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The Chinese Pension System

Hanming Fang and Jin Feng

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ABSTRACT

We provide a detailed overview of the current state of the Chinese pension system, as well as its development, its problems and some ideas for future reforms.

Hanming Fang
Department of Economics
Ronald O. Perelman Center
for Political Science and Economics
133 South 36th Street
Suite 150
Philadelphia, PA 19104
and NBER
hanming.fang@econ.upenn.edu

Jin Feng
School of Economics
Fudan University
600 Guoquan Road
Shanghai 200433
PR China
jfeng@fudan.edu.cn

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1   Introduction

The Chinese pension system is multi-layered. The first layer consists of several public pension schemes, some mandatory (Basic Old Age Insurance and Public Employee Pension) and some voluntary (Urban Resident Pension and New Rural Resident Pension). These public pension schemes aim to provide basic social security to all residents when they reach old age, regardless of whether they were employed. The second layer consists of employer-sponsored annuity programs, which employers voluntarily provide as a supplement to the public pension schemes. The third layer consists of household savings-based annuity insurance policies. The public pension schemes of the first layer receive substantial direct fiscal subsidies from the government, while all schemes or products regardless of layer receive tax preferences.

As of the end of 2017, Chinese public pension schemes had more than 915 million participants (accounting for 65.8% of the total population), and the total public pension expenditure was 4,032 billion RMB, about 5% of China's GDP. Unlike the broad coverage of the first layer, participation in the second layer is much more limited; only about 80 thousand firms, accounting for less than 0.5% of all the firms in China, offered employer-sponsored annuity programs to 23.3 million employees in 2017.[1] The third layer is still in its infancy.

The remainder of this chapter is structured as follows. In Section 2, we offer a detailed overview of the three layers of China's pension system. We then discuss the development of China's pension system and the problems it faces in Sections 3 and 4, respectively. In Section 5, we present some ideas for future reforms. Section 6 concludes.

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[1] Data in this section are from the Ministry of Human Resources and Social Security (MOHRSS) of China.

2 China's Multi-Layered Pension System

2.1 Public Pension Schemes

China's public pension system is on track to achieve universal coverage. Until 2015, the system encompassed four schemes that were intended to cover the entire eligible population. The first two schemes were for *employed* workers in firms and the government sector, respectively, and the latter two schemes were for *non-employed* individuals in rural and urban areas.

- Basic Old Age Insurance (BOAI): For employees in for-profit enterprises, including for-profit public enterprises, and all other private sectors;

- Public Employee Pension (PEP): For civil servants and employees in non-profit government institutions, such as schools and cultural and health facilities;

- Urban Resident Pension (URP): For urban residents aged 16 and older without a formal non-agricultural job;

- New Rural Resident Pension (NRP): For rural residents aged 16 and older without a formal non-agricultural job.

At the beginning of 2014, the State Council announced that the URP and NRP were to be merged into a uniform Resident Pension system. Also, in 2015, the PEP was merged into BOAI, making BOAI the uniform program for all employees in urban sectors. As of the end of 2017, BOAI had 402.9 million participants, of which about 37 million were public sector employees. The Resident Pension scheme had 512.6 million participants.

The public pension system's four schemes—BOAI, PEP, URP and NRP—aim to cover different groups of the population and workforce, and they vary in their contribution and benefit rules. The existence of two different systems for employees (BOAI and PEP) and the fact that non-employed individuals fall into different schemes depending on their residency

status (urban or rural) help explain the vast inequalities in the pension system. Table 1 summarizes the key features of the four pension schemes.

[Table 1 About Here]

These schemes were established by the State Council and are regulated by the Ministry of Human Resources and Social Security (MOHRSS) of China. However, local governments are responsible for managing these schemes. Thus, a second source of the serious inequalities in the generosity of public pension schemes across different locations is their fragmented nature. This feature also leads to portability challenges when individuals change their employment to a different public pension administrative region. In Section 4, we address such inequality issues in detail.

Basic Old Age Insurance (BOAI): BOAI is the most important public pension scheme. Established in 1951 for urban employees of enterprises, it was reformed into a multi-pillar system in 1997. The first pillar of BOAI is a compulsory scheme with both defined contribution and defined benefit features. On the contribution side, employers are required to contribute 20% of the wages paid to their workforce. The maximum wage level subject to the contribution requirement is 300% of the local average wage, and the minimum wage level subject to the requirement is 60% of the local average wage.[2] On the benefit side, employees with a contribution history of 15 or more years are entitled to the pension benefits, and the replacement ratio (pension benefit as a percentage of pre-retirement wage) depends on the number of years of contribution and the individual's wage relative to the local average wage.

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[2] "Local" could be the provincial, city or even county level, depending on the administrative region of the public pension fund.

For example, a retiree whose pre-retirement wage was equal to the local average wage will have a pension replacement ratio of 35% after 35 years of contribution.

The second pillar of BOAI is the individual account pension, which has a contribution rate of 8% of wages. The individual account is notional, and individuals do not have the authority to make any allocation decisions regarding how contributions to it are managed. In 2005, the MOHRSS published a target replacement ratio of 59.2% (relative to the local average wage) for a person who worked for 35 years, with 35% from the pooling account (basic pension) and 24.2% from the individual account.[3]

The BOAI retirement eligibility age is 50 for female blue-collar workers, 55 for female white-collar workers, and 60 for males.

Public Employee Pension (PEP): PEP was established in 1953 for civil servants and employees in the non-profit public sector. PEP system expenditure is included in both the central and local governments' fiscal budgets. It is more generous than the other schemes, and a notable feature is that it does not require any contribution from public employees. Public employees have an average pension replacement ratio of 80-90% of pre-retirement wages. When PEP was merged into BOAI in 2015, the contribution and benefit rules for public employees were switched to those of BOAI. There is a transition arrangement between the two schemes. For those who retired before the 2015 reform, pension benefits are unchanged; for those who entered the public sector after 2015, the BOAI system applies; and for those who were already in PEP but not yet retired in 2015, there is a transitional arrangement for financing individual accounts, as there had been no contributions to

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[3] Self-employed people or workers in informal sectors may participate in BOAI voluntarily. The contribution is 20% of the local average wage, of which 8% is recorded in the individual account. The benefit rule is the same as that for workers in the formal sectors.

individual accounts before the reform. The PEP retirement eligibility age is 55 for females and 60 for males.

New Rural Resident Pension (NRP) and Urban Resident Pension (URP): The NRP was established in 2009 to cover rural residents, and the URP was established in 2011 to cover urban non-employed residents. The NRP and URP are voluntary schemes funded in conjunction with government subsidies. Individual contributions are put into individual accounts. In addition, because the amount of contributions depends on local economic conditions, there are clear variations across regions as well as between urban and rural residents. Benefits consist of two parts: a basic pension and the individual account pension. Participants with a contribution history of 15 or more years are entitled to receive a basic pension upon reaching 60 years of age (at a benefit level of 55 RMB per month in most regions when the scheme was introduced). The basic pension is funded entirely by the central government in the middle and western provinces, while it is funded equally by the central and local governments in the eastern provinces. Local governments have the autonomy to raise basic pension benefits in line with local economic conditions, but they are responsible for outstanding financial obligations. The replacement ratio is about 20% (nation-wide average) of rural per capita net income. At the beginning of 2014, the State Council announced that the two schemes would be merged into a uniform Resident Pension system. The pension eligibility age for the NRP and URP is 60 years for both males and females.

The Social Insurance Law enacted in 2011 stipulates that rural migrant workers are entitled to the same treatment given to urban workers. However, among both employers and migrant workers, compliance with the policy is poor.

