

A Comparison of LTC System between China and Japan

-A Simulation for China to Introduce Japan-Style LTCI-

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Abstract

China is now facing a critical issue on the rapid population ageing. This results in reconsideration about reform of the existing systems (e.g. healthcare, pension system) and explorations of new welfare scheme for the aged in China. As we know, one of the most aging country, Japan, has run LTCI system since 2000, which financed by individuals, the municipalities and the government. Standing on the turning point to search for the most suitable system of the aged, China can take a gasp at the Japan-style LTCI. In this paper, the LTCI system in Japan was applied in China and two conclusions were drawn after the simulation. 1) Applying partial Japan-style LTCI is promising and 2) the government should target more elders with light functional disability.

Key Words: Long-Term Care, medical care, ordered-probit model, pension, simulation

Introduction

Being the second largest economic power for 7 years, China has been collecting a lot of attention not only on the economic growth, but also on the issues that China has been suffered for a long time, including the construction of infrastructure, aging population and social security. Especially, the latter two. Due to the baby booms (in 50s, 60s) and the one child policy, the demographic shifts rapidly as baby boomer aging and the proportion of young generation declining. It results large challenges in social security for the aged. For a long time, China has not construct a formal LTCI system over the country, and only fragments of Long-Term Care services, such as welfare house for the aged, were established. In addition to the fragments of LTC, the existing healthcare system with high coverage and pension system has been the main option when the elderly encounters body functional disability. Thus, some literatures provide a brief introduction of both healthcare and pension system when explaining Chinese LTC issues (e.g. Shiyu Li & Shuanglin Lin 2016; Weihui 2016; Wei Yang *et al.* 2016). In recent year, a trail LTCI is taking place in 15 pioneer cities. Qingdao, which is the first place to implement LTCI in 2012, were used as the LTCI basic model of China in some literatures when discuss LTCI in China (e.g. Mieko Okamura 2016; Yuki Katayama 2016).

This paper prescribes a comprehensive introduction of welfares for the aged in china, containing the traditional LTC services, healthcare system, pension system and the trial LTCI (Qingdao), and LTCI system in Japan. There are some similarities can be found in comparison between the two countries about the path of welfares for the aged. Also, since Japan-style LTCI which financed 50% by premiums collected from individuals and 50% from the municipalities and the government, not pushing the young generations to pay more tax or pushing the poor older people to pay higher premiums, is suitable for the current situation of China (small population of the young and large aging population of severe poverty). Thus, a simulation of Japan-style LTCI in China conducted in this paper is meaningful. We estimated that the insurance benefits are of extremely high level and the high insurance premium is too high to afford for the average in China. Although the result seems to be unsuitable for China to apply the same LTCI as Japan does, one conclusion still can be draw, that is, by applying the basic structure of Japan-style LTCI with lowered the premium and lowered the deductibles or lowed the quality of the services, a comfortable elder life can still be guaranteed. By

applying the same certification in Qingdao, we gained another conclusion, that is, the severest older people who are targeted mainly in the trial system presents little share of the total population, whereas a lot of people with relatively light body functional limits remain unmet.

There are almost descriptive studies on Chinese welfare in Chinese or in English (e.g. Dai Wendong 2012; A.P. Glass *et al.* 2013; Yu Cheung Wong & Joe Leung 2012; Wu *et al.* 2005). Some articles use econometrics on the effects on different LTC financing (Wei Yang *et al.* 2016) and on factors associated with LTC needs (Danan Gu & Denese Ashbaugh Vlosky 2008). As for literatures on LTCI in Japan, the determinants on the needs of the LTC services (Hiroshi Sano & Kensaku Kishida 2013), the determinants on the body status (Shigeru Sugihara *et al.* 2017; Mariko Yamamura & Hirokazu Yaragihara 2007) and the gap among different areas (Shinpei Okada & Shujiro Kubori 2010) are the domestic topics. Therefore, using the ordered-probit method to find out the determinants or how the determinants affect one to be certified as Support Required/ Care Level, has been applied in many previous studies about LTCI in Japan. However, applying the coefficients to simulate a Japan-Style LTCI introduced into another country or special area is not exist.

This paper proceeds as follows. Section 1 describes the aging problems faced by China, including the rapid growth of the aging population and welfares that China has constructed for the aged. Section 2 outline the Long-Term Care Insurance in Japan. In section 3, simulation of Japan-style LTCI application in China will be conducted. The final section lays out the insightful message for the direction the LTCI in China should be.

1 Severe aging problems faced by China

1.1 The dramatically rapid growth of the aging population.

The growing aging population has been a significant problem not only in developed countries but also some developing countries. China is not an exception, either. The generation who were born in two big baby booms, which is during 1950's and 60's in China, are reaching their 60s when they need plans for the lives after retirement. Simultaneously, due to the one-child policy implemented in 1980, birth rate has been reducing sharply from

23.33%¹ to 12.07‰ in the last 37 years². Until 2015, there are more than 140 million of people over 65 years old in China, which forms approximately 10.5 % of the total population.

According to WHO, there are three definitions of a society with different aging rate, aging society (exceeding 7%), aged society (exceeding 14%) and super-aged society (exceeding 26%). This criterion is globally used to define the severity of aging population. China has already stepped in aging society in 2000 and was estimated to have 14% of people over 65 years old in 2025. Compared to Japan, currently having the largest aging population proportion, which took 24 years from aging society to aged society, China will take only 25 years which shows almost equally high speed as Japan.

Currently, almost 23 million older people who are in economic difficulty, meaning these population will probably suffer in their elder lives under the incomplete welfare security in China. The condition in rural area is severer, about 50 million older people are empty nesters. Without nursing by their children, remarkably low welfare (e.g. healthcare, pension system) for rural residents can not provide them a comfortable living for future.

Therefore, the large population of baby boom generation coming to their age accelerates the need for LTC evermore. Comparatively small population of young generation are facing the problem for being a caregiver of two elders.

