

## Pensioners among Chinese elderly

Yun Zhou\* and Xiao Wang

*Department of Sociology, Peking University, Beijing, China*

The pension system is one type of social welfare system which provides support for elderly citizens after retirement. The system in the People's Republic of China was established in the 1950s, mainly for state employees and employees of privately owned enterprises, while peasants relied on their land to support them in their old age. Up to the 1970s, there was little change in this system. However, the system has since undergone dramatic reform. The implication of the new system for the future elderly in China will be significant. This paper discusses the current impact of the pension system on the elderly in China. According to our analysis, fewer than 25% of Chinese elderly receive a pension. The social and demographic characteristics (e.g. age, gender, residence, educational attainment, occupation) of pension recipients are partially a legacy of past policies. As new policies are implemented and the pension system improves, more elderly will be covered by the pension system. Nonetheless, we need to find ways to support those who do not receive a pension.

**摘要:** 养老金制度是社会福利体系中保障个人退休后晚年生活的项目之一。中国的养老金制度开始于上世纪五十年代,当时主要适用于国企和私营企业的职工;农民依靠土地养老。这一制度直到上世纪七十年代后期才开始有所变动,目前仍处于调整和改进过程中。新近的养老金制度对未来中国老年人的影响将在今后几十年中显现。本文讨论了老龄化背景下老年人获得养老金的现状。目前老年人领取养老金的比例不到 25%,其中呈现出性别、年龄、居住地、教育程度、以往工作类别等人口社会特征差异。这种差异与以往养老金相关政策有关。不断改进的养老金制度将会提升老年人口中领取养老金的比例,但目前老年人晚年的经济状况应该引起有关部门的关注与帮助。

**Keywords:** pension; aging in China; social policies

**关键词:** 养老金, 中国人口老龄化, 社会政策

Pensions provide a financial guarantee that is independent of family support for individuals upon retirement from work. The retirement pension is called *yang-lao-jin* in Chinese, which literally means 'money for old age', highlighting its importance for the elderly. At different stages of social and demographic development, the significance of pensions for the elderly varies. For example, in a society where children are considered responsible for supporting their parents in their old age, a pension may be valued as less important than in a society where the elderly are expected to support themselves financially. According to Chinese tradition, children are the main source of financial, emotional and physical support for the elderly. The responsibility of caring for the elderly

---

\*Corresponding author. Email: zhouyun@pku.edu.cn

is shared among children, especially among sons. Accordingly, a ‘son for old age’ (*yang-er-fang-lao*) becomes one of the main purposes and motivations for reproduction in China, particularly in the past when a pension system was absent and children were the sole source of support for the elderly. Most agrarian societies do not have a modern pension system, and children are the sole source of old age care. As a society becomes industrialized, pension provision becomes more important as more people are covered by different pension or social security systems.

In this paper, we will first present the trend of population aging in China, highlighting the importance of pension provision for the elderly in China at a societal level. After that, we will examine the characteristics of pension recipients among senior Chinese citizens. Finally, we will demonstrate the correlation between the characteristics of pension recipients and a national pension system and policies, thereby underlining the influence of state policies on the elderly.

### 1. Aging in China

In the past 60 years (1950–2010), the population structure in China has experienced dramatic changes. During this period, both mortality and fertility rates declined sharply. Changes in the mortality rate were a result of improvement in public health as well as in standards of living, while the decline in the fertility rate, particularly after the 1980s, was a result of population policy advocated by the government. These two factors accelerated the aging rate in China (Figure 1). China became an aging society after 2000 according to the United Nations standard whereby the population of those aged over 65 constitutes over 7% of the total population. The percentage of the population aged over 65 to the total population is increasing at an unprecedented level. By 2025, 13.2% of the population of China will be aged over 65, and will further increase to 22.7% of the total population in 2050 according to projections made by the United Nations (Population Division of United Nations 2001). This trend has caught the attention of the Chinese government. In 2006, the China National Committee on Aging (CNCA<sup>1</sup>) outlined three stages of the anticipated aging process in China in a projection report: a fast growing period (2001–2020), an accelerating growth period (2021–2050), and a severe aging period (2051–2100).<sup>2</sup>

