Aging and Retirement

The Role of Insurers in Developing the Third Pillar of China's Pension System

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Executive Summary

China's pension system is facing funding challenges as a result of changing demographics. The first pillar, which relies on contributions from current workers, is particularly vulnerable to an aging population. While the second pillar has shown some growth, its limited coverage cannot fully bridge the funding gap of the first pillar. The third pillar presents a potential solution to enhance the financial sustainability of China's pension system.

In this context, actuaries play a crucial role in advancing the third pillar. Our research aims to provide valuable insights and recommendations that can optimize the participation of insurance companies, enhancing the long-term sustainability and effectiveness of China's pension system.

In Section 2, we examine the existing commercial pension product in China. We discuss in detail the insurance product offerings within the private pension scheme, which represents a significant step toward establishing voluntary pension plans in China. Additionally, we draw valuable insights from comparing voluntary private pension plans in Japan, Germany, and the U.S., aiming to enhance China's third pillar.

Section 3 quantifies the demand-supply gap in China's third pillar pension system. The analysis focuses on providing essential financial support for retirement living using resources from the first two pillars. Our findings reveal that women are more likely than men to face insufficient funds due to their younger retirement age and longer life expectancy. Additionally, younger generations face an increased risk of inadequate funding from the first two pillars due to improvements in longevity over time. Moreover, a significant urban-rural disparity exists, with rural residents lacking access to the second pillar and receiving lower payments from the first pillar.

The analysis of the current situation and the quantitative assessment of the demand-supply gap emphasize the need to develop the third pillar to address the gaps left unfilled by the first two pillars. Section 4 presents several recommendations to enhance the involvement of insurers in developing the third pillar. One key suggestion is to establish a retirement ecosystem that integrates various products and services. This approach enables product diversification and customization to cater to different consumers. Furthermore, enhancing cooperation between banks and insurance companies is particularly beneficial for addressing the pension needs of rural residents, as banks have an extensive branch network and are a popular choice among the elderly.

Section 1: Introduction

China has a multi-pillar pension system dominated by the first pillar of public pension schemes. These schemes extend coverage to over 90% of the eligible population and represent a significant portion, accounting for more than 60% of the pension system's asset value (National Development and Reform Commission, 2021). Although operating under a "social pooling plus individual account" model, the first pillar primarily relies on contributions from current workers, following a pay-as-you-go approach (Dong & Wang, 2016). Concerns have emerged regarding the financial sustainability of the public pension schemes in China, particularly after funding deficits experienced in the country's northeastern provinces. This deficit raises doubts about the long-term viability of the pension system. The situation is further compounded by China's aging population, as the number of pensioners continues to grow at a faster rate than that of the working population.

China's second pillar of the pension system has witnessed significant growth in terms of assets under management over the past decade (MOHRSS, 2023b). However, its ability to address the funding shortfall of the first pillar is limited due to its restricted coverage. The second pillar is composed of two sectors: enterprise annuities and occupational annuities. Enterprise annuities are voluntary schemes, primarily established by state-owned enterprises or large private companies (Cai & Cheng, 2014; Z. Wang, 2022). On the other hand, occupational annuities, although mandatory, are solely available to government agencies and public institution employees.

While enterprise annuities have the potential for expansion, their voluntary nature hinders their capacity to bridge the funding gap of the first pillar. The majority of employers who adopt these schemes are limited to state-owned enterprises or large private companies (Cai & Cheng, 2014; Z. Wang, 2022). In contrast, occupational annuities, which are mandatory, face limitations due to their confinement to the public sector. As the number of employees in the public sector remains relatively stable, the participation rate in occupational annuities is expected to approach a plateau, constraining potential asset growth (Z. Wang, 2022). Therefore, while the second pillar has experienced substantial development, its current regulatory arrangement is unlikely to fully resolve the funding shortage of the first pillar.

The third pillar is a relatively recent addition to China's multi-pillar pension system. In 2018, the pension target fund of funds and tax-deferred commercial pension insurance were introduced, marking the emergence of individual pension plans. In 2021, an exclusive commercial pension insurance tailored for gig workers, who often lack coverage from the first two pillars, was piloted. This product features both an accumulation and a drawdown phase. Another significant development in the third pillar is the introduction of the private pension scheme. This scheme allows participants to make voluntary contributions to personal accounts and invest in a variety of financial products. By November 2022, the pilot program had been rolled out in 36 cities across 31 provinces. While the third pillar is still in its early stages, it presents a potential solution to strengthen the financial stability of the first pillar and address the coverage limitations of the second pillar.