1.2 The collapsing of the tradition that adult children care for their elders.

In China, it has been a tradition for a long time that adult child or other family members are responsible for caring the old. The Chinese Constitution, the Elders' Protection Law as well as Marriage Law, all prescribe that society and family have a responsibility to take care of their elders. For instance, in the Law on the Protection of the Rights and Interests of Older People, it stipulates that care for elders shall mainly depend on family and family members should take care and look after them (Article10, Chapter2). Also, the caregivers have the obligation to care for their elders in daily life,

¹ I take the highest value of birth rate from 1980 to 2015, which is in 1987. The Data is from CHINA STATISTICAL YEARBOOK 2016, National Bureau Statistics of China, China Statistics Press.

² The birth rate was continuously increasing (until the late 1980s) after the one-child policy implemented because the baby boomers coming to the age to give a birth in 1980s.

economically and emotionally (Article11, Chapter2). As for the public support for the aging population, although the targets are no longer limited to some specified older people (disability, no income, no families etc.) anymore, people in need are still not freely accessible to those public resources due to insufficient facilities. Unlike some developed countries where LTC Insurance System had already been established in early years, Chinese government has been focusing on transforming health care system and encouraging old people to seek their LTC support from their own family. Due to the one-child policy, the number of adult children that are obligated to raise two aging parents and four aging grandparents will eliminate to one soon. This care structure is called 4-2-1. As a result, the sandwich generation who must take care both the elders and the youngers are to be burdened more than ever.

Besides LTC, the other obligation the youngers take for their elders is health care. Despite the Basic Medical Insurance has been taking great effort on expanding coverage to the entire country with the participation of more than 1.3 billion (covering over 95% of the total population) (The State Council Information Office 2017) until 2016, low benefit package, big gap of medical quality among regions remain the current concerns. Under these circumstances, the large part of medical expenditure which cannot be covered by the insurance overwhelms most of the elders who tend to be poor, since medical care is too expensive to afford for them. Thus, the youngers are forced to take responsibility of the expenditure.

However, the youngers have neither sufficient time nor adequate money for both LTC and health care. Therefore, sustaining the tradition that adult children should take care their elders is becoming more and more difficult. Transformation in welfare of the elderly is no long an issue for only the elderly but also the youngers.

1.3 LTC and related services provided for older people in China.

In China, since the government has been encouraging to combine both LTC nursing with healthcare together for a long time, one always thinks up of healthcare insurance when accesses to LTC services even if he/she has functional limitation due to aging. Besides healthcare insurance which still makes most of the elder pay out of pocket, disposable pension can relieve some burden in one's older time. Therefore, it is necessary to take both healthcare system and pension system into consideration when discuss LTC services in

China.

1.3.1 A brief history of public LTC services

After China established in 1949, the first step the government took to care and support older people is only limited to the elderly who fell into “Three No’s” and “Five Guarantee’s” categories, which are the standards referred to when the government decides whether one is qualified to public LTC. “Three No’s” was used in urban areas, meaning no incomes, no families and no labor ability. In rural areas, “Five Guarantee’s” was the correspondence applied to vulnerable groups (older people, the disabled and children) who have no incomes, no families, no labor ability, meaning government takes care of these people’s food, clothes, medical care, shelters and burial. Until early 1980s, the LTC services for these “Three No’s” older people is restrained in only welfare institutions financed and managed by the government. So far, the service provided to older people in China show a strong residual orientation. As the aging population with “Three No’s” or “Five Guarantee’s” declines each year and the number of older people who is not in the previous categories but still need care increases on the contrary, Chinese government realized it is not sufficient to meet the needs only rely on state and collective sectors. Thus, pushing welfare services to society (socialization) was the best choice back to that time (Ministry of Civil Affairs 2008). Then, China started to transform the welfare system of elderly in 1980s and 1990s. The transformations were made in three orientations. 1) expanding targets to all older people, rather than limiting to one qualified as “Three No’s” or “Five Guarantee’s”; 2) providing services meet needs on several dimensions (medical cares, education, entertainment etc.), rather than only on survival level; 3) operated by various organizations (the government, enterprises and individuals) and funded by different sources, rather than solely relying on the government (Dai Wendong 2012).

In 1987, Chinese government adopted welfare lotteries as another approach to finance and now it became a large part of public welfare fund that cannot be underestimated. According to Ministry of Civil Affairs, public welfare fund should present no less than 35% (Ministry of Civil Affairs 2012). Until 2014, China has sold over 1.1billion yuan’s welfare lotteries and raised welfare fund up to 36 million. Besides welfare lottery fund, LTC services providers also started to collect profit from people who are not part of “Three No’s” or “Five Guarantee’s” and has functional limitation. With diversity of

funding sources, governments could construct more formal welfare homes and provide services of better quality to larger benefiter range. For profit-making sectors (e.g. enterprise-operated facilities), the appearance of fee-paying public users and government support guaranteed them incentives to build institutions and provide services for the elderly. In 1998, the government published a regulation to allowed non-state sectors, non-collective sectors and non-enterprise units (NGOs, private enterprise, individuals etc.) to play a role in social welfare services, including investment and operation (Yu Cheung Wong & Joe Leung 2012). As China took great effort in socialization, nursing homes and welfare houses were increasing year by year. In 1988, there were only 870 welfare institutions with 46,837 residents (Zhan *et al.* 2006). Then the number of the institutions increased to about 40,000 with 2.66 million older adults taken care of in 2013 (A. P. Glass *et al.* 2013).

Since 2001 when community-based LTC were introduced, China formed a basic LTC pattern which still maintains nowadays, that is, mainly relying on home-based services, partially depending on community-based services and taking institutional LTC as a supplement (The State Council 2017). Home-based LTC is the traditional way that family members taking care of the elderly. Community-based LTC is a pattern that family members care for their elders at night, and care workers accompany and assist older people's daily works (e.g. housekeeping, bathing, urinating, walking and light sports) at home or in community-operated institutions in daytime. It combines both institutional LTC and home-based LTC care, and gathers more and more attention from not only the government but also elder users or their families.