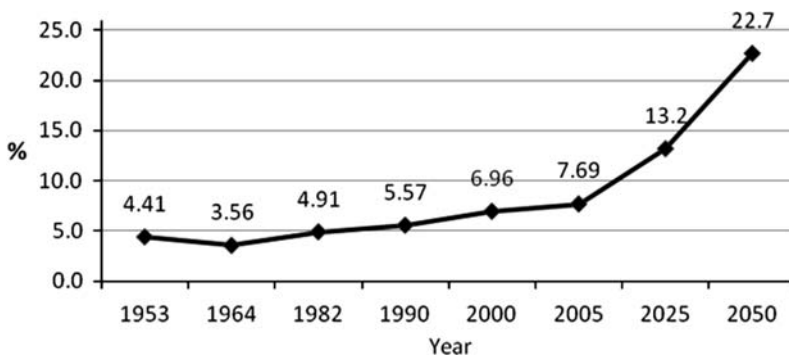


Figure 1. Changes of the older population in China by year (% of the total population). Sources: data for 1953, 1964 and 1982 are from Population Statistics Department of the National Bureau of Statistics of China Population Division (ed.), 1988; from 1990 and 2000 from Office of Census Bureau and Population Statistics, Department of the National Bureau of Statistics of China, 1993 and 2002; from 2005 from Population Statistics Department of the National Bureau of Statistics of China 2007 and 2025–2050 from Population Division, DESA, United Nations 2001.

Furthermore, population aging will also be accompanied by an increasing number of 'empty nest' families in both urban and rural areas during the Twelfth Five Year Plan (2011–2015) period.<sup>3</sup>

Due to the large base of the Chinese population, any percentage increase in the elderly population will translate into a large increase in absolute numbers. In 2000 there were 88.11 million elderly in China.<sup>4</sup> Based on the size of Chinese population in 2009 (1.335 billion<sup>5</sup>), one percentage increase in the older population means a 13.3 million increase in absolute numbers of elderly. If the projection by the United Nations is realized, a little over one tenth of Chinese will be over 65 years old in 2025 and one in five in 2050. If the Chinese population stays at the level of 2009 (1.335 billion), then the size of the older population in 2025 will be 176.2 million and 302.9 million in 2050. To put these numbers in perspective, China's population of elderly in 2025 will be larger than Japan's total population in 2010 and by 2050 it will be close to the total population of the United States of America in 2010.<sup>6</sup> The size of the elderly population puts pressure on Chinese society in the areas of social development and social security system as well as on individual families caring for elderly relatives. As the fertility rate declines and young people become more mobile, we can expect the responsibility of daily care for the elderly to shift to non-family members, and the cost of care will be heavily reliant on the elders' own financial resources. Pension provision, thus, becomes an indispensable and valuable source of financial support in old age.

## 2. Pension recipients among Chinese elderly

We used data from the Chinese Longevity and Health Survey (CLHLS),<sup>7</sup> a longitudinal survey on the elderly which began in 1998, to construct a profile of pensioners in China. Data used in this study derive from the fifth wave of the CLHLS in 2008. While the survey initially focused on the oldest segment of senior citizens (aged above 80) (Gu and Zeng 2004), the scope of the survey was widened to include elders from a younger age cohort (65–80) in 2002. In 2008, 4,285 (25.85%) of respondents were aged between 65 and 80, which makes this an ideal sample to capture general information for all age groups over 65. In order to adjust for an oversampling of the over 80 age group (74.13%), we weighted the data in our analysis. The weighting method employed in this study is similar to Zeng *et al.*'s (2001) method, which generated an age-gender-residence specific weight for each observation according to the 2000 Chinese population census. The weighted sample used in our analysis is 16,033, for which the basic demographic description is shown in Table 1.

Pension recipients from the survey were identified according to whether the respondent received a pension in 2008. We then used a set of socio-demographic variables to draw profiles of the potential pensioners and non-pensioners. The variables, which include gender, age, place of residence, education level (measured by year of schooling), and primary lifetime occupation before 60, were construed as characteristics instead of 'factors' or 'determinants', since the correlation between these variables and pension-receiving outcome is less than clear.<sup>8</sup>

The statistical model used in our analysis is logistic regression, which takes the form shown here in equation (1):

$$\log\left(\frac{P(y_i = 1)}{1 - P(y_i = 1)}\right) = \beta_0 X_i$$

Table 1. Demographic characteristics of CLHLS 2008 weighted sample.

