.4%	1.5	1.1	0.8	-43.9%
Age 80+, Both sexes total	100	100	100		100	100	100		100	100	100	

Figure 1. Family household size distributions, 1990-2010, rural-urban combined, China

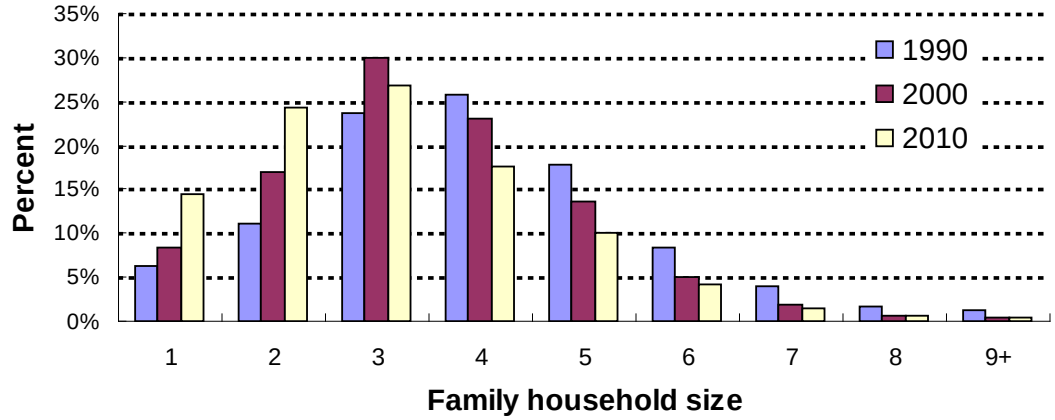

Figure 2. The relative increases of number of households and population size, 1990-2010, China

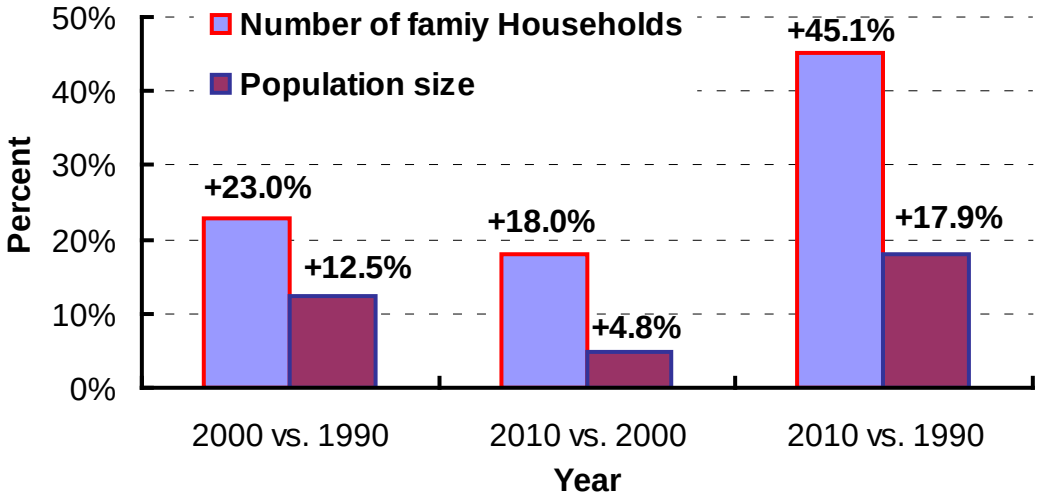

Figure 3. Household size distributions, 1990-2010, rural versus urban, China