So far, China has established home-, community-base and institutional LTC provided in formal and informal way, which seems to be adequate for the growing aging population. However, there remains some critical problems. 1) unmet needs for institutional LTC. Until 2016, more than 40 million older people have functional disability (Ministry of Civil Affairs 2017) and the number of beds in all kinds of institutions is 5.84 million (ChinaNews.com 2015), which only meets 14.6% of the total needs. As the young generation has neither time nor money to take care of their elders and the prevalence of community-based LTC, more older residuals will emerge in the future; 2) utilization ratio gap in different institutions. Despite the shortage of institutional LTC, the institution is not made full use of and the utilization

factor remains low level (77%)³. This phenomenon can be responded to by the filial piety, high charge and inadequacies of the facilities or the services (Guo Fang 2014). As the ethic concept of filial piety was deeper and in rural areas than in cities, there is high vacancy rate in rural welfare institutions. In cities, state-operated institutions present high utilization factor that even one bed is hard to apply because of the low expenses. On the contrary, private-owned institutions do not attract as much as state-operated ones, presenting high vacancy ratio.

1.3.2 An abstract of healthcare system and pension system

Besides the LTC support which still seems to be insufficient, China has constructed comparatively complete healthcare system and pension system to support the elderly's lives.

The healthcare system forms a multi-pillar structure called "3+1". "3" means the main three types of fundamental healthcare insurances, containing, 1) Urban Employment Basic Medical Insurance(UEBMI); 2) Urban Resident Basic Medical Insurance(URBMI); 3) New Rural Cooperate Medical Scheme(NRCMS). "1" means medical assistance in urban and rural areas, which covers people who are with "basic living allowance", "Five Guarantee's" or in other troubled groups (Ministry of Civil Affairs 2009).

Participation of UEBMI is mandatory for urban employees and is mainly financed by employee themselves and the employer; the insured members are entitled to utilize the combining pooled funds in their individual accounts (called "social security card") on designated medical expenses. As for unemployed individuals in urban regions, they can participate in URBMI which is voluntary at household level (Mossialos et al. 2016). Under these two previous medical insurance systems, one can get recovered by 80%(UEBMI) and 70%(URBMI) of in-patient expenditure in 2016. In the same year, China raised the reimbursement upper-bound of the two urban basic insurances to 6 times as much as the local average wage and the local average resident income, respectively (The State Council Information Office 2017). NRCMS, which targets all residents in rural areas at household level, covers only severe diseases and has some strict constraints for reimbursement (Danan Gu & Denese Ashbaugh Vlosky 2008). According to National Health and Family Planning Commission, the government increased funds to 570 yuan

³ The number was calculated from "The 2013 Report on Aging Population"

(including 470 yuan from government subsidy) per person and raised the reimbursement ratio up to 50%(out-patient) and 75%(in-patient). Social medical assistance, which guarantees all residents to have equal rights to benefit from public health services, helps people in financial difficulty to access to the three basic healthcare insurances through copayment and provision of subsidy for deductibles.

As healthcare system in China presents a remarkable rural and urban geographic disparity, pension system also shares the same characteristics. Until now, China has run an urban-priority pension system that the Rural Residence Basic Pension System (RBP) cannot evenly matched. In cities, Urban Employment Basic Pension System (UEBP) is implemented, formed in a multi-pillared structure. 1) Basic Pension Scheme. It contains Pay-as-you-go (PAYG) portion financed by employer (20% of the wage) and individual accounts portion contributed by the employee (8% of the wage). 2) Supplementary Enterprise Annuities. In addition to the Basic Pension which is mandatory for both employers and employees, some enterprises voluntarily pay Supplementary Enterprise Annuities to improve their employees' pension level. 3) Individual savings. It is also a supplement of the Basic Pension and is contributed by individuals if one wishes. In rural areas, the pension is funded by individuals, the government and collective sectors. The payment of individuals can be divided into 12 levels⁴. The more you pay, the more pension you will receive in the future (The Central People's Government 2014).

Until 2015, over 508 million rural residents had participated in RBP and 293 billion yuan was fund in 2015. Whereas, the participant of UEBP reached about 343 million and about 2677 billion yuan was collected (Ministry of Human Resources and Social Security 2017). It is not difficult to forecast that pension in rural area is much lower than in cities, since the funded revenue in urban areas is as 9 times as that in rural areas, though the number of participants in UEBP is only 0.7 times of the number in RBP.

Whether in healthcare system or pension system, exists notable gap between rural and urban. While there are around 590 million⁵ rural residents which is 3.3⁶ times as urban employee population, only small part

⁴ Rural residents can choose the payment for pension from 100, 200, 300, 400, 500, 600, 700,800, 900, 1000, 1500 and 2000 yuan every year.

⁵ National Bureau Statistics of China (2017) CHINA STATISTICAL YEARBOOK 2017, *China Statistics Press*.

⁶ According to National Bureau Statistics of China, the population of urban employees

of people, especially who works in urban, were entitled to enjoy the most delicious privilege (e.g. UEBMI and UEBP).

1.3.3 The trial of LTC insurance(LTCI) in China

Since first LTCI launched in Qingdao in 2012, China has explored the most suitable LTCI system for itself. Until 2017, LTCI has been under pilot run in 15 pioneer cities including Nantong, Shanghai, Changchun and Qingdao. In the trial period, only people who are insured in UEBMI can participate in the trial LTCI. Among the insured, the State Council puts, each city government should give priority to the elderly with severest functional limits, mainly provide them nursing services on daily basis and solve their economic trouble on LTC services. In addition to severest-prior attitude, cities can expand to cover more older people with different severity of body functioning based on their financial conditions (The State Council 2016). As for the methods of finance, a part of Basic Medical Insurance Fund⁷ is used to run the new system and the insured are not required to pay insurance premium. This means that one pay UEBMI premium to enjoy both UEBMI and LTCI services, which is different from LTCI in Japan financed by individuals, the municipalities and the government.

As Ministry of Human Resource and Social Security suggests the 15 pioneer cities have the right to adjust the regulation on targets, deductible ratios and funding, the LTCI varies in the 15 cities. In Qingdao, the LTCI were divided into two categories, Employment LTCI and Resident LTCI. Employment LTCI are funded by 1) the UEBMI balance and 2) monthly payment from UEBMI Fund. The first part from the UEBMI balance of previous years cannot be over 20% of the total. The second part should be 0.5% of the amount which entering in this account monthly. Resident LTCI are financed by the less than 10% of the Resident Basic Medical Insurance Fund⁸. The services provided in Qingdao can be broadly categorized into five types. 1) Special Nursing, mainly targeting the older people who has severe functional disability, provides people who is in stable condition after heavy disease high-level medical nursing in hospital. 2) Hospital Care. People has long been in bed or suffered by chronic diseases, can receive LTC in medical

is about 179 million.