Characteristics		Number of obs.	%
Gender	Male	7878	49.14
	Female	8155	50.86
Age group	65 ~ 69	5503	34.33
	70 ~ 74	4749	26.62
	75 ~ 79	2651	16.54
	80 ~ 84	2372	14.79
	85 +	755	4.72
Residence	City	3283	20.48
	Town	2989	18.64
	Rural	9761	60.88
Total		16,033	100

where  $P(y_i = 1)$  is the subject  $i$ 's probability for being a pensioner in 2008;  $X$  is the vector of variables representing socio-demographic characteristics of the subject and vector  $\beta_0$  stands for their effects. The model is estimated by STATA 11.

Results from our analysis are summarized in Table 2 and Table 3. Table 2 shows the socio-demographic traits of pensioners and non-pensioners. Compared with non-pensioners, pensioners are more likely to be male (60.44% vs. 45.46%) and be of Han ethnicity (96.11% vs. 93.34%), although the difference in the latter is relatively insignificant. Moreover, pensioners tend to be younger, with more years of education, and are more likely to reside in the city. They are also more likely to come from eastern provinces (56.82% vs. 42.51%). In terms of the primary lifetime occupation before 60, the majority (close to 90%) of pensioners were in the top three types of occupation, namely 'commercial and industrial worker' (55.72%), 'professional and technical personnel' (18.31%), and 'governmental and institutional personnel' (15.09%). On the other hand, most non-pensioners worked in agriculture-related fields before the age of 60 (84.10%). This difference suggests a strong institutional link between occupation and pension coverage.

To further investigate the characteristics of pensioners and non-pensioners, we used logistic regression to estimate the effect of socio-demographic characteristics on pension-receipt status (Table 3). Consistent with the description shown in Table 2, we found that male elders were much more likely to receive pension than their female counterparts (OR = 1.45). In comparison with people living in rural areas, the elderly from the cities were more likely to benefit from the pension system (OR = 4.13 and 7.04 respectively). However, differences in the likelihood of receiving a pension between eastern, central and western provinces were insignificant in the presence of controls for other individual characteristics. Furthermore, we found that those with more years of education were more likely to have a pension, although the magnitude of this effect was small (OR = 1.24 and 1.95 respectively).

Contrastingly, the pattern of the effect of age is more ambiguous. While the result shows that elders from the youngest age group (65 ~ 69) were more likely to be pensioners than people over 80, elders between the age of 70 and 74 were even more likely to have a pension (OR = 1.18). The advantage of elders from 70 to 74<sup>9</sup> is however insignificant when we conducted a similar analysis using non-weighted data.

In terms of occupation, the relationship between type of primary lifetime occupation and pension-receipt status appears to be strong, with two significant differences. First,

Table 2. Socio-demographic characteristics of pensioners and non-pensioners.

Characteristics		Pensioner		Non-pensioner	
		Num. of obs.	%	Num. of obs.	%
<b>Gender</b>	Male	2380	60.44	5497	45.46
	Female	1558	39.56	6596	54.54
<b>Ethnicity</b>	Han	3785	96.11	11288	93.34
	Minority	152	3.89	805	6.66
<b>Age</b>	65–69	1521	38.62	3982	32.93
	70–74	1276	32.43	3471	28.71
	75–79	641	16.30	2010	16.62
	80–84	409	10.41	1962	16.22
	85 +	88	2.25	667	5.52
<b>Residence</b>	City	2404	61.03	878	7.72
	Town	734	18.63	2254	18.65
	Rural	800	20.33	8959	74.08
<b>Province</b>	Eastern	2238	56.82	5140	42.51
	Central	1059	26.88	3519	29.10
	Western	642	16.30	3435	28.40
<b>Year of schooling</b>	0	622	15.58	6379	52.75
	1 ~ 6	1630	41.40	4721	39.04
	6 +	1685	42.80	991	8.02
<b>Occupation</b>	Professional & Technical	720	18.31	172	1.43
	Governmental/Institutional	593	15.09	138	1.15
	Commercial/Industrial Worker	2194	55.72	456	3.78
	Agricultural	245	6.21	10171	84.10
	Housework	39	1.02	599	4.95
	Others/Never Worked	144	3.66	556	4.60
<b>Total</b>		<b>3939</b>	<b>24.57</b>	<b>12094</b>	<b>75.43</b>