2.2 Enterprise Annuity and Occupational Annuity

The employer-sponsored pension system (Enterprise Annuity, or EA; "企业年金" in Chinese) was introduced in 1991. The EA system has grown considerably in the ensuing years, but it is still an underdeveloped market in terms of the number of participants, the number of providers (enterprises) and pension assets. As of 2017, the EA system had 23.3 million participants, representing only about 5.8% of the number of BOAI participants. The number of enterprises providing EA was 80.4 thousand, about 0.35% of total enterprises. Total assets stood at about 1,288 billion RMB at the end of 2017, about 1.5% of GDP.

Enterprises offering pension plans tend to be large state-owned enterprises (SOE) or monopolistic companies in, for example, the railway, electricity and communication industries (Cai and Cheng, 2014; Impavido, et al., 2009). Employers are increasingly offering defined contribution (DC) plans in which they are not responsible for how pension money is invested and do not guarantee a certain benefit. Most employers, however, cannot afford and have little incentive to offer pension plans. Legislation and regulations have played key roles in the development of pension plans; the central government issued two regulations in 2004 on the EA system and the management of pension funds. In addition, since 2014, contributions and investment returns from both employers and employees have been tax exempt; favorable tax treatment was not in place before 2014.

As part of the 2015 reform of the PEP, public sector employers are required to provide occupational annuity ("职业年金" in Chinese) as a complement to benefits. Employers contribute 8% of employees' wages and employees contribute an additional 4%, with tax preferences applied. Occupational annuity differs from EA in that the individual accounts are partly notional, because government employers' contribution for civil servants is notional, and some self-financed public sectors cannot afford the contribution. The contribution of

employees is fully funded in the accounts. Implementation of the occupational pension is still in the initial stage, with little publicly available information about the extent of coverage.

2.3   Private Annuity Insurance

Currently, 69 insurers in China are involved in the commercial annuity business through a variety of products. Annuity insurance has grown rapidly, with an average annual growth rate of 16.9% between 2001 and 2014. In 2014, annuity insurance income totaled 282.2 billion RMB (increasing more than 77.2% year-over-year). There were 69.433 million in-force policies covering 100 million people, providing protection amounting to 1.4 trillion RMB.[4] Until 2018, there was no tax preference for commercial annuity insurance. However, it should be noted that many of these annuity insurance products are sold as wealth management products and are not intended to be kept in force for long durations; such products are thus unlikely to serve the genuine purpose of pension income.

At the beginning of 2018, a pilot policy was issued to provide individual income tax-deferred annuity insurance products in Shanghai, Fujian Province and Suzhou Industrial Park. The model incorporates income tax deductions for individual premiums and does not tax investment returns, but benefits are subject to income taxation when received by individuals who reach the eligible age. However, the maximum premium that can receive a tax deduction is limited to 6% of one's taxable income or 12,000 RMB, whichever is lower. There are also tax preferences for annuity benefits, with 25% of the annuity free from income taxation.

Figure 1 shows the number of participants and total pension benefits of each program and layer. The Resident Pension program covers the most people, while BOAI accounts for

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[4] Sources: Annual Report of the Chinese Insurance Market 2015.

the lion's share of benefits. The pension programs of the second and third layers are quite marginal in comparison.

[Figure 1 About Here]

3 Development of China's Public Pension System

China's public pension system has gone through four phases. The first phase began in 1951, when "labor insurance" was introduced as an unfunded, employer-sponsored pension program that covered employees of SOEs and collectively owned enterprises. There was also a separate pension system for public (civil service) employees—the Public Employee Pension (PEP)—but the rural population did not have any formal old age social security.

The second phase lasted from the mid-1980s to the early 1990s. With the marketization of the economy and the reforms of SOEs, the enterprise-based pension system hindered fair competition and the mobility of labor. The pooling of pensions at the municipal or county level was introduced, but the system remained pay-as-you-go (PAYG), financed by enterprises.

The third phase lasted from the early 1990s to the late 2000s. In 1997, China adopted a three-pillar pension system for urban employees to deal with population aging and SOEs' growing pension burden. The new system was called Basic Old Age Insurance (BOAI). The first pillar was the PAYG system, financed by employers; the second pillar was the notional individual account, financed by employees' contributions; and the third pillar was voluntary retirement savings.

The fourth phase, which began in 2009, is characterized by the expansion of pension system coverage to non-SOE firms. To achieve universal coverage, the New Rural Resident Pension (NRP) scheme was established in 2009 to cover rural residents, and the Urban Resident Pension (URP) scheme was established in 2011 to cover urban non-employed

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residents. The Social Insurance Law enacted in 2011 stipulates that rural migrant workers are to be given the same treatment as that given to urban workers.

3.1 Coverage and Dependency Ratio

The BOAI system has steadily increased its coverage in recent decades (Figure 2). The number of participants (workers) as a percentage of total urban employees increased from 45.1% in 2000 to 68.7% in 2017.

[Figure 2 About Here]

The in-system dependency ratio in BOAI increased from 18.6% in 1990 to 32.5% in 2010 and 37.7% in 2017. In other words, it has gone from 5.4 workers supporting a retiree to fewer than three workers supporting a retiree. This is mainly attributable to the shift in the age distribution of the Chinese population. The old-age dependency ratio—elderly (60+ years)/working age (15-59 years)—has risen over time (Figure 3). From 1950 to 2010, the number of people over 60 increased threefold to 240 million, rising from 7.5% of the total population in 1950 to 17.2% in 2010. The proportion of 65-year-olds and above has risen from 4.5% in 1950 to 8.2% in 2010. Meanwhile, the proportion of people in the 15-59 age group has risen from 58.3% in 1950 to 68.2% in 2010, and the proportion in the 15-64 age group has risen from 61.3% to 72.4%. The fact that both the aged group and the working age group have seen their population shares increase reflects the rapid decline in China's fertility rate; the population share of the 0-14 age group declined from 34.2% to 19.5%.

[Figure 3 About Here]

As noted in Section 2.2, the NRP and URP programs were merged into a unified Resident Pension scheme in 2014. The number of pensioners increased from 89.2 million to

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152.7 million. The dependency ratio within the Resident Pension scheme stood at 43% in 2016, much higher than that of the BOAI system.

Fact 1: The in-system dependency ratio of China's Basic Old Age Insurance system is about 38%, much higher than the population-wide dependency ratio of 26% in 2017. The in-system dependency ratio of the Resident Pension scheme was 43% in 2016.

3.2 Contributions and Benefits

The contribution rate of BOAI is among the highest in the world, even higher than the rates seen in Sweden, the US and France (Table 2).

[Table 2 About Here]

China enacted the Social Insurance Law in 2011 to help enforce the regulations that require employers to pay contributions for their employees. Since then, compliance among private firms has improved. However, it led to a heavier burden on employers, with their social insurance and housing fund contributions reaching more than 40% of employees' wages. To lessen the burden, in 2016, the State Council decided to lower the contribution rates for employers. For BOAI, if the local contribution rate is higher than 20%, it should be reduced to 20%. For provinces with contribution rates of 20% and a pension fund balance sufficient to cover at least nine months of expenditure, the contribution rate can be reduced by one percentage point to 19%.

Fact 2: China has one of the highest statutory pension contribution rates in the world, at 28%.