⁷ It is a part of the fund financed to run Medical Care Insurance, such as UEBMI and URBMI.

⁸ In Qingdao, URBMI and NRCMS are include in Resident Basic Medical Insurance.

qualified institutions. 3) In-Home Care for the Urban Retired and 4) In-Home Care for Normal Resident. In 3) and 4), one can receive nursing services at home or in non-medical institutions. As for the benefits, the insured of UEBMI can demand 90% of the expenditure as reimbursement. The insurer of Resident Basic Medical Insurance (first rank)⁹, teenager, children and college students can require 80% as the reimbursement, whereas the insurer of Resident Basic Medical Insurance (second rank) can only apply In-Home for Normal Resident and have to pay 60% of the cost.

2. LTCI system in Japan

Before the LTCI system was launched, there were Act on Social Welfare for the Elderly (SWE) established in 1963 and Health System for the Aged (HSA) established in 1983 (abolished in 2008) supporting the aged. There are two main regulations included in SWE system. While SWE helps to arrange older people's caring places, HSA guarantees free access to medical care for the aged, namely geriatric hospital. In 2000, although the previous two systems remained functioning, LTCI system was implemented under several considerations. 1) Diminishing Social Hospitalization phenomenon. Before the establishment of LTCI, many people choose hospitalizing in geriatric hospitals which require less than nursing homes, even if they need LTC more instead of medical treatment (Michiko Mukuno & Kotaro Tanaka 2017). Consequently, people choose between medical care and LTC services mainly depending on their deductibles rather than their actual needs. Since the elderly must pay the LTCI premium every month, the payment makes them aware that they need reconsider when they face the previous situation. Thus, LTCI helps fix this social phenomenon. 2) Increasing female employment. After LTCI were established, the emergence of a large amount of facilities and demands for in-home care (e.g. visiting nursing care, short-term admission for daily life LTC) was creating considerable employment for females. 3) Receiving efficient caring support. Under LTCI system, insured people can receive LTC services in form of non-cash benefits. This measurement prevents older people use in other way if it returned in cash and ensures appropriate services to them.

⁹ Under Resident Basic Medical Insurance in Qingdao, people can choose to pay First Rank which requires 350 yuan/year or Second Rank which requires 110 yuan/year.

In LTCI, the insured are divided into two categories, Category 1 (aged 65 and over) and Category 2 (aged 40 to 64 who are insured by healthcare insurance). Category 2 can receive LTC services only when they are in support or care required condition caused by some specified diseases, such as terminal cancer and rheumatoid arthritis. Whereas Category 1 are not required to satisfy being examined with the specified diseases. The insured have to take the LTC Requirement Certification and Support Requirement Certification provided by municipalities. Then municipalities determine what LTC or support services and how much you should receive according to the Level you certified. The Level can be roughly classified into three categories, Independent, Support Required Level and Care Level. Table 1 is the structure of the Level and the trend of body functional conditions in each level. Support Required Level is divided into two subcategories and Care Level is divided into five. As the table presents, the severer the Level be certified, the worse

Table 1 The categories of the Level in details

The Level	Body functional conditions
Independent	Basic Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs), such as making phone calls, can be performed independently.
Support Required Level 1	ADLs can be performed mostly independently. Some IADLs assistance are needed to prevent to step into worse state and help to be independent.
Support Required Level 2	Though ADLs can be performed basically, the body functioning is not as good as in Support Required Level 1.
Care Level 1	Compared to Support Required Level, the capability to perform IADLs deteriorates more. Partially LTC should be conducted.
Care Level 2	In addition to the same difficulties in performing IADLs as Care Level 1, ADLs also need to be performed with partial LTC.
Care Level 3	Compared to Care Level 2, the performance of both IADLs and ADLs becomes significantly worse. Almost comprehensive LTC is needed.
Care Level 4	In addition to the condition of Care Level 3, daily activities become more difficult and daily living without LTC is hard.

Care Level 5	The capability of doing daily activities is lower than that of Care Level 4 and it is almost impossible to live without LTC.
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Note. This table was compiled by the author, based on 高齢者介護研究会 (2015) 報告書「2015年の高齢者介護」

you function on ADLs and IADLs. If the elders were certified as Independent, they can only use Preventive LTC Management which provides services helping to prevent to step into Care Level. One can utilize services in both Preventive LTC Management and Preventive LTC Service Plan if he/she was classified as Support Required Level. For people who are certified as Care Level, Institutional services and In-home services are available to them. People choose services which are premised in their level on their own. Then within the upper bound set in each level, they pay 10%¹⁰ and the 90% portion will be covered by the LTCI (the government and the municipalities), generally.

Compare the history of the welfare for the aged in China and in Japan, it is not difficult to find some common turning points. Table 2 is the summary.

Table 2 Comparison between welfare for the aged in China and Japan

Year	China	Year	Japan
1949	Government-operated institutions for people in “Three No’s” or “Five Guarantee’s” categories.	1874	Social welfare institutions targeting the aged, the disabled and children.
1980s to 1990s	From “residual” welfare to “universal” welfare.	1962	From “helping the poor” welfare to “preventing poverty” welfare.
	To diversify the services and enhance the quality, the government let social sectors, profit-making sectors, NPOs, etc. enter the welfare market.	1970-1990	The social welfare developed rapidly, and the number of special nursing homes for the aged increased from 27 (in 1965) to 539 (in 1975).

¹⁰ If your annual income is 3.4 million and over yen, you are obliged to pay 30% of the LTC expenses on your own. If you earn over 2.8 million yen but lower than 3.4 million yen, then your deductible is 20%.

2012	Trial LTCI implemented in some cities.	2000	To separate LTC services from medical insurance, LTCI was launched.
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Note. This table was compiled by the author.

The history of welfare for the aged in Japan was based on (Guo Fang 2014).