relative to agricultural workers, elders for whom housework was their primary lifetime occupation were more likely to receive a pension after the age of 65 (OR = 2.06). Second, there was a significant discrepancy between those who were professional, institutional personnel or industrial workers and agricultural workers/house workers with regard to their likelihood of receiving pension in 2008 (for example, OR[professional personnel vs. agricultural worker] = 62.5; OR[professional personnel vs. house worker] = 30.3). Occupational differences, while failing to proxy all pension-related intuitional differences,<sup>10</sup> still largely account for the structural gap between pensioners and their counterparts. In other words, long-term membership of certain working units is the most important pension resource since the 1950s. The characteristics of pensioners and the factors that increase the likelihood of receiving pension are heavily influenced by pension policies and regulations.

### 3. Policies shaping patterns of pension receipt among the Chinese elderly

In China, the pension system still does not provide comprehensive coverage. There was no universal pension system in China in the 1950s and pension availability was solely dependent on the individual's occupation. Peasants had to rely on their own land for financial support in their twilight years. By contrast, different pension schemes funded by the Chinese

Table 3. Estimated effects for socio-demographic characteristics on pension-receiving status by logistic regression model.

	Estimate	SE	OR
<b>Male</b> (Female)	0.372***	0.076	1.449
<b>Minorities (Han)</b>	0.212	0.161	1.237
<b>Age group</b> (65 ~ 69)			
70 ~ 74	0.167*	0.082	1.182
75 ~ 79	0.025	0.099	1.026
80 ~ 84	-0.316**	0.109	0.729
85 +	-0.796***	0.187	0.451
<b>Current residence</b> (City)			
Town	-1.418***	0.090	0.242
Rural	-1.951***	0.084	0.142
<b>Province</b> (Eastern)			
Central	-0.119	0.078	0.888
Western	-0.004	0.088	0.996
<b>Year of schooling</b> (0 year)			
1 ~ 6	0.231**	0.087	1.259
6 +	0.665***	0.107	1.944
<b>Primary lifetime Occupation</b> (Professional/Technical Personnel)			
Governmental/Institutional Personnel	0.001	0.137	1.001
Commercial/Industrial Worker	0.302**	0.115	1.353
Agricultural worker	-4.120***	0.125	0.016
Housework	-3.422***	0.202	0.033
Others/Never Worked	-2.422***	0.142	0.089
<b>Constant</b>	2.466***	0.208	-
<b>Chi-square (df)</b>	<b>11247.34(17)</b>		
<b>Number of Obs.</b>	<b>16033</b>		

Note: \* < 0.1 \*\* < 0.01 \*\*\* < 0.001

government were available to workers and government employees. ‘Labor Insurance Regulations of the People’s Republic of China’ (1951) marked the beginning of the pension system in China. Although this law was not a pension regulation, it nevertheless contained provisions related to pensions. The law covered employees of the state or collective-owned enterprises. Initially, the scope and the amount of the pension were limited. Few enterprises were included in the policy and the amount of pension was about 35–60% of the wage before retirement (Hu 2009, p. 79). The law was revised in 1953 to expand both the coverage and the amount of the pension (for example, in 1953, the pension was about 50–70% of the wage: Hu 2009, p. 80). For government employees, the ‘Decree on Interim Measure of Benefit on Retirement, Resignation, and Sick Leave for Governmental Employee as Well as on Counting Duration of Work’ (in 1955) provided the guideline for their pension. The ‘Interim Regulation on Resignation of Workers and Staff’ in 1958 established a unified pension system for both workers and government employees. The amount of pension one received depended on the retirement status (e.g. regular retirement, retirement due to illness, retirement due to disability from work) (Hu 2009, p. 81).