Actuaries have the expertise necessary to make significant contributions to the development of the third pillar. Their skills in risk management, financial analysis, and statistical modeling are well-suited for addressing the challenges associated with pension security. Our objective is to provide valuable insights and recommendations that can optimize the participation of insurance companies in strengthening the third pillar of China's pension system. We hope to promote the role of actuaries in enhancing the long-term sustainability and effectiveness of the pension system in China.

We begin our analysis with the existing pension-related commercial products in China. We discuss in detail several types of insurance products that have been approved for the private pension scheme in China. This scheme's introduction marks a significant advancement toward the establishment of voluntary pension plans. Additionally, we compare the strengths and weaknesses of insurers in offering pension-related products to other providers, including

banks and the capital market. Furthermore, we draw lessons from comparing voluntary private pension plans in Japan, Germany, and the U.S. to improve China's third pillar.

The status quo analysis is followed by a quantitative assessment of the demand-supply gap for the third pillar. We define demand as the basic necessities of living in retirement, including various aspects such as food, clothing, housing, daily necessities, transportation, entertainment, and basic medical expenses. The definition aligns with the consumption expenditure data collected by the National Bureau of Statistics of China (NBS). In terms of supply, we consider payments received from the first two pillars. Our analysis accounts for factors such as gender differences in retirement age and life expectancy, urban-rural disparities in living standards, and variations in public pension arrangements.

Lastly, we offer recommendations to insurers on how they can strengthen their contribution to the development of the third pillar. One important suggestion is to establish a retirement ecosystem that seamlessly integrates various products and services, providing retirees with a cohesive and efficient experience. We also propose initiatives such as bank-insurance cooperation, policy alignment, and risk mitigation measures to enhance insurers' participation in the development of the third pillar.

Section 2: Analyzing Status Quo

This section analyzes individual pension plans in China and other countries. It begins by examining existing programs and products in China (Section 2.1 to Section 2.4), followed by a comparative analysis of international third pillar pension arrangements (Section 2.5). Section 2.6 evaluates the strengths and weaknesses of financial institutions in providing pension financial products.

The existing programs or products related to individual pension plans in China include the following four categories:

1. tax-deferred commercial pension insurance (个人税收递延型商业养老保险),
2. exclusive commercial pension insurance pilot program (专属商业养老保险),
3. private pension scheme (个人养老金),
4. other products, such as pension-related wealth management products (养老理财产品) offered by banks, and pension target fund of funds (养老目标基金) offered by fund management companies.

2.1 TAX-DEFERRED COMMERCIAL PENSION INSURANCE

The tax-deferred commercial pension insurance was introduced in 2018. Its main feature is tax incentives. During the contribution stage, policyholders can claim tax deductions of up to 12,000 CNY. Investment returns are exempt from taxes, while retirement benefits are taxable at an effective rate of 7.5%.[1]

The tax incentives, which are the main feature of such insurance, did not attract enough participants, so the national rollout was suspended (EY-Parthenon, 2022). Several obstacles impede the progress of tax-deferred commercial pension insurance, as highlighted in Zheng (2018). First and foremost, policyholders rely on their employers to process personal income tax, making it difficult for taxpayers to participate in insurance independently. In addition, the complex calculation of the tax-deferred limit and its low value discourage taxpayers from investing in such insurance products.

2.2 EXCLUSIVE COMMERCIAL PENSION INSURANCE PILOT PROGRAM

The pilot program of exclusive commercial pension insurance was introduced in 2021. The product is intended for gig workers who often do not participate in the first or second pillar of China's pension system. It has two phases: accumulation and drawdown. During the accumulation phase, policyholders are guaranteed a minimum rate of return, and they have the flexibility to decide when they want to enter the drawdown phase.

Following the introduction of the private pension scheme, participants of the scheme are able to purchase the exclusive commercial pension insurance products that were originally part of the pilot program, as well as newly developed ones. In Section 2.3, we discuss in detail the various exclusive commercial pension insurance products available within the private pension scheme.