From the table, we notice some similarity, such as both country constructing universal welfare instead of only focusing on the residual, took place first in Japan and then in China. Therefore, China has great possibility to step into the same path as Japan to adopt LTCI overall in the future. Therefore, before it come true, taking a grasp at what China's finance will be if the Japan-style LTCI was implemented is very insightful.

3. Model

The research aims at estimating the government expenditure if Japanese LTCI were introduced in China. Firstly, we discuss what variables affect the classification of care level in Japanese LTCI system. Then, we apply ordered-probit model to estimate on these variables. Secondly, we fill the coefficient into correspond variables in China to find out which care level are the elders in, if China adopted the same LTCI as Japan. Finally, we evaluate the expenditure needed to prepare by Chinese government.

3.1 Data

We used "National Survey of the Japanese Elderly" (ASJE) conducted by Tokyo Metropolitan Institute of Gerontology, Michigan University and the University of Tokyo. The survey targets people who are 60 and over, investigating the resources possessed and conditions of their lives, including their physical and mental health, family, other relationships besides the family and economical ability. The national survey conducts every 3 years from 1986, almost every survey targets both previous responders and some new elders. With LTCI launched in 2000, there were some modification in the questionnaire (e.g. the Level you certified and difficulty in performing ADLs), thus only Wave 6 (conducted in 2002) was used in this research. Wave 6 targets previous responders (3877 persons in total) only and the family members can replace their elders to answer if it is not convenient for the elders to do so. Therefore, we substituted the non-empty data in family-

questionnaire for the missing data in self-questionnaire.

As for dataset in China, we used China Health and Nutrition Survey (CHNS) conducted jointly by the Carolina Population Center at the University of North Carolina at Chapel Hill and the Chinese Center for Disease Control and Prevention. CHNS used a multistage, random cluster process to draw a sample of about 7,200 households with over 30,000 individuals in 15 provinces and municipal cities¹¹, such as Beijing, Shanghai, Liaoning and Jiangsu. CHNS was conducted in 1989, and seven additional waves were collected in 1991, 1993, 1997, 2000, 2004, 2006, 2009 and 2011. Since there are neither ADLs nor IADLs information in the survey after 2006, we used wave 2006 as the simulation dataset.

3.2 Application of ordered-probit model to Japanese LTCI

Although the LTC Requirement certification or the Support Requirement Certification in details are not published, body conditions can indirectly help recognize which level you were in. From Table 1, we can find a strong correlation between the Level and the capability of performing ADLs and IADLs. Therefore, we selected questions about ADLs and IADLs in the questionnaire of Wave 6 and used the answers as the main explanatory

Table 3 Explanation of the data used in the model

Data used in this model	Details
The Support Required/ Care Level ¹²	Indenpent:1 ; Support Required Level : 2 ; Care Level 1: 3 ; Care Level 2: 4 ; Care Level 3: 5 ; Care Level 4: 6 ; Care Level 5: 7 ;
Age	The current age of the target
Weight	The current weight of the target (kg)
Height	The current height of the target (cm)
Gender	Male:1 ; Female:0
Marriage Condition	Currently married:1 ; Others:0

¹¹ The home page of CHNS, <http://www.cpc.unc.edu/projects/china>

¹² Since in 2002, there were no subcategory in Support Required Level in LTCI, we consider the situation that only one rank exists in Support Required Level.

Employment	Currently employed:1 ; Others:0
Health Condition	Health condition felt by oneself. Not good:4 ; Normal:3 ; Quite good:2 ; Entirely good:1
High Blood Pressure	Currently diagnosed with it:1 ; Others:0
Diabetes	Currently diagnosed with it:1 ; Others:0
Smoke	Currently smoke:1 ; Others:0
Frequency of consuming Alcohol	Frequency of drinking alcohol once a month. $25 \leq \text{Frequency} \leq 30$: 5 ; $24 \leq \text{Frequency} \leq 19$: 4 ; $18 \leq \text{Frequency} \leq 13$: 3 ; $12 \leq \text{Frequency} \leq 7$: 2 ; $6 \leq \text{Frequency} \leq 1$: 1 ; Frequency=0: 0
Difficulty of bathing	Extremely difficult:4 ; Quite difficult:3 ; A little difficult:2 ; Not difficult:1
Difficulty of putting on cloth	Extremely difficult:4 ; Quite difficult:3 ; A little difficult:2 ; Not difficult:1
Difficulty of eating	Extremely difficult:4 ; Quite difficult:3 ; A little difficult:2 ; Not difficult:1
Difficulty of going to toilet	Extremely difficult:4 ; Quite difficult:3 ; A little difficult:2 ; Not difficult:1
Difficulty of shopping	Extremely difficult:4 ; Quite difficult:3 ; A little difficult:2 ; Not difficult:1
Difficulty of bathing	Extremely difficult:4 ; Quite difficult:3 ; A little difficult:2 ; Not difficult:1
Difficulty of walking	Extremely difficult:4 ; Quite difficult:3 ; A little difficult:2 ; Not difficult:1
Difficulty of squatting/kneeling	Extremely difficult:4 ; Quite difficult:3 ; A little difficult:2 ; Not difficult:1
Difficulty of going upstairs	Extremely difficult:4 ; Quite difficult:3 ; A little difficult:2 ; Not difficult:1
Difficulty of call	Extremely difficult:4 ; Quite difficult:3 ; A little difficult:2 ; Not difficult:1
Difficulty of utilizing transportation	Extremely difficult:4 ; Quite difficult:3 ; A little difficult:2 ; Not difficult:1

Note. This table is compiled by the author.

variables, such as difficulty of bathing, walking, shopping, calling. In addition to the severity of ADLs and IADLs, age, weight, high blood pressure, frequency of consuming alcohol were used in this model, since they may have great impact affecting the certified Level. For example, people who are married may accept more happiness and assistance in daily life from the spouse that helps them not to be certified as server Level than others.

We used ordered-probit model to estimate how the variables affect the Level to be certified. The latent variable model is $y^* = \beta x + \epsilon$. y is the actual outcome (the certified Level, numbered 1~7), realized by the latent

$$\begin{aligned}
 y^* &= \beta x + \epsilon \\
 y &= 1, y^* < c_1 \\
 y &= 2, c_1 \leq y^* < c_2 \\
 &\vdots \\
 y &= 7, y^* \geq c_6
 \end{aligned}$$

variable y^* . In this part, the mission is to find the rational coefficients and the cut points ($c_1 \sim c_6$).