The development of the pension system in China was stunted by the political movement during the 1960s and did not resume until the 1970s. In 1978, the State Council issued two important regulations, the ‘Interim Measure of State Council on Placement of Older, Disabled, and Sick Cadres’ and the ‘Interim Measure of State Council on



Retirement and Resignation of Workers', which established different pension schemes for workers and government employees. Up to this period, the pension fund was financed by the government. Since the 1980s, the Chinese government has implemented a new system with multiple funding sources.

In 1991, the government undertook a significant development in the national pension policy with the 'Decision on Reform of Pension System for Enterprise Employees'. This was focused solely on enterprise employees, and initiated a multi or three-layer pension system, which includes basic pension insurance (compulsory), comprising of enterprise supplementary old age insurance (recommended and encouraged), and commercial old age insurance for individuals (encouraged). The State Council issued another important decision, the 'Decision on Establishing a Unified Basic Pension System for Enterprise Employees' in 1997, which outlined a governmental plan and the measures for establishing a unified basic pension system for enterprise employees. This system is now viewed as a milestone in the development of the social security system in China. The system established a new funding model (a combination of pay-as-you-go and fund accumulation), built a new management system (social pooling and individual account), spread the burden of pension (a joint responsibility of government, enterprise and the individual), expanded pension coverage (to all employees in urban areas), adopted a system to promote the growth of the pension fund, and shifted the management of the system from enterprises to social management (Jiang 2005, pp. 174–180). The system has been under revision and improvement since then. In this process, the government changed the name of 'enterprise supplementary old-age insurance' to 'enterprise annuity' in 2000 (Hu 2009, p. 106) and the Ministry of Human Resource and Social Security has been put in charge of administrating and monitoring the system.

In addition to changes in the pension system for enterprise employees, changes also affected the pension arrangements for government employees. In 1992, 'Notification on Reform of Pension System for Governmental Institutions' signaled the beginning of reform. In 1999, the organizational status of universities, research institutions, and cultural entities was changed from governmental to enterprise organizations. The employees of these units qualify for a pension according to the policy for enterprise employees. Under this policy, the pension one receives is from two sources, namely basic pension insurance (from the social pool and personal account which is paid by the individual before retirement; the contribution level is about 8% of their salary), and enterprise annuity (Hu 2009). Wealthier individuals and those planning for their old age can also buy commercial old age insurance using their own savings. Government employees, on the other hand, are subject to a different and rather generous pension policy. Table 4 summarizes the most important policies and regulations on pension since 1949.

The pension system for rural residents, a group that makes up 57% of the Chinese population,<sup>11</sup> is currently being established and improved. Currently, urban and rural residents are subject to different pension systems. There is no universal pension system for rural residents and pension entitlement for rural residents depends heavily on the economic condition of the region in which the individual lives, whereby well developed regions have better rural pension systems. Rural residents depend on their land as a source of financial support upon retirement and land is considered a 'pension' for peasants.

The 2008 CLHLS data indicate the low percentage of pensioners among the elderly, but relatively higher percentages among younger senior population (Figure 2); trends that are outcomes of vigorous and positive changes in pension policy over the past years.

Table 4. Most important regulations on pension in China since 1949.

Year	Regulations	Issued by
1951	"Labor Insurance Regulations of the People's Republic of China" 《中华人民共和国劳动保险条例》	Former Administration Council
1955	"Decree on Interim Measure of Benefit on Retirement, Resignation, and Sick Leave for Governmental Employee as Well as on Counting Duration of Work" 《关于颁发国家机关工作人员退休、退职、病假期间待遇等暂行办法和计算工作年限暂行办法规定的命令》	State Council
1958	"Interim Regulation on Resignation of Workers and Staff" 《关于工人、职员退职处理的暂行规定》	State Council
1978	"Interim Measure of State Council on Placement of Older, Disabled, and Sick Cadres", "Interim Measure of State Council on Retirement and Resignation of Workers" 《国务院关于安置老弱病残干部的暂行办法》、《国务院关于工人退休、退职的暂行办法》	State Council
1991	"Decision on Reform of Pension System for Enterprise Employees" 《关于企业职工养老保险制度改革的规定》	State Council, Document No.33 [1991]
1992	"Notification on Reform of Pension System for Governmental Institutions" 《关于机关、事业单位养老保险制度改革有关问题的通知》	Former Ministry of Human Resources
1997	"Decision on Establishing a Unified Basic Pension System for Enterprise Employees" 《关于建立统一的企业职工基本养老保险制度的决定》	State Council, Document No.26 [1997]
2005	"Decision on Improving Basic Pension System for Enterprise Employees" 《关于完善企业职工基本养老保险制度的决定》	State Council, Document No. 38 [2005]