2.3 PRIVATE PENSION SCHEME

The introduction of the private pension scheme in China is a significant step toward fostering voluntary private pension plans. Since November 2022, the pilot program has been implemented in 36 cities, primarily provincial

[1] Commencing on January 1, 2022, the tax policy for tax-deferred commercial pension insurance aligns with the regulations governing the private pension scheme, which is discussed in detail in Section 2.3.

capital cities, across 31 provinces. This scheme enables individuals enrolled in the first pillar of the pension system to make voluntary contributions to personal accounts and invest in various types of financial products.

2.3.1 TAXATION

The contributions are tax-deductible and capped at 12,000 CNY per annum. According to the progressive personal income tax rates in China, the annual cap means personal tax savings ranging from 360 CNY to 5,400 CNY per annum. Investment returns for private pension scheme products are tax-exempt. Retirement withdrawals are taxed at a flat rate of 3%.

Compared to tax-deferred commercial pension insurance, the private pension scheme provides enhanced tax benefits during the drawdown phase (3% vs. 7.5%), making it more appealing to taxpayers. More importantly, the private pension scheme simplifies the tax deduction process in the accumulation phase. Each participant has a personalized account on the Personal Pension Information Management Service Platform managed by the Ministry of Human Resources and Social Security, allowing them to claim tax deductions using centralized platform records instead of relying on their employers. This eliminates the need for lengthy and burdensome administrative approval processes. The calculation of tax deductions is also simplified. All contributions, subject to a cap, are tax-deductible, and no further calculation is required.

2.3.2 PRODUCTS

Eligible products for the private pension scheme can be categorized into four types:

1. banking wealth management products,
2. savings products,
3. insurance, and
4. fund of funds.

Among these, insurance products are particularly effective in managing retirement risks, making them highly relevant to our study. Insurance products include

- exclusive commercial pension insurance,
- annuities, and
- endowment life insurance.

Exclusive commercial pension insurance products

Following the pilot program of exclusive commercial pension insurance products, additional products have been approved for the private pension scheme. These products feature a wide range of coverage, from infants to those well beyond the legal retirement age in China (Table 1).

Table 1

INSURANCE COVERAGE OF THE EXCLUSIVE COMMERCIAL PENSION INSURANCE PRODUCTS APPROVED FOR THE PRIVATE PENSION SCHEME.

Product Name*	Coverage
China Life Insurance Company Limited (中国人寿保险股份有限公司)	
国寿鑫享宝	No age requirement so long as one is healthy
China Pacific Insurance Co., Ltd. (中国太平洋人寿保险股份有限公司)	
太保易生福专属商业养老保险	5 days -- 80 years
Guomin Pension & Insurance Co., Ltd. (国民养老保险股份有限公司)	
国民共同富裕	28 days -- 95 years
New China Life Insurance Co., Ltd. (新华人寿保险股份有限公司)	
卓越优选	30 days -- 70 years
New China Pension Co., Ltd. (新华养老保险股份有限公司)	
新华养老盈佳人生	30 days -- 70 years
PICC Life Insurance Co., Ltd. (中国人民人寿保险股份有限公司)	
人保寿险福寿年年	28 days -- 85 years
Taikang Life Insurance Co., Ltd (泰康人寿保险有限责任公司)	
泰康臻享百岁 泰康臻享百岁 B 款	No age requirement so long as one is healthy 0 years - 70 years
Taikang Pension & Insurance Co., Ltd. (泰康养老保险股份有限公司)	
泰康福享百岁	No age requirement so long as one is healthy
Taiping Life Insurance Co., Ltd. (太平人寿保险有限公司)	
太平岁岁金生	28 days -- 70 years
Taiping Pension Co., Ltd. (太平养老保险股份有限公司)	
太平盛世福享金生	30 days -- 80 years

* The products in bold were also approved for the pilot program of the exclusive commercial pension insurance products.
Note: The product information in this table is based on data collected on 6/26/2023 for comparison purposes. Please be aware that product features are subject to change.

In terms of benefit offerings, Table 2 shows that all products offer pension annuity and death benefits, with the majority also providing disability benefits. Moreover, policyholders can select between two investment portfolios for the accumulation phase. The balanced portfolio guarantees a return ranging from 2% to 3% p.a., while the growth portfolio generally offers a minimum return close to 0%.

Table 2

THE EXCLUSIVE COMMERCIAL PENSION INSURANCE PRODUCTS APPROVED FOR THE PRIVATE PENSION SCHEME: THE BENEFITS INCLUDED AND THE GUARANTEED RATE OF RETURN FOR EACH PRODUCT.

Product Name†	Insurance Benefit*			Guaranteed Rate of Return	
	A	D	Death	Balanced	Growth
China Life Insurance Company Limited (中国人寿保险股份有限公司)					
国寿鑫享宝	✓	✓	✓	2.0%	0%
China Pacific Insurance Co., Ltd. (中国太平洋人寿保险股份有限公司)					
太保易生福专属商业养老保险	✓	×	✓	2.0%	0.5%
Guomin Pension & Insurance Co., Ltd. (国民养老保险股份有限公司)					
国民共同富裕	✓	×	✓	3.0%	0%
New China Life Insurance Co., Ltd. (新华人寿保险股份有限公司)					
卓越优选	✓	×	✓	2.5%	1%
New China Pension Co., Ltd. (新华养老保险股份有限公司)					
新华养老盈佳人生	✓	×	✓	2.5%	0.5%
PICC Life Insurance Co., Ltd. (中国人民人寿保险股份有限公司)					
人保寿险福寿年年	✓	✓	✓	3.0%	0.5%
Taikang Life Insurance Co., Ltd (泰康人寿保险有限责任公司)					
泰康臻享百岁 泰康臻享百岁 B 款	✓ ✓	✓ ×	✓ ✓	2.5% 2.85%	0.6% 0.5%
Taikang Pension & Insurance Co., Ltd. (泰康养老保险股份有限公司)					
泰康福享百岁	✓	✓	✓	2.5%	0.6%
Taiping Life Insurance Co., Ltd. (太平人寿保险有限公司)					
太平岁岁金生	✓	✓	✓	2.0%	0%
Taiping Pension Co., Ltd. (太平养老保险股份有限公司)					
太平盛世福享金生	✓	✓	✓	3.0%	0.55%

* `A' stands for pension annuity (养老年金); `D' stands for disability benefits (失能保险金); `Death' stands for death benefits (身故保险金). ✓ indicates the benefit is included in the product, while × indicates the benefit is not included in the product.

† The products in bold were also approved for the pilot program of the exclusive commercial pension insurance products.

Note: The product information in this table is based on data collected on 6/26/2023 for comparison purposes. Please be aware that product features are subject to change.

Table 3 compares the eligibility age and payout options of the pension annuity benefits. The minimum eligibility age is 60 for all of the products. The age of 60 is the current retirement age for men; for women, however, they need to wait between five to ten years after retirement before they can claim the pension annuity benefits. All these products provide longevity protection since policyholders can choose to receive lifetime income streams. They can also opt for fixed-term annuities that range from 10 to 30 years.

Table 3

THE PENSION ANNUITY BENEFITS INCLUDED IN THE EXCLUSIVE COMMERCIAL PENSION INSURANCE PRODUCTS THAT HAVE BEEN APPROVED FOR THE PRIVATE PENSION SCHEME.

Product Name‡	Eligibility Age	Payout Options*					
		Lifetime	Fixed Period				
			10	15	20	25	30
China Life Insurance Company Limited (中国人寿保险股份有限公司)							
国寿鑫享宝	60 - 100	✓		✓	✓		
China Pacific Insurance Co., Ltd. (中国太平洋人寿保险股份有限公司)							
太保易生福专属商业养老保险	60 - 80	✓	✓	✓	✓		✓
Guomin Pension & Insurance Co., Ltd. (国民养老保险股份有限公司)							
国民共同富裕	≥60	✓	✓		✓		
New China Life Insurance Co., Ltd. (新华人寿保险股份有限公司)							
卓越优选	60 - 100	✓	✓	✓	✓		
New China Pension Co., Ltd. (新华养老保险股份有限公司)							
新华养老盈佳人生	60 - 80	✓	✓	✓	✓		
PICC Life Insurance Co., Ltd. (中国人民人寿保险股份有限公司)							
人保寿险福寿年年	≥60	✓	✓	✓	✓	✓	
Taikang Life Insurance Co., Ltd (泰康人寿保险有限责任公司)							
泰康臻享百岁 泰康臻享百岁 B 款	≥60	✓	✓	✓	✓		✓
Taikang Pension & Insurance Co., Ltd. (泰康养老保险股份有限公司)							
泰康福享百岁	≥60	✓	✓	✓	✓		✓
Taiping Life Insurance Co., Ltd. (太平人寿保险有限公司)							
太平岁岁金生	≥60	✓	✓		✓		
Taiping Pension Co., Ltd. (太平养老保险股份有限公司)							
太平盛世福享金生	≥60	✓	✓	✓	✓	✓	

* ✓ indicates the benefit is included in the product.
† The figures listed below are in terms of years.
‡ The products in bold were also approved for the pilot program of the exclusive commercial pension insurance products.
Note: The product information in this table is based on data collected on 6/26/2023 for comparison purposes. Please be aware that product features are subject to change.

Table 4 presents a comparison of eligibility criteria and payout options for disability benefits. The majority of products grant disability benefits when the policyholder is unable to independently perform three or more activities of daily living (ADL). However, only two out of the six products extend coverage to cognitive impairment. These criteria are more stringent compared to long-term care insurance products available in the U.S., which typically provide benefits when the policyholder requires assistance with two or more ADLs or has a cognitive impairment (Administration for Community Living, 2020). Regarding payout options, all products offer a lump sum payment, while only two out of the six products offer a lifetime annuity.

Table 4

THE DISABILITY BENEFITS INCLUDED IN THE EXCLUSIVE COMMERCIAL PENSION INSURANCE PRODUCTS THAT HAVE BEEN APPROVED FOR THE PRIVATE PENSION SCHEME.

Product Name‡	Eligibility§	Payout Options*						
		Lump Sum	Annuity					
			Lifetime	Fixed Period†				
				10	15	20	25	30
China Life Insurance Company Limited (中国人寿保险股份有限公司)								
国寿鑫享宝	I or II	✓		✓	✓	✓		
PICC Life Insurance Co., Ltd. (中国人民人寿保险股份有限公司)								
人保寿险福寿年年	I	✓		✓	✓	✓	✓	
Taikang Life Insurance Co., Ltd (泰康人寿保险有限责任公司)								
泰康臻享百岁	I	✓	✓	✓	✓	✓		✓
Taikang Pension & Insurance Co., Ltd. (泰康养老保险股份有限公司)								
泰康福享百岁	I	✓	✓	✓	✓	✓		✓
Taiping Life Insurance Co., Ltd. (太平人寿保险有限公司)								
太平岁岁金生	III	✓						
Taiping Pension Co., Ltd. (太平养老保险股份有限公司)								
太平盛世福享金生	I, II, or III	✓		✓	✓	✓	✓	

* ✓ indicates the benefit is included in the product.
† The figures listed below are in terms of years.
‡ The products in bold were also approved for the pilot program of the exclusive commercial pension insurance products.
§ Criterion I is defined in terms of Activities of Daily Living (ADLs). The payment is triggered if the policyholder is unable to independently perform three or more of the six ADLs that include (1) dressing, (2) walking, (3) getting in and out of bed or a chair, (4) using the toilet, (5) eating, and (6) bathing. Criterion II refers to cognitive impairment. Criterion III involves permanent disability such as blindness and amputation.
Note: The product information in this table is based on data collected on 6/26/2023 for comparison purposes. Please be aware that product features are subject to change.

Annuities

The annuity insurance products approved under the private insurance scheme primarily focus on offering longevity protection. These products differ from the exclusive commercial pension insurance products in terms of coverage scope, as they typically have narrower coverage and do not include disability benefits. Additionally, they lack an accumulation phase.

Table 5 presents the eligibility age and insurance policy period for annuity insurance products approved under the private insurance scheme. The upper limit of eligibility age generally aligns with the legal retirement age. Most products offer lifetime insurance policy periods, providing robust protection against longevity risk.

Table 5

AN EXCERPT FROM ANNUITY INSURANCE PRODUCTS APPROVED FOR THE PRIVATE INSURANCE SCHEME: AGE OF ELIGIBILITY FOR INSURANCE AND INSURANCE POLICY PERIOD.

	Age of eligibility for insurance	Insurance policy period
BOCOM MSIG Life Insurance Co., Ltd. (交银人寿保险有限公司)		
交银人寿个人养老年金保险 (万能型)	≥16 years and has not reached the legal retirement age	Lifetime
AIA Group Limited (友邦人寿保险有限公司)		
友邦悦享年年年金保险	18 years -- 55 years	40 years or until the policyholder reaches the age of 75, 80, or 85
Guomin Pension & Insurance Co., Ltd. (国民养老保险股份有限公司)		
国民美好生活养老年金保险 国民美好生活 B 款养老年金保险	Unspecified	Lifetime
Taiping Pension Co., Ltd. (太平养老保险股份有限公司)		
太平共享盛世年金保险 H 款	Unspecified	10 or 15 years
ICBC-AXA Life Insurance Co., Ltd. (工银安盛人寿保险有限公司)		
工银安盛人寿盛享颐年养老年金保险 工银安盛人寿金账户年金保险 (万能型)	7 days -- 65 years 7 days -- 70 years	Lifetime or until the 20th policy anniversary Lifetime
CCB Life Insurance Co., Ltd. (建信人寿保险股份有限公司)		
建信尊享延年养老年金保险	30 days -- 75 years	Until age of 106
Taikang Pension & Insurance Co., Ltd. (泰康养老保险股份有限公司)		
泰康尊享一生年金保险 E 款 (万能型) 泰康幸福赢家年金保险 (分红型)	Unspecified Unspecified	Lifetime Vary by insurance policy
Sunshine Life Insurance Co., Ltd. (阳光人寿保险股份有限公司)		
阳光人寿阳光寿养老年金保险	Unspecified	Lifetime

Note: The product information in this table is based on data collected on 6/26/2023 for comparison purposes. Please be aware that product features are subject to change.

Regarding insurance coverage, Table 6 indicates that all listed products include pension annuity and death benefits. Products with fixed insurance policy periods often include maturity benefits, while some also offer additional benefits if the policyholder survives for a specified period.

Table 6

AN EXCERPT FROM ANNUITY INSURANCE PRODUCTS APPROVED FOR THE PRIVATE INSURANCE SCHEME: INSURANCE COVERAGE.

	Pension annuity	Death	Total disability	Congratulatory*	Maturity
BOCOM MSIG Life Insurance Co., Ltd. (交银人寿保险有限公司)					
交银人寿个人养老年金保险 (万能型)	✓	✓	✓	×	×
AIA Group Limited (友邦人寿保险有限公司)					
友邦悦享年年年金保险	✓	✓	✓	×	✓
Guomin Pension & Insurance Co., Ltd. (国民养老保险股份有限公司)					
国民美好生活养老年金保险	✓	✓	×	✓	×
国民美好生活 B 款养老年金保险	✓	✓	×	×	×
Taiping Pension Co., Ltd. (太平养老保险股份有限公司)					
太平共享盛世年金保险 H 款	✓	✓	×	×	✓
ICBC-AXA Life Insurance Co., Ltd. (工银安盛人寿保险有限公司)					
工银安盛人寿盛享颐年养老年金保险	✓	✓	×	×	✓
工银安盛人寿金账户年金保险 (万能型)	✓	✓	×	×	×
CCB Life Insurance Co., Ltd. (建信人寿保险股份有限公司)					
建信尊享延年养老年金保险	✓	✓	×	×	×
Taikang Pension & Insurance Co., Ltd. (泰康养老保险股份有限公司)					
泰康尊享一生年金保险 E 款 (万能型)	✓	✓	×	×	×
泰康幸福赢家年金保险 (分红型) †	✓	✓	×	✓	×
Sunshine Life Insurance Co., Ltd. (阳光人寿保险股份有限公司)					
阳光人寿阳光寿养老年金保险	✓	✓	×	×	×

✓ indicates the benefit is included in the product, while × indicates the benefit is not included in the product.
* The benefit is triggered when the policyholder reaches specific milestone ages, e.g., 70, 80, 90.
† This product has two additional types of benefits: (1) special survival benefit: payable if the policyholder is alive between the 6th and the 10th policy anniversaries, (2) survival benefits: payable if the policyholder is alive after the 11th policy anniversary and before receiving the pension annuity.
Note: The product information in this table is based on data collected on 6/26/2023 for comparison purposes. Please be aware that product features are subject to change.

Endowment life insurance

Apart from exclusive commercial pension insurance and annuities, the private pension scheme in China also includes endowment life insurance products. These endowment life insurance products typically integrate term life insurance with a savings plan, and some may additionally provide permanent disability benefits.

Table 7 presents a selection of representative endowment life insurance products, highlighting the eligibility age for insurance and the policy period. The eligibility age and policy duration indicate that these products primarily cater to the working-age population, offering insurance coverage for their human capital and serving as long-term savings vehicles for