Table 4 The regression results with three different variable groups

VARIABLES	(1) Support Required/Care Level	(2) Support Required/Care Level	(3) Support Required/Care Level
Age	28.73 (24.61)	21.53 (23.42)	22.72*** (8.105)
Age ²	-2.397*** (0.785)	-2.151*** (0.765)	-2.140*** (0.735)
Weight	92.66 (70.22)	1.353 (26.82)	2.801 (3.854)
Weight ²	1.615 (3.039)		
Height	76.77		

	(55.72)		
Age*Weight	-0.801 (6.267)	0.328 (6.025)	
Weight*Height	-20.22 (14.30)	-0.555 (0.712)	-0.557 (0.711)
Gender	0.530 (0.371)	0.442 (0.346)	0.445 (0.343)
Marriage Condition	0.113 (0.244)	0.0929 (0.236)	0.0927 (0.236)
Employment	-0.208 (0.525)	-0.0941 (0.506)	-0.0952 (0.505)
Health Condition	0.211 (0.168)	0.192 (0.166)	0.192 (0.166)
High Blood Pressure	-0.148 (0.232)	-0.115 (0.226)	-0.113 (0.222)
Diabetes	0.562* (0.306)	0.501* (0.302)	0.499* (0.299)
Smoke	0.0389 (0.383)	-0.0424 (0.371)	-0.0418 (0.371)
Frequency of Consuming Alcohol	-0.0777 (0.292)	-0.115 (0.0723)	-0.116 (0.0720)
AlcoholFrequency ²	-0.00977 (0.0605)		
Difficulty of Bathing	0.203 (0.252)	0.121 (0.242)	0.119 (0.240)
Difficulty of Clothing	0.137 (0.389)	-0.0335 (0.355)	-0.0330 (0.355)
Difficulty of Eating	0.0224 (0.439)	0.0951 (0.425)	0.0985 (0.420)
Difficulty of Going to Toilet	-0.266 (0.337)		
Difficulty of Shopping	-0.139 (0.205)		
Difficulty of Walk	0.241	0.131	0.131

	(0.191)	(0.175)	(0.175)
Difficulty of Squatting Kneeling	0.395**	0.408**	0.409**
	(0.175)	(0.172)	(0.171)
Difficulty of Going Upstairs	-0.113	-0.0842	-0.0850
	(0.158)	(0.156)	(0.155)
Difficulty of Calling	-0.164	-0.135	-0.138
	(0.252)	(0.248)	(0.242)
Difficulty of Utilizing Transportation	0.337*	0.308**	0.308**
	(0.178)	(0.155)	(0.155)
Constant cut1	442.3	53.88	59.34***
	(289.8)	(102.8)	(22.71)
Constant cut2	443.5	55.03	60.50***
	(289.8)	(102.8)	(22.74)
Constant cut3	444.9	56.35	61.81***
	(289.8)	(102.8)	(22.75)
Constant cut4	445.7	57.21	62.68***
	(289.8)	(102.8)	(22.74)
Constant cut5	446.1	57.64	63.10***
	(289.8)	(102.8)	(22.74)
Constant cut6	446.6	58.08	63.54***
	(289.8)	(102.8)	(22.74)
Observations	124	124	124

Standard errors in parentheses

Note. Age, Weight and Height were taken the logarithm.

*** p<0.01, ** p<0.05, * p<0.1

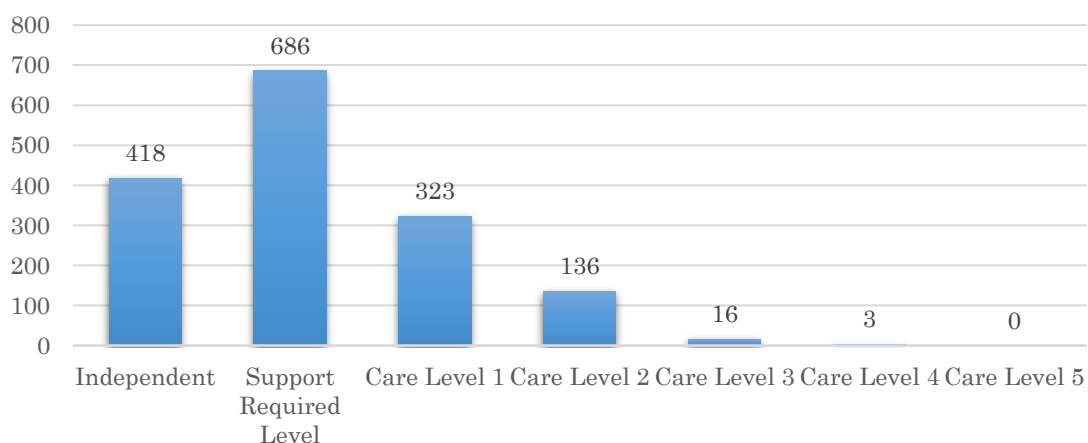
As Table 4 presents, three different variable groups were applied in the model. As Group 3 returns statistically significant result in all cut points, we shall apply the coefficients of each variable of Group 3 in the next section. In Group 3, Age presents a positive relation with the certified Level, whereas Age squared has a negative relation, since the extremely longer you can live, the healthier you probably are. Difficulty of Squatting/Kneeling and Utilizing

Transportation returns a positive relation with the Level, while difficulty of Going Upstairs and Calling is presenting the opposite way due to the small sample size.

3.3 Introduction of Japanese LTCI to China

In this section, we simulate implementation of Japanese-style LTCI in China. Since all people who answered their Support Required Level/Care Level in the ASJE were over 65 coincidentally, the LTC expense of Category 2 who are aged 40~65 cannot be evaluated in this research. Therefore, the data with people aged lower than 65 were dropped out in CHNS. We apply coefficients β derived from Group 3 and x which are the corresponding in CHNS to derive latent variable $y^* = \beta x + \epsilon$. Then evaluate the Level Chinese will be certified if LTCI were launched by locating y^* among these cut points derived in the previous section. Figure 1 is the popularity distribution in each

Figure 1 the population of each Level after introduction of LTCI



Note. This figure is compiled by the author.