Table 5. Pension in urban and rural China.

	in urban	in rural
Type of pension	A combination of social pool and individual account	Family as primary source, community as a supplementary source
Coverage	All employees	Varied depending on regions
Source of pension	Government, enterprise, and individuals	Premium from individuals, collective benefits, government subsidies
Nature of pension	Compulsory	Voluntary

Source: Cited from Tuo and Wang 2003, p. 323.

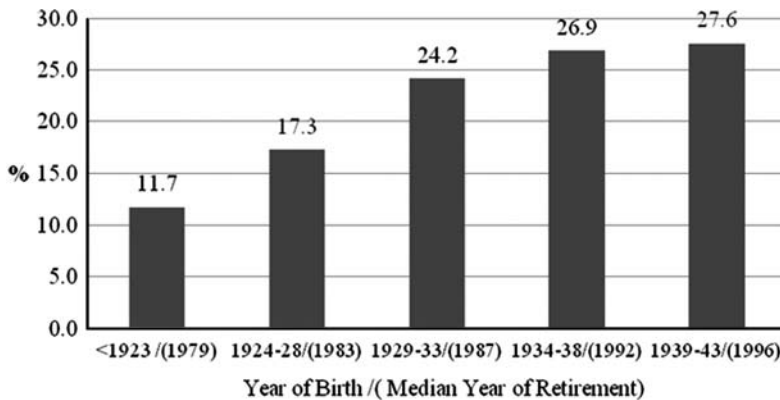


Figure 2. Percentage of pensioners by year of birth and median year of retirement. Source: Calculated from CLHLS 2008.

#### 4. Conclusion

Pension provision is an important issue not only because of the need to improve public policy, but also because of a critical need in an aging society where people are living longer but have fewer family members to provide support. Our analysis presents the characteristics of pension recipients among the Chinese elderly using a large data set collected in 2008. The analysis shows that pensioners in China tend to be male and younger elderly, urban elderly, elderly with more years of schooling and employed in non-agricultural fields.

Besides the characteristics of pensioners at the individual level shown in the data from CLHLS, our study also explored the influence of policy on the coverage of the pension system. Without changes in governmental policies and regulations, a large group of the older population who live longer due to increases in life expectancy<sup>12</sup> and who work more years due to changes in the working system<sup>13</sup> will not be covered by the pension system.

Changes in policies and regulations have a deciding influence on the number of pensioners in China as well as the amount of pension for the retirees. Age differences in the percentage of pension recipients among older Chinese is one example that shows the influence. If China has a universal pension system, we would expect a higher coverage, close to 100%.<sup>14</sup> With the improvement of the pension system in China, there would be a dramatic increase in the number of pensioners among the older Chinese in the next few

decades and ultimately almost every Chinese elder will be covered. This is what all elders are longing for and what an aging society should work on for its people.