Pension benefits were generous before the reform in the mid-1990s, at about 75-90% of a worker's pre-retirement wages. The reform of the late 1990s reduced the replacement ratio

of pensions for enterprise workers, particularly for younger workers (Feng et al., 2011). According to the reform framework, those who had retired before 1997 (referred to as the "old" workers) remained in the original PAYG system; those who entered the labor market in or after 1997 (the "new" workers) came under the new three-pillar pension system; and those who started work before 1997 and retired or will retire after 1997 (the "middle" workers) were covered by a transitional plan, which reduced the replacement ratio gradually over cohorts. Another reform in 2005 set the target replacement ratio (first-year pension benefit after retirement/local average wage) at 59.2% for a worker who had worked for 35 years and earned wages equal to the local average wage.

The average replacement ratio—i.e., pension benefits per pensioner as a percentage of the average wage of workers—has declined steadily over the last decade in China (Figure 4). This is the combined result of the transitional arrangement, wage differences across cohorts and the different growth rates of wages and pension benefits.

[Figure 4 About Here]

Fact 3: The average replacement ratio has declined steadily and stood at 46% in 2017.

The mandatory retirement age is the same in the BOAI and PEP programs. For men, it is age 60. For women, it is age 55 for white-collar employees (i.e., civil servants, professionals, administrative staff in enterprises, etc.) and age 50 for blue-collar employees. Only a small fraction of women work in white-collar jobs or the public sector and hence qualify for the higher retirement age; Chinese urban household survey data from the National Bureau of Statistics show that about 7% of women employees are eligible for the higher retirement age of 55 years. In urban China, reaching retirement age means one must retire from one's current job and start receiving public pension benefits. After that, the individual can stay in the labor market informally without losing pension benefits, but the opportunity to find a job

declines dramatically. The current retirement age policy was established at the beginning of the 1950s, when the life expectancy at birth was about 43 years. An increase to the retirement age is likely to happen, given population aging. We will discuss a reform proposal to raise the retirement age in Section 5.3.

Fact 4: Current retirement ages are 60 for men, 50 for women who work in blue-collar jobs and 55 for women who work in white-collar jobs; about 93% of women are required to retire at age 50.

3.3   Revenue, Expenditure and Government Subsidy

The BOAI pension fund has maintained an annual surplus for many years. In 2011, the fund's revenue was 1.69 trillion RMB and its expenditure was 1.28 trillion RMB (Figure 4). The BOAI fund's surplus is mainly attributable to the steady expansion of coverage, with the increase in participants far exceeding the increase in retirees. Furthermore, BOAI also receives government subsidies, which accounted for 16.7% of total revenue in 2015 (Figure 6). If these subsidies were subtracted from the accounting, BOAI funds in 14 provinces (including Shanghai, Jiangsu, Hubei and Hunan) would likely be in a deficit, and BOAI accounts would have reported a total deficit in 2010, possibly as large as 67.9 billion RMB, instead of the surplus that was observed.

<div align="center">

[Figure 5 About Here]

[Figure 6 About Here]

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Fact 5: Despite the high statutory contribution rate, BOAI would have run a fiscal deficit in 14 provinces in the absence of government subsidies.

In the Resident Pension system, revenue was 330.4 billion RMB at the end of 2017, of which about 25% came from individual contributions and the rest from national and

subnational government subsidies. Expenses totaled 237.2 billion. The system has an

accumulated surplus of 631.8 billion RMB, mostly from the accumulated balance of

individual accounts belonging to younger cohorts.[5] In the future, when more residents start

receiving pension benefits, the individual account surplus will be reduced.

3.4   Notional Individual Account

Individual accounts in BOAI were designed to be fully funded. However, many

provinces have been using the funds in individual accounts to support the PAYG pillar,

which renders the accounts essentially notional. The use of the individual account balance

was necessitated by the transitional costs of the 1997 public pension reform, which

established the multi-pillar system. These transitional costs stem from the need to pay off the

debt accumulated by the old system over many years.[6] The Chinese government tried to use a

combination of two methods to finance the transition. A PAYG pillar was retained, and about

seven percentage points of the contribution was designated to finance the transition. The

other method was to expand pension coverage and borrow from the individual accounts of

younger workers (Wang et al., 2004). As of 2016, the notional individual accounts had

accumulated 3.6 trillion RMB.[7]

In 2013, the Chinese government gave up fully funded individual accounts and started to

follow a model of notional accounts. Under this model, interest is credited to accounts each

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[5] Sources: Statistics of MOHRSS:

http://www.mohrss.gov.cn/SYrlzyhshbzb/zwgk/szrs/tjgb/201805/W020180521567611022649.pdf

[6] Transition cost arises from the financing gap created when expenditure to pensioners and future retirees must continue even
though part of the contributions has been diverted to funded individual accounts (Wang, et al., 2004).

[7] China Pension Report 2016 (In Chinese), Economic Management Press, 2016, Beijing, China.

year by local governments, with the interest rate depending on the growth rate of the local average wage, bank deposit interest rate and the pension fund investment rate. Before 2016, notional interest rates were less than 4% in most provinces. In 2016, however, MOHRSS published a high unified interest rate of 8.31%.

Fact 6: China employs notional individual accounts, and the notional interest rate is currently 8.31%.

4   Problems in Current Public Pension System

4.1   Financial Sustainability

Similar to many other countries, the pension system in China will have to face the challenges of a dwindling labor force and a rapidly aging population. Due to rapid aging, the share of the Chinese population over 65 years of age will double between 2010 and 2030. Meanwhile, the present system is barely maintaining its financial balance with the help of government subsidies. The fiscal subsidy for the public system stands at 800 billion RMB as of 2017, or about 1% of GDP, and this is likely to exhibit a dramatic increase if there are no reforms in the near future.

Table 3 shows simulation results regarding the future fiscal balances of the BOAI scheme. For population dynamics, we refer to Feng and Chen (2016). There are several assumptions under the simulations. In scenario 1, the assumptions are the following. First, the urbanization process is expected to continue in China, with its share reaching 70% in 2030. Second, there will be no change in BOAI contribution and benefit rules or in the program's retirement age. It is also assumed that all contributions due can be collected. Third, benefits are indexed; specifically, benefits grow after retirement in line with the average rate of real wage growth rate and future inflation. The growth rate assumptions for wages and GDP are Word Bank projections (World Bank, 2012), where the annual growth rate of GDP is 8.6%

during 2011-2015, 7.0% during 2016-2020, 5.9% during 2021-2025 and 5% during 2026-2030.

In scenario 1, the coverage rate remains unchanged, i.e., 80% for local employees and 20% for migrant workers. In scenario 2, the coverage of migrant workers expands gradually from 20% in 2010 to 60% in 2050. Each simulation is an estimation of the national average level. In scenario 1, there is a clearly increasing trend in the number of pensioners over time, while the number of contributors is declining. The annual deficit as a percentage of GDP will be 2.15% in 2030. The accumulated deficit in 2030 will be 23.37% of GDP. It is obvious that the current arrangement of BOAI is unsustainable.

In scenario 2, increasing BOAI coverage among migrant workers improves the potential deficit situation. The annual deficit as a percentage of GDP will be 1.11% in 2030, and the accumulated deficit will be 2.86% of GDP. Expanding coverage of BOAI among migrant workers will lead to a slower increase in the deficit, although it does not offer a complete solution.

[Table 3 About Here]

For the Resident Pension scheme, the initial pension benefit is rather low (representing less than 20% of the average income per capita), and so the scheme has not yet caused significant financial burden on local governments. However, the Resident Pension scheme relies more on *ad hoc* governmental support than on sound actuarial principles. The balance between fund revenues and expenditure has not received much attention at the current stage.

4.2 Participation Incentives

Social insurance contribution evasion is a prevalent phenomenon in China. In 2015, 70% of firms paid less than the prescribed levels of social insurance contributions (Zheng, 2016).

There are several reasons for the low participation incentives. First, as has already been noted (Fact 2), the contribution rate in China is higher than in most other countries. The social insurance contribution rate for employers is 29-33% (BOAI: 20%; Health insurance: 6-10%; Unemployment insurance: 2%; Injury insurance: 0.5%; Maternity insurance: 0.5%), and employees contribute 11% of their own wages (BOAI: 8%; Health insurance: 2%; Unemployment insurance: 1%). The wage levels subject to the contribution requirement range from a lower bound of 60% of the local average wage to an upper bound of three times the local average wage. Employers can evade contributions by not formally registering employees at local government bureaus; hiring temporary employees or family members; postponing social insurance contribution payments; and reducing reported nominal wages to reduce contributions (Nyland, et al., 2010).

Second, some employees are also not willing to join the insurance programs. Those in the low-income group face unstable employment and, hence, high uncertainty about their eligibility for future benefits. Young people have high current consumption demand, and the high contribution rate reduces their consumption. Thus, there is an incentive for collusion between employers and employees to default on pension contributions (Nyland, et al., 2011).

Third, local governments do not punish defaults on contribution payments with the kind of severity that would be needed to deter cheating. Local governments normally focus on targets related to economic growth and adopt preferential policies to reduce employers' tax and contribution burdens. They are therefore lax in enforcing social insurance contribution requirements.

The Resident Pension scheme carries both positive and negative incentives for participation. The most obvious positive incentive is the heavy government subsidy. For example, those who are already 60 years old at the time the program starts automatically receive basic pension benefits without paying any premiums. However, the lack of sufficient

returns on individual contributions to pension accounts creates a negative incentive. This is the most important factor that determines younger people's willingness to participate in the scheme. Currently, the fund's rate of return is claimed to be the one-year term deposit interest rate. Although very secure, such a low rate virtually guarantees a low individual account balance at retirement and thus weakens participation incentives for rural workers (Lei, et al., 2014; Dorfman, et al., 2013). As a result, participants tend to choose the lowest premium standard and the shortest contribution period only to be eligible for cash transfers under the basic pension.

An empirical investigation using micro data verifies these disincentive phenomena. Lei et al. (2014), employing CHARLS (China Health and Retirement Longitudinal Studies) data from 2011, found that individuals prefer shorter periods of participation and choose the lowest level of premiums. There is an age gradient of enrollment rates; the enrollment rates generally increase with age, even though they are generally low among all age groups. Numerous surveys on the NRP find similar evidence that the enrollment was observed only from age 45, leaving 15 years of contribution to meet the eligibility.

4.3   Regional Disparity and Inequality

As we emphasized, China's public pension systems are managed by local governments. In the BOAI system, some provinces pool their funds at the provincial level, but most provinces pool funds at the city or even county levels. Although the statutory rules of contributions and benefits are determined by the central government, the actual contribution rates are different across regions. Wage inequalities also help explain the disparities in the amount of contributions and benefits. Workers in municipalities and east coast provinces earn much higher incomes than those in the inland provinces. When workers move from one city to another to get a better job, their pension plans remain tied to their original city of

employment. This creates serious inequality issues and problems with labor mobility (Bar and Diamond, 2010).

Along with disparities in regional economic development, demographic structures are also becoming greatly differentiated across provinces (Figure 7). In those provinces with better job opportunities, the demographic structure becomes more favorable as younger workers are attracted. For example, in Guangdong province, about nine workers support one retiree. Eastern regions like Beijing, Fujian and Shangdong also have more favorable demographics than other provinces. Shanghai's population aging remains severe due to the increased life expectancy, although it continues to attract young migrant workers.

To balance the payment burdens on local governments, China in July announced plans to establish a central adjustment system for basic pension funds in BOAI. The adjustment fund will draw a certain portion from the provincial capital pool, which will enable the central government to redistribute it later. This will be the first step toward nationwide coordination, which will help to facilitate labor mobility and reduce regional inequalties.

4.4   Adequacy of Resident Pension Benefits

There is a significant gap between the pension benefits of BOAI and those of the Resident Pension scheme. For example, in 2017, the monthly average pension in BOAI was about 2,870 RMB, while it was only about 127 RMB in the Resident Pension scheme—less than 5% of the BOAI pension level. It is worth noting that the benefits in the two systems are not directly comparable, as the amount of required contribution is much higher in BOAI. However, the adequacy of Resident Pension benefits remains a serious problem. By income and consumption measures, there have been relatively high poverty rates in elderly households, especially in rural areas. The China Urban and Rural Elderly Survey in 2006, a nationally representative sample of the elderly, suggests that 19% of the rural elderly had

consumption levels below the official poverty line (Dorfman, et al., 2013). The scheme is supposed to provide a universal protection floor to alleviate old-age poverty, but despite its impressive progress in achieving near-universal coverage, the system is still plagued with inadequate income security.

The basic pension level of the Resident Pension scheme is about 10-25% of consumption per capita and about 7-20% of income per capita, depending on the region. While adult children remain the most important source of elderly care and financial support, the NRP has become an important supplement to the traditional eldercare patterns in rural China. Research shows that following the introduction of NRP, enrollees were more likely to live independently rather than co-reside with their adult children in rural areas. In addition, enrollees became less dependent on children for financial resources and informal care. There is also research evaluating the effect of the Resident Pension scheme on family transfers, with results indicating some degree of crowding out effect on family transfers (Chen, et al., 2017).

4.5   Fiscal Risks

As population aging continues to unfold, subsidies to the BOAI and Resident Pension schemes will play an increasingly key role in financing social security expenditure in the future. The share of BOAI subsidies of total government fiscal expenditure remained steady at around 2% in the last decade, while the share of social insurance expenditure in total fiscal expenditure was about 10%. In the future, central and local fiscal subsidies will inevitably be a key source of financing for the pension system.

Concerns are growing over China's fiscal risks, particularly the contingent liabilities of local governments in recent years.[8] A slowdown in economic growth, an aging population

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[8] Contingent liabilities are liabilities that may be incurred by an entity depending on the outcome of future events.

and financial repression are all factors that can contribute to fiscal position deterioration (Kawai and Morgan, 2013). Among emerging economies, China's public sector balance sheet is one of the more indebted. Hemming (2012) pointed out that contingent liabilities are one of the reasons for the lower government debt ratios in emerging Asian countries, and China is a notable example. Various contingent liabilities in China have the potential to raise the total debt ratio to as high as 113%. The risks posed by contingent liabilities will challenge the sustainability of the fiscal system when growth slows down.[9]

[Table 4 About Here]

5   Future Reforms

5.1   Exploring More Ways to Finance the Pension System

National Social Security Fund (NSSF): The National Social Security Fund (NSSF) of China was established in 2000 as a strategic reserve fund to cope with future pension needs. The NSSF is financed in four ways: (1) funds allocated from the central government's budget; (2) capital and equity assets derived from the sale of shares of SOEs, which are required to send 10% of their IPO funds to the NSSF; (3) other methods approved by the State Council, such as state lottery license fees and funds obtained through a securities repo program; and (4) investment returns. Total NSSF assets have increased rapidly from 781 billion RMB to 1.83 trillion RMB in 2017.

The NSSF can invest in a broad set of instruments, subject to certain restrictions on allocation. According to the "Temporary Regulations on the National Social Security Fund

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[9] If growth slows down, then non-performing loans and other liabilities are likely to rise. When they increase to an extent that leads to a financial crisis, the government may have to inject capital into the financial sector.

Investment Management" （"全国社会保障基金投资管理暂行办法" in Chinese) issued in 2001, NSSF assets can be invested in the following three broad categories: (1) bank deposits and treasury bonds (no less than 50% of total assets, with bank deposits accounting for no less than 10%); (2) corporate bonds（企业债）and financial bonds (金融债) (no more than 10% of total assets); and (3) securities investment fund (证券投资基金) and stocks (股票) (no more than 40% of total assets). In Table 5, we show annual rates of return for the NSSF from 2010 to 2017. Between 2001 and 2012, the NSSF achieved an average annual rate of return of more than 8%, outpacing inflation, which stood at around 4%. However, it should be noted that the NSSF invests nearly 40% of the fund in the Chinese stock market, and therefore fluctuations in investment returns are likely to be correlated with the volatility of the domestic stock market. The fund is now allowing investments in private equity and foreign equity, and it is beginning to invest in both emerging and European markets.

[Table 5 About Here]

Dividend from SOE: As of 2017, China's SOEs have assets valued at 52 trillion RMB.[10] SOE profits as a share of China's GDP were about 3.85% in 2014 and 3.5% in 2017.[11] SOEs were also exempted from paying dividends through much of the 1990s and 2000s, which gave them an advantage over competitors by keeping their cost of capital low. At the same time, it also reduced government revenue that could have been spent on pensions, education and other social services. This changed in 2007, when the State Council

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[10] Data from State-Owned Assets Supervision and Administration Commission (SASAC) of the State Council of China: http://www.sasac.gov.cn. The SOEs included in the statistics are all SOEs administered by central and local governments, except for financial SOEs.

[11] SASAC only released the net profits of central SOEs prior to 2014.

mandated that central SOEs begin paying dividends at a rate of 10% in highly profitable industries, 5% in industries where SOEs were less profitable, and 0% for protected firms like military armaments manufacturers. In 2011, the rates were increased by five percentage points across the board to 15%, 10% and 5% percent, respectively. In 2016, SOEs in China made a net profit of 2.3 trillion RMB, of which 216 billion RMB, or about 9.4%, was remitted to central and local governments.

The World Bank (2012) noted that Chinese SOEs are far outside the international norm when it comes to dividend payout ratios. The average dividend payout for mature and established industrial firms in the United States is 50-60%. SOEs in Demark, Norway, Finland and Sweden set multi-year payout targets ranging from 33% to 67% of earnings. Chinese SOEs that are listed in Hong Kong pay an average dividend of 23%. Thus, even the top rate of 15% set by the State Council is still low relative to what Chinese SOEs themselves pay shareholders in Hong Kong.

China will moderately increase the ratio of dividends paid out by SOEs by increasing the number of centrally and locally administered SOEs that are required to pay dividends to the state. SOE dividends have been regarded as a key building block in funding the social security system by the central government. Further reform also calls for changes in how SOE dividends are managed. In the past, these funds were not included in the general budget to pay for public expenditure. Now, it has been decided that the Ministry of Finance will collect the dividends and place them into a "State Capital Management Budget."

Hypothetically, an increase in SOEs' dividend payout rate to 20% can translate to an extra 145 billion RMB, based on SOEs' total net profit of 2.9 trillion RMB in 2017. These additional funds can be used to finance the BOAI pension deficit.

5.2 Improving Productivity

The key to sustaining the pension system lies in the enhancement of labor productivity. If productivity is rising, the wealth created by the younger generation can, in effect, support a larger group of old people. With growing output (and thereby income), the PAYG system remains in balance without the need for either a reduction in pensions or an increase in contributions. An increase in output is also possibly the best solution for funded schemes, as it will help control inflation in the goods market and deflation in the asset market (Barr, 2000).

Table 12 reports the World Bank's (2012) estimates of China's labor productivity growth over the next two decades. Here, labor productivity is measured by the amount of real GDP produced by an employee. While China's labor productivity growth rate is expected to drop in tandem with the GDP growth rate, it will still continue to grow at a relatively high level of approximately 5.5% annually from 2026 to 2030. Improving labor productivity will thus increase the amount of effective labor and offset the negative influence of population aging.

[Table 6 About Here]

Of course, increases in future productivity depend on some crucial factors, the first being the quality of the labor force. The educational level of China's labor force has been rising. The average years of schooling received by workers as of the 1964 census was only 2.34 years; this figure increased to 9.07 years in 2010. Enrollment in higher education increased from 45.7 per ten thousand individuals in 1995 to 218.8 in 2010. Faced with an aging population, expanding investment in human capital is likely an effective strategy to raise productivity. Second, any change in labor productivity also hinges on economic restructuring. Labor productivity in the agricultural sector is typically lower than that in non-

agricultural sectors. Policies that facilitate the mobility of labor will thus play a crucial part in ensuring rising labor productivity.

5.3 Raising the Retirement Age

A common policy recommendation for pension reform is to raise the retirement age. This is often considered an obvious remedy for the fiscal problems the pension system may face because of China's currently low retirement ages (see Fact 4).

Proponents of raising the retirement age all implicitly assume that elderly workers would still be able to find employment if their retirement were to be delayed. In recent research, Fang and Zhang (2018) question this assumption. They provide evidence that Chinese workers' productivity has been growing at a more rapid rate, about 6.13% per annum, than that of their counterparts in developed economies (at about 1.5% per annum). This rapid growth in productivity across cohorts, coupled with the behavioral tendency of higher pay for more senior workers relative to their junior counterparts, may make firms unwilling to hire elderly workers when the retirement age is delayed. Because of the rapid productivity growth in China, it stands to reason that the productivity of the elderly falls behind that of the young, and a competitive labor market should require that the old be paid much less than the young. However, Fang and Zhang (2018) argue that many factors, such as traditional respect for seniority in Chinese society and especially in SOEs, or the fair wage hypothesis, would require the wage level for the elderly to be close to that for the young. The resulting "wage compression" would imply that a reform to delay the retirement age would not automatically guarantee demand for elderly labor. The analysis of Fang and Zhang (2018) thus calls for more extensive labor training for the elderly before implementing any reforms that delay pension eligibility.

5.4 Unlocking Housing Wealth for Retirement

The home ownership rate in China is about 89.68%, according to the China Household Finance Survey (CHFS), with the rate being 85.49% in urban areas and 92.60% in rural areas. Chinese home ownership is substantially higher than the world average of 63% and the rates in the US (65%) and Japan (60%). Moreover, housing wealth accounts for a much higher fraction (74%, according to CHFS) of household wealth in China than in other countries. For example, housing wealth accounts for about 40% of household wealth in the US. Older households typically hold an even larger proportion of their wealth in residential housing. Home equity release products such as reverse mortgages allow older homeowners to liquidate and consume home equity without relocating. Theoretical studies document welfare gains of reverse mortgages in life-cycle models (see, e.g., Davidoff, 2009; Cocco and Lopes, 2014; Hanewald et al., 2016; Nakajima and Telyukova, 2017).

In 2014, the Chinese government started a two-year pilot program to introduce reverse mortgages in China. The insurer Happy Life Insurance was commissioned to offer reverse mortgages in Beijing, Shanghai, Guangzhou and Wuhan starting from July 1, 2014. In 2016, the program was extended to mid-2018 and expanded to a larger number of cities (Wee, 2016). The product is sold under the name XYZ, which is usually translated as the "house for pension" program (Merton and Lai, 2016). However, the piloted reverse mortgage proved to be unpopular in China. Up to the end of July 2017, only 65 households had participated in the program nationwide. News reports list several factors underlying the low demand, including children's disapproval of their parents mortgaging their homes in return for a monthly pension, legal and regulatory concerns, and high mortgage rates charged by providers who consider the product too risky (Merton and Lai, 2016; Asia Insurance Review, 2017).

How should we interpret the disappointing results from the pilot study? Could the lack of

demand be due to the poor design of the reverse mortgage? Could it have resulted from parents' incorrect expectations of how their children would react to them using home equity to finance retirement? Are there alternative designs of the reverse mortgage contracts that may be more suitable for the Chinese market? What is the potential of home equity release products in financing the retirement of Chinese elderly? In recent work, Bateman, Fang, Hanewald and Wu (2018) conduct and analyze two online surveys on the demand for reverse mortgage products in China. They test a flexible product design that overcomes the shortcomings of the above-mentioned unsuccessful reverse mortgage product recently piloted in China by the Happy Life Insurance company. They find that there is high interest in this new reverse mortgage product among older homeowners aged 45-69 years, and adult children aged 20-49 years would recommend such a reverse mortgage product to their parents. In addition, they find that participants mainly want to use reverse mortgage payments to live more comfortably in retirement and to pay for better medical treatment and aged care services. They also identify individual covariates influencing the interest in the reverse mortgage product and the use of the product payments. These results provide a new evidence base for the development of China's reverse mortgage market.

6   Conclusion

This chapter provides a detailed review of the three layers of China's pension system, and discusses the development of the system and the problems facing it. We also present several ideas for future reforms in the Chinese pension system.

As the Chinese population ages, reforming and improving the pension system is of utmost importance. Future reforms could consider basing the pension system on social insurance schemes, which provide a basic level of old-age support for all Chinese retirees, supplemented by private insurance products such as private annuity and/or reverse mortgage

products. In all of these areas, there are many issues open to study. For example, on the social insurance side, what is the standard consumption insurance/behavioral moral hazard trade-off in China? What is the efficiency cost of China's fragmented social insurance system? What are the fiscal implications for the pension system if China's growth slows down further? On the private insurance side, what are the product characteristics for annuity or reverse mortgage products that may appeal to the Chinese population? Where are the gaps in the supply of resources needed to meet the rising demand for long-term elderly care in China? How would the need to care for parents affect the mobility and efficiency of the Chinese labor market?

Figure 1 Comparison of the Various Pension Schemes in China
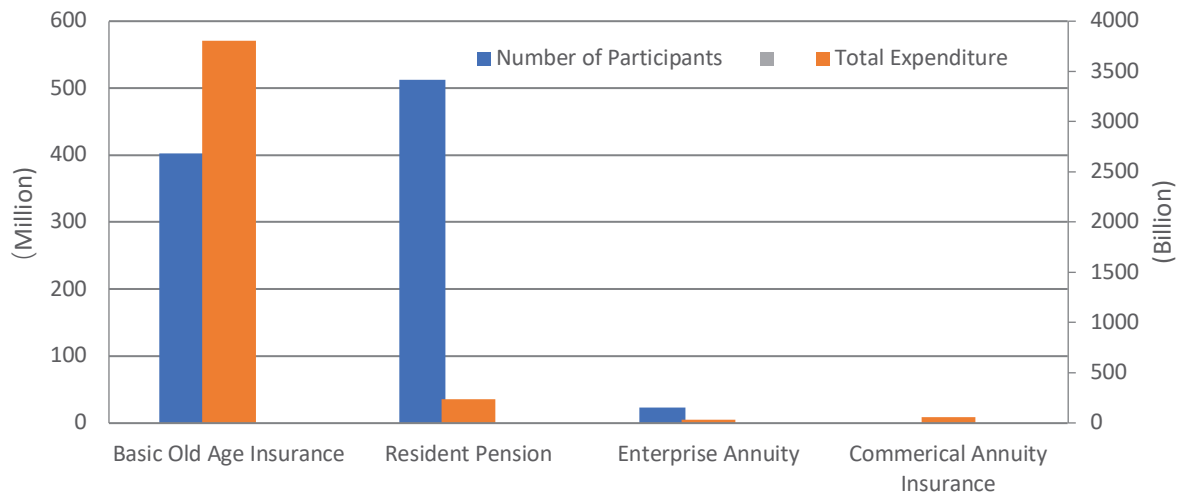
Source: MOHRSS; China's Statistical Yearbook of Insurance Industry (2017).

Figure 2 Number of Participants in the BOAI System
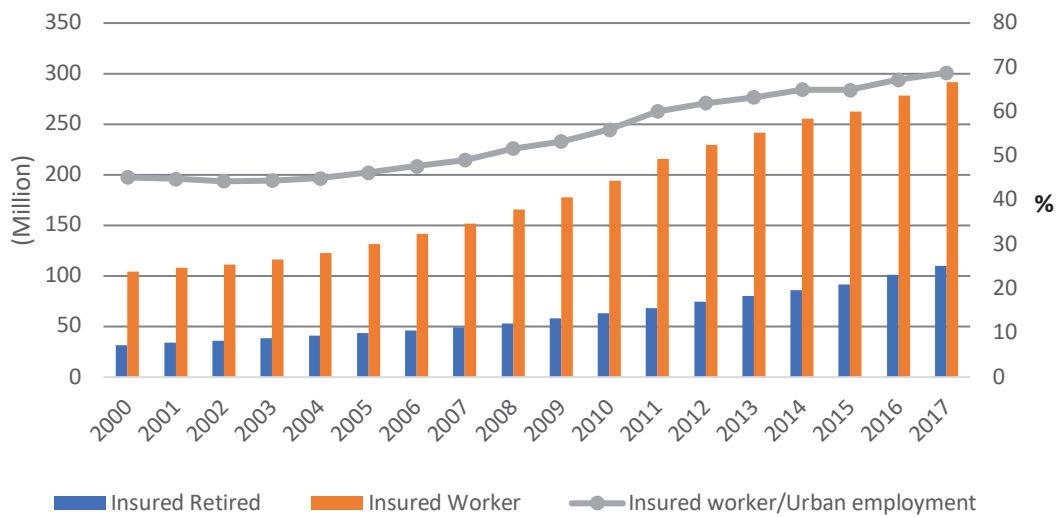
Source: MOHRSS.

Figure 3 Dependency Ratio in the Pension System and Demographic Change
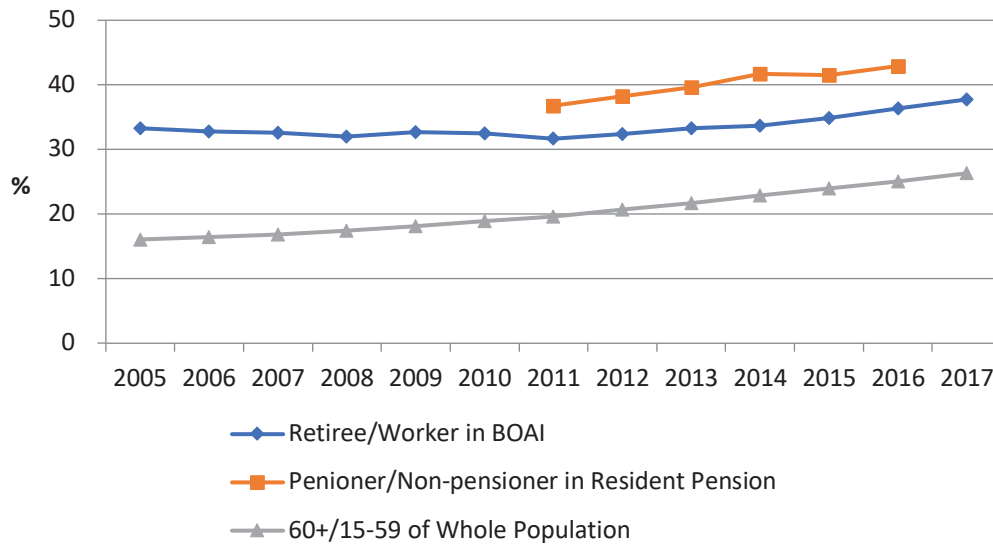
Sources: Participant data are from MOHRSS; population structure data are from the China Statistical Yearbook, various years.

Figure 4 Average Pension Benefit and Replacement Ratio
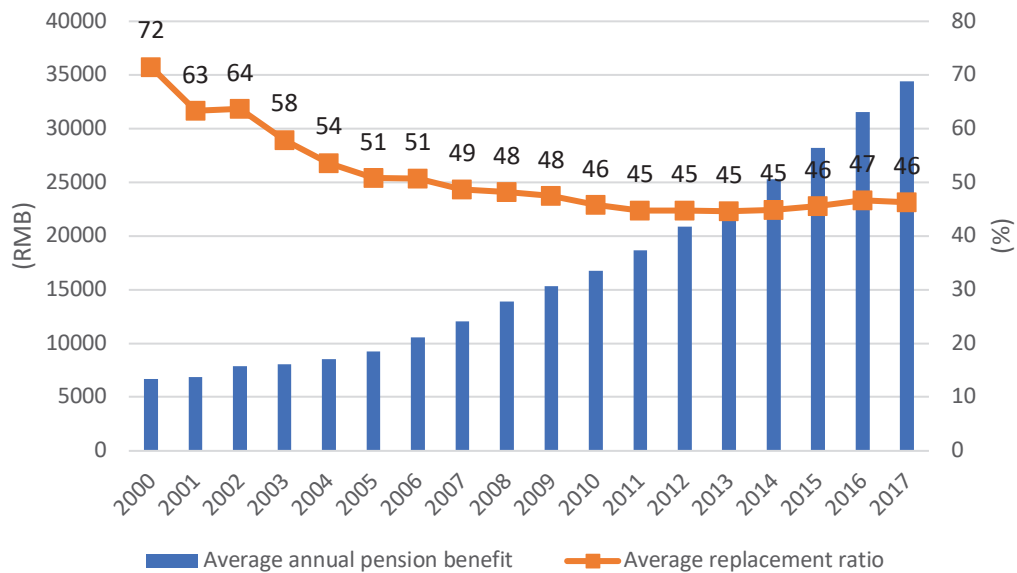
Sources: Pension data are from MOHRSS; wage data are from the China Statistical Yearbook, various years.

Figure 5 Revenue and Expenses of the BOAI System
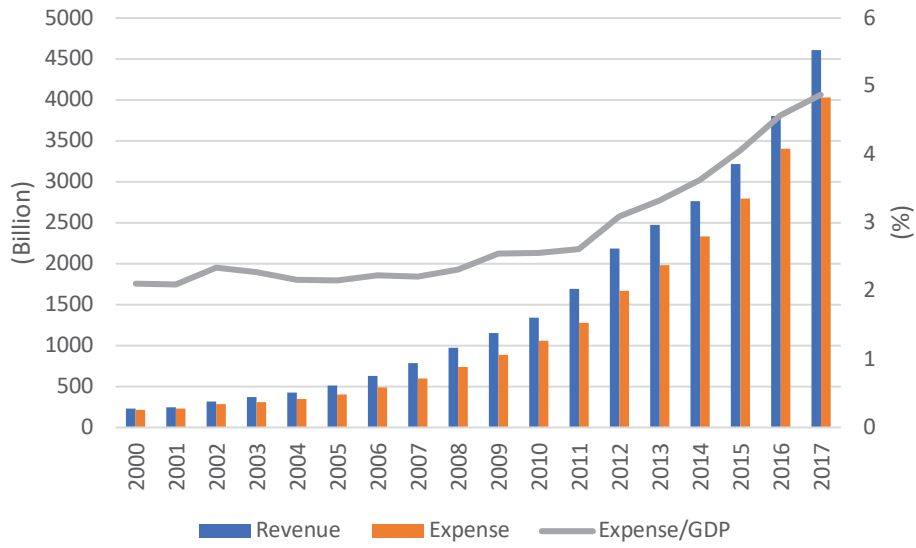
Sources: Revenue and expense data are from MOHRSS; GDP data are from the China Statistical Yearbook, various years.

Figure 6 Sources of Revenue in the BOAI System
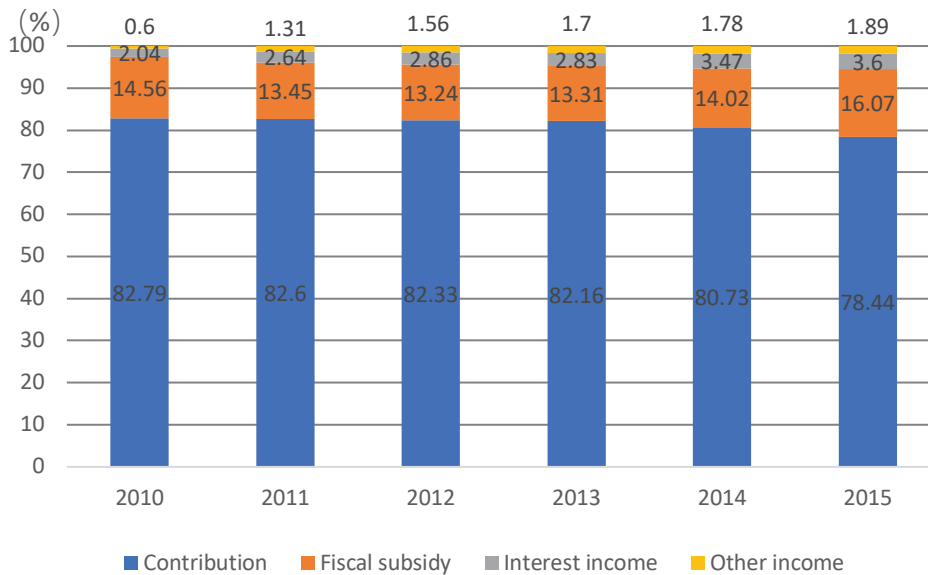
Source: Zheng, 2016.

Figure 7 Regional Disparity in the Support Ratio (Number of Contributors/Number of Retirees), 2016

Region	Support Ratio
Whole Nation	2.75
Guangdong	9.28
Fujian	4.63
Beijing	4.62
Guizhou	3.25
Shandong	3.24
Henan	3.10
Jiangsu	2.95
Zhejiang	2.78
Shanaxi	2.70
Hebei	2.59
Tibet	2.52
Shanxi	2.51
Yunnan	2.46
Anhui	2.46
Hainan	2.38
Jiangxi	2.36
Ningxia	2.27
Hunan	2.27
Shanghai	2.21
Qinghai	2.19
Xinjiang	2.18
Guangxi	2.12
Tianjin	2.06
Hubei	1.96
Sichuan	1.77
Inner Mongolia	1.77
Gansu	1.76
Chongqing	1.75
Liaoning	1.65
Jilin	1.47
Heilongjiang	1.34

Source: MOHRSS.

Table 1. Public Pension Schemes in China

Scheme	Basic Old Age Insurance system (BOAI)			Resident Pension (Unified in 2014)	
Establishment	**Basic Old Age Insurance system (BOAI)** Established in 1951; Current Practices Finalized in 1997		**Public Employee Pension (PEP)** Established in 1953; Practices Finalized in 1978; **Merged into BOAI in 2015**	2011 Urban Resident Pension Scheme (URP)	2009 New Rural Resident Pension Scheme (NRP)
Participants	Urban employees in enterprises		Urban employees in public sectors	Urban non-employed 16 years or above	Rural residents 16 years or above
Contribution	Pay-as-you-go: 20% of payroll (depending on locality)	Individual accounts: 8% of individual wage	No contribution required	Individual accounts: government subsidy +Individual contribution	Individual accounts: government subsidy +Individual contribution
Benefit	Social pooling: Minimum 15 years of contribution. 1-year accrual rate 1%; 35% based on 35 years of contribution	Individual accounts: Replacement ratio: 24.2% Total replacement ratio from both:59.2%	Average Replacement ratio: 80-90%	Basic Pension+ Individual account Pension	Basic Pension+ Individual account Pension
Mandatory	Yes		Yes	No	No

Source: Authors' tabulations.

Table 2. Cross-Country Comparison of Contribution Rates

Country	Employer	Employee	Total
Canada	5.0	5.0	9.9
France	6.8	9.9	16.7
Germany	10.0	10.0	19.9
Sweden	7.0	11.9	18.9
U.K.	11.0	12.8	23.8
U.S.	6.2	6.2	12.4
Japan	7.7	7.7	15.4
Korean	4.5	4.5	9.0
Hungary	1.5	24.0	25.5
Czech Republic	6.5	21.5	28
Chile	-	18.8	18.8
Brazil	7.7	20.0	27.7
China	20	8	28

Sources: HDNSP Pensions Database of the World Bank.

Table 3. Simulations for Future Fiscal Balances of Basic Old Age Insurance System

	2020	**2025**	**2030**	**2035**
Scenario 1				
Balance as a percentage of current GDP	-0.40%	-1.25%	-2.15%	-2.60%
Accumulated deficit to current GDP	1.77%	-2.27%	-11.17%	-23.37%
Scenario 2				
Balance as a percentage of current GDP	-0.08%	-0.61%	-1.11%	-1.09%
Accumulated deficit to current GDP	3.19%	1.68%	-2.86%	-8.38%

Notes: Policy rules of BOAI remain unchanged. In scenario 1, it covers 80% for local employees and 20% for migrant workers. In scenario 2, coverage of migrant workers expands gradually to 60% from 2010 to 2050.

Sources: Simulation results by authors

Table 4. Total government debt 2015-2017 (% of GDP)

Debt	**2015**	**2016**	**2017**
Official government debt	15.47	16.15	16.29
Local government debt	21.42	20.65	19.96
Ministry of Railways liabilities	5.94	6.34	6.03
Total government debt	42.83	43.14	42.28

Sources: Ministry of Finance of China; National Audit Office.

Table 5. National Social Security Fund Assets and Investment Return Rate

	2010	2011	2012	2013	2014	2015	2016	2017
Assets (billion RMB)	781	773	893	991	1241	1508	1604	1830
Investment return (%)	4.23	0.84	7.01	6.20	11.69	15.19	1.73	9.68

Source: NSSF Board of Managers.

Table 6. Projected Labor Productivity Growth (1995-2030)

	1995-2010	**2011-2015**	**2016-2020**	**2021-2025**	**2026-2030**
GDP annual growth （%）	9.9	8.6	7.0	5.9	5.0
Labor growth （%）	0.9	0.3	-0.2	-0.2	-0.4
Labor productivity growth （%）	8.9	8.3	7.1	6.2	5.5
Share of employment in agriculture （%）	38.1	30.0	23.7	18.2	12.5
Share of employment in service （%）	34.1	42.0	47.6	52.9	59.0

Source：The World Bank and Development and Reform Council (2012): China 2030: Building a Modern, Harmonious, and Creative High-Income Society.

References

Asia Insurance Review (2017). China: Reverse mortgage scheme struggles to take off. *Asia Insurance Review*, Vol. 31.

Bar, N. and P. Diamond (2010). Pension Reform in China: Issues, Options and Recommendations.

Bateman, Hazel, Hanming Fang, Katja Hanewald and Shang Wu (2018). "The Role of Home Equity for Retirement Financial Planning in China." Working Paper.

Cai, Y., & Cheng, Y. (2014). Pension reform in china: challenges and opportunities. Journal of Economic Surveys, 28(4), 636-651(16).

Chen, X., Eggleston, K., & Sun, A. (2017). The impact of social pensions on intergenerational relationships: comparative evidence from China. *Journal of the Economics of Ageing*.

Cocco, J. F. and Lopes, P. (2014). Reverse mortgage design. Technical report, London Business School.

Davidoff, T. (2009). Housing, health, and annuities. *Journal of Risk and Insurance*, **76**(1), 31–52.

Dorfman, M., R. Holzmann, P. O'Keefe, D. Wang, Y. Sin, and R. Hinz. (2013). *China's Pension System: A Vision*. Washington, DC: The World Bank.

Fang, Hanming and Yi Zhang (2018). "Growing Pains" in the Chinese Social Security System." Working Paper.

Feng, Jin and Qin Chen, 2016 "Public Pension System and Fiscal Policy Response in China", in "Age Related Pension Expenditure and Fiscal Space: Modelling technique and case studies from East Asia", Edited by Mukul G. Asher and Fauziah Zen. Published by Routledge, 711 Third Avenue, New York, NY10017.

Feng, J., He, L., & Sato, H. (2011). Public pension and household saving: evidence from urban china. Journal of Comparative Economics, 39(4), 470-485.

Hanewald, K., Post, T., and Sherris, M. (2016). Portfolio choice in retirement–what is the optimal home equity release product? *Journal of Risk and Insurance*, **83**(2), 421– 446.

Impavido, G., Hu, Y. W., & Li, X. (2009). Governance and fund management in the Chinese pension system. IMF Working Papers, 09(246), 1-50.

Lei, X., C. Zhang and Y. Zhao (2014), Incentive Problems in China's New Rural Pension Program, *Research in Labor Economic*s, 37, pp. 181–201.

Merton, R. and Lai, R. N. (2016). On an Efficient Design of Reverse Mort- gages: A Possible Solution for Aging Asian Populations. Available at SSRN: https://ssrn.com/abstract=3075087.

Nakajima, M. and Telyukova, I. A. (2017). Reverse mortgage loans: A quantitative analysis. *The Journal of Finance*, **72**(2), 911–950.

Nyland, C., Smyth, R., and Zhu, C. J. 2010, "What determines the extent to which employers will comply with their social security obligations? evidence from chinese firm‐level data",Social Policy & Administration,40(2), 196-214.

Nyland, C., Thomson, S. B., and Zhu, C. J. 2011, "Employer attitudes towards social insurance compliance in shanghai, china", International Social Security Review, 64(4), 73-98.

World Bank (2012), China 2030: Building a Modern, Harmonious, and Creative High-Income Society. Available at: http://www.worldbank.org/content/dam/Worldbank/document/China-2030-complete.pdf

Wang, Y., Xu, D., Wang, Z., & Zhai, F. (2004). Options and impact of china's pension reform: a computable general equilibrium analysis. Journal of Comparative Economics, 32(1), 105-127.

Wee, S.-L. (2016). China's 'Godfather of Real Estate' Pitches Reverse Mortgages to Skeptical Elders. *The New York Times* (December 26, 2016).

Zheng, B. (2016). China Pension Report 2016 (In Chinese), Economic Management Press, 2016, Beijing, China.