Level of the 1582 sample size. Next, assume the proportion of population in each level does not change in country level. Then we can apply the proportion to entire China.

The detailed simulation process was contained in Table 5. ① we calculated actual LTCI benefits per person of each level in Japan. ② we evaluated the population of the elderly of each level in China. ③ we multiplied the result in ① and ② to derive the total LTCI benefits in

Table 5 Financial Simulation in China

	Support Required Level 1	Support Required Level 2	Care Level 1	Care Level 2	Care Level 3	Care Level 4	Care Level 5
Japan							
Expense	160,666,359	307,200,095	1,163,083,421	1,532,486,261	1,725,064,469	1,847,132,032	1,643,847,297
Population	877,055	839,069	1,197,558	1,051,444	791,189	728,175	583,918
Expense per person	183	366	971	1,458	2,180	2,537	2,815
China (simulation)							
Population on sample-base	686		323	136	16	3	0
proportion	43.36%		20.42%	8.60%	1.01%	0.19%	0.00%
Population	65,057,257		30,631,915	12,897,649	1,517,370	284,507	0
Expense/JPY	35,736,513,609		29,750,102,154	18,798,404,096	3,308,390,022	721,697,266	0
Expense/CHN	1,245,879,646		1,037,175,790	655,367,485	115,340,177	25,160,483	0
Total/CHN	3,078,923,581						

Note. This table was compiled by the author.

Unit of Expense is 1 thousand yen or yuan.

The population of people aged over 65 is 150.03 million in China.
(National Bureau of Statistics of China, 2017)

China. ④ Since the result derived in ③ is valued in JPY, we adjusted ③

Table 6 PPP in China and Japan

	To USA (US\$=1.00)	To Japan (JPY)
China	3.51	0.035
Japan	100.68	1

Note. This table was compiled by the author.

The PPP of China and Japan is from IMF World Economic Outlook

in CHN by using PPP of China and Japan. Finally, we derived the total LTCI benefits that Chinese people will demand as reimbursement. The number is about 3.1 trillion which is 4.15% of current GDP, twice time as in Japan (1.9%¹³). This means if we introduce the same system of LTCI as Japan, we will probably enjoy an elder life of quite high-quality. However, to gain the delicious result must be on the premise that a large of people pay the LTCI premium. The least yearly premium cost of LTCI in Japan is about 1085 yuan¹⁴ per person, which exceeds the average premium of UEBMI in Qingdao¹⁵. Thus, it will probably crash to a financial problem if we apply the same premium rate, same quality of services and deductible ratio as in Japan.

Table 7 Simulation in Qingdao

	Sample		Qingdao
	Population	proportion	Population(simulated)
Independent	49	25.13%	275,682
Support Required Level	73	37.44%	410,709
Care Level 1	42	21.54%	236,298
Care Level 2	27	13.85%	151,906
Care Level 3	4	2.05%	22,505
Care Level 4	0	0.00%	0

¹³ The number is from Cabinet Office (2016). The current condition of social welfare on benefit and payment (社会保障の給付と負担の現状).

¹⁴ The number was adjusted by the PPP.

¹⁵ The average wage in Qingdao is 4143 yuan/month and the part of premium needed to be paid by individuals is 2% of one's wage.

Care Level 5	0	0.00%	0
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Note. This table was compiled by the author.

The total aging population of Qingdao is 1.0971 million.

In Table 7, we selected people only residents in Shandong province¹⁶ from the previous simulated result. By assuming the proportion of each level's population in sample does not change in the real province level, and each city presents the same distribution in the province, we calculated the population of each certified level in Qingdao. As Table 7 presents, there are no person qualified in Care Level 4 and Care Level 5. Certainly, people have the same severe functional disability as the people who certified in the two levels exist in Qingdao. The 0% means there are relatively small number of people who have severest functional difficulty.

3.4 Result

As the result of simulation presents the proportion of people certified in Independent and Support Required Level having the second and the first share respectively, aging population in China are relatively in good body condition if we apply the same certification as Japan does¹⁷. As detailed LTCI implemented in Qingdao was explained in the previous section, Qingdao-style LTCI provides services mainly targets who are already in severe functional condition. However, in our result, the severest people are only of a small amount and people who qualified in other dependent level remains high, that is, 821 thousand people need LTC. Whereas, among 8 million insured members, only 41 thousand people have received the LTC services benefited from LTCI.

Conclusion

From the establishment of welfare for the aged to the trail LTCI runs in 15 pioneer cities, China has always been searching for the most suitable system for guarantee the lives of the huge aging population. In this research, we introduced the same LTCI system as in Japan to China and did some calculations about the finance and the distribution of people certified to each level. We found some defectives exist in the method used in this research.

¹⁶ Qingdao is a city in Shandong province.

¹⁷ The first two highest proportions in Japan are people in Care Level 1 and 2.

1) Due to the small size of ASJE, only the expense of Category 1 can be evaluated in China and there presents 0% in the share some levels. 2) Since the survey data of ASJE is old, Support Required Level had not been subcategorized into two levels. Therefore, the simulation of LTC expense in Support Required Level 1 and 2 cannot be recognized separately. 3) The preference of selecting LTC services in the two countries may not be the same. Thus, the expenses of LTC services simulated in China may be biased.

Despite the defectives, we can still draw two meaningful conclusions based on the results. 1) If we consider apply LTCI based on Japanese-Style LTCI, we can lower the insurance premium to allow people with low income can participate in. And to balance the budget, lower current deductible rate which is 90% or lower the quality of services which helps to lower the cost of the services. 2) China should increase financing methods and target more aged people who can be certified to Support Required Level and Care Level 1~3. In simulation of Qingdao, we found large unmet needs in these light levels and how to take over these growing number of these people will become an urgent issue. To collect more fund, we probably should impose premium for aged people. Only fund is enough, can the local government expand the range of the targets.

Reference

- Anne P. Glass, Yuan Gao & Jing Luo (2013) China: Facing a long-term care challenge on an unprecedented scale, *Global Public Health*, 8:6, 725-738.
- Bei Wu PhD, Mary W. Carter PhD, R. Turner Goins PhD & Chunrong Cheng BS (2005). Emerging Services for Community-Based Long-Term Care in Urban China, *Journal of Aging & Social Policy*, 17:4, 37-60.
- Bi Lijie (2011). Feasibility study on the introduction of a public nursing care system in urban China: through a comparative analysis with Germany, Japan, and South Korea (中国都市部における公的介護保険制度創設の可能性), *The Ritsumeikan journal of international studies* 23(3), 599-621, 2011-03.
- Cabinet Office (2016). The current condition of social welfare on benefit and payment (社会保障の給付と負担の現状).
- Carolina Population Center and the Chinese Center for Disease Control and Prevention (2011). *China Health and Nutrition Survey(Wave2006)*
- ChinaNews.com (2015). Ministry of Civil Affairs: every thousands of the elderly have 27.5 beds (民政部: 每千名老年人拥有养老床位数达 27.5 张)
- Dai Wendong (2012). The experience on the reforms of welfares for the aged since “Reform and opening” (改革开放以来老年福利制度建设的经验与教训) *J. of Wuhan Uni. of Sci. & Tech. (Social Science Edition)*, Vol.14, No.4.
- Danan Gu & Denese Ashbaugh Vlosky (2008). Long-Term Care Needs and Related Issues in China, *Social Sciences in Health Care and Medicine*.
- Elderly Care Research Group (2015). The 2015 report on LTCI of the aged (報告『2015 年高齢者介護』).
- Guo Fang (2014). The welfares for the aged in rural areas of China-Heading to small and multi-functional care (『中国農村地域における高齢者福祉サービス—小規模多機能ケアの構築に向けて』), Akashi Press.
- Heying J. Zhan PhD , Guangya Liu BA , Xinping Guan PhD & Hong-guang Bai PhD (2006). Recent Developments in Institutional Elder Care in China, *Journal of Aging & Social Policy*, 18:2, 85-108.
- Hiroshi Sano & Kensaku Kishida (2013). The determinants on LTC services except from LTCI (介護保険外サービス需要の決定要因), *Kake Keizai kenkyu* (99), 52-61.
- Hui Wei (2016). Population Aging and Long-Term Care Policy in China and the United States, *Culminating Projects in Gerontology*. Paper 3.
- Mariko Yamamura & Hirokazu Yaragihara (2007). Multivariate probit analysis based on comprehensive survey of living condition of the people on health and welfare: home long-term care utilization under national long-term care insurance system (「国民生活基礎調査」データに基づく居宅介護サービス利用に関する多変量プロビット分析), *Proceedings of the Institute of Statistical Mathematics* 55(1), 125-142, 2007.
- Michiko Mukuno & Kotaro Tanaka (2017). *Guide to Social Security*, 14th ed.

Yuihikaku Publishing Co., Ltd. P119.

Mieko Okamura (2016). A Primary Study on the Test Run of Long-Term Care Insurance in China(中国における介護保険制度導入に関する初期的考察), Chiba keizai ronso (53), 39-53.

Ministry of Civil Affairs (2008). Encouraging Home-Based LTC (大力推进社区居家养老).

Ministry of Civil Affairs (2009). A suggestion on Medical Insurance in urban and rural areas (民政部、卫生部、财政部、人力资源和社会保障部关于进一步完善城乡医疗救助制度的意见).

Ministry of Civil Affairs (2017). The explanation of “the criteria of welfare institutions” (夯实养老服务质量基准线 持续提升养老机构服务质量——解读国家标准《养老机构服务质量基本规范》).

Ministry of Civil Affairs of the People’s Republic of China (2012). How does the welfare lottery construct (彩票资金是如何构成的).

Ministry of Human Resources and Social Security (2017). The report on (2016 年度人力资源和社会保障事业发展统计公报).

Ministry of Health, Labor and Welfare (2015). The current condition of LTCI and the role in the future (公的介護保険制度の現状と今後の役割).

Mossialos, Wenzl, Osborn and Sarnak (2016). 2015 International Profiles of Health Care Systems.

National Committee on Aging (2011). The 2010 Report On Aging Population (2010 年度中国老龄事业发展统计公报).

National Committee on Aging (2013). The 2013 Report On Aging Population (中国老龄事业发展报告(2013)).

Shigeru Sugihara *et al.* (2017). State Dependence of Long-Term Care and Preventive Effects of Care Expenditures, New ESRI Working Paper No.42.

Shinpei Okada & Shujiro Kubori (2010). The payment of National Health Insurance for the aged and the gap of LTCI in Nagano (長野県内保険者の国保老人医療費と介護費の地域差の動向), Shinsyu koshu eisei 4(2): 29-38(2010).

Shiyu Li & Shuanglin Lin (2016). Population aging and China’s social security reforms, Journal of Policy Modeling 38 (2016) 65-95.

The Central People’s Government (2014). A suggest on Basic Medical Insurance in urban and rural areas (国务院关于建立统一的城乡居民基本养老保险制度的意见).

The State Council (2016). A suggest on the trial LTCI (人力资源社会保障部办公厅关于开展长期护理保险制度试点的指导意见).

The State Council (2017). The plan of constructing welfares for the aged in “135” (“十三五”国家老龄事业发展和养老体系建设规划).

The State Council Information Office of the People's Republic of China (2017) .
The development of health care and human rights in China (White Paper) (中国健康事业的发展与人权进步(白皮书)).

Tokyo Metropolitan Institute of Gerontology, Michigan University and the University of Tokyo (2006). National Survey of the Japanese Elderly(Wave6)

Wei Yang, Alex Jingwei He, Lijie Fang and Elias Mossialos (2016). Financing institutional long-term care for the elderly in China: a policy evaluation of new models, *Health Policy and Planning*, 31, 1391–1401.

Yu Cheung Wong & Joe Leung (2012) Long-term Care in China: Issues and Prospects, *Journal of Gerontological Social Work*, 55:7, 570-586.

Yuki Katayama (2016). The future of the LTCI of aging China (老いる中国、介護保険制度はどうなっているのか。), *Nissei reaserch*.