## Notes

1. China National Committee on Aging (CNCA) is part of the China National Working Commission on Ageing (CNWCA), which is an advisory and coordinating organization of the State Council, established in October 1999.
2. See [http://news.xinhuanet.com/video/2006-10/11/content\\_5467909.htm](http://news.xinhuanet.com/video/2006-10/11/content_5467909.htm): a publication announcement of 'Research report on projection of aging process in China'.
3. See <http://www.cncaprc.gov.cn/info/13084.html> – Yushao Wu, deputy director of CNCA at a press conference of 'China National Working Commission on Aging'.
4. See [http://www.stats.gov.cn/tjgb/rkpcgb/qgrkpcgb/t20020331\\_15434.htm](http://www.stats.gov.cn/tjgb/rkpcgb/qgrkpcgb/t20020331_15434.htm)
5. See [http://www.stats.gov.cn/tjgb/ndtjgb/qgndtjgb/t20100225\\_402622945.htm](http://www.stats.gov.cn/tjgb/ndtjgb/qgndtjgb/t20100225_402622945.htm)
6. See <http://www.prb.org/Publications/Datasheets/2010/2010wpds.aspx>
7. Details of the survey are explained at: [http://centerforaging.duke.edu/index.php?option=com\\_content&view=article&id=115&Itemid=152](http://centerforaging.duke.edu/index.php?option=com_content&view=article&id=115&Itemid=152)
8. Moreover, the place of residence (surveyed in 2008) might change after an elder retired and thus makes for an invalid factor in terms of its presumed influence on pension-receipt status.
9. We considered that the pattern was caused either by sampling bias or problems in pension system reform prior to 1995 (James 2001).
10. That is, the gap of pension coverage due to institutional arrangements.
11. See [http://www.stats.gov.cn/tjgb/rkpcgb/qgrkpcgb/t20060316\\_402310923.htm](http://www.stats.gov.cn/tjgb/rkpcgb/qgrkpcgb/t20060316_402310923.htm)
12. For example, life expectancy in China increased from 68 years in 1990 to 74 years in 2007: [http://data.un.org/Data.aspx?q=life+expectancy&d=WHO&f=MEASURE\\_CODE%3aWHOSIS\\_000001](http://data.un.org/Data.aspx?q=life+expectancy&d=WHO&f=MEASURE_CODE%3aWHOSIS_000001)
13. In 1989, right before the important pension reform, China had 143.9 million employed persons in urban areas. The number increased to 224.1 million in 1999 and reached 302.1 million in 2008 (National Bureau of Statistics of China 2009).
14. Due to a different pension system, among Japanese elderly in the age group 65–69, the percentage of beneficiaries of at least one type of old-age pension was 94.3% for males and 93.1% for females. [www.oecd.org/els/employment/olderworkers](http://www.oecd.org/els/employment/olderworkers)

## References

- Gu, Danan and Zeng, Yi, 2004. Sociodemographic effects on the onset and recovery of ADL disability among chinese oldest-old. *Demographic research*, 11, 1–42.
- Hu, Xiaoyi, ed., 2009. *Toward harmony: 60 years of the development of social security in China (走向和谐: 中国社会保障发展60年)*. Beijing: China Labor and Social Security Publishing House.
- James, Estelle, 2001. How can China solve its old age security problem?, The interaction between pension, SOE and financial market reform, paper prepared for Conference on Financial Sector Reform in China, Harvard University, Cambridge, MA, September 11–13.
- Jiang, Xiangqun, 2005. *Social security system for the elderly: history and reform (老年社会保障制度: 历史与变革)*. Beijing: China Renmin University Press.
- National Bureau of Statistics of China, 2009. *China statistical yearbook 2009*. Beijing: China Statistics Press.
- Office of Census Bureau and Population Statistics, Department of National Bureau of Statistics of China, 1993. *Tabulation on the 1990 population census of the People's Republic of China*. Beijing: China Statistical Publishing House.
- Office of Census Bureau and Population Statistics, 2002. *Tabulation on the 2000 population census of the People's Republic of China*. Beijing: China Statistical Publishing House.
- Population Division, DESA, United Nations, 2001. *World population aging, 1950–2050*. New York: United Nations.
- Population Statistics Department of the National Bureau of Statistics of China Population Division, ed., 1988. *A collection of population statistics, 1949–1985*. Beijing: China Financial & Economic Publishing House.

- Population Statistics Department of the National Bureau of Statistics of China, 2007. *1% population sample survey data of 2005 in China*. Beijing: Publishing House of the National Bureau of Statistics of China.
- Tuo, Guozhu and Wang, Guojun, 2003. *A study on agricultural insurance and rural social security system in China* (中国农业保险与农村社会保障制度研究). Beijing: Capital University of Economics and Business Press.
- Yi, Zeng, Vaupel, James W., Zhenyu, Xiao, Chunyuang, Zhang and Yuzhi, Liu, 2001. The healthy longevity survey and the active life expectancy of the oldest old in China. *Population: an English selection*, 13 (1), 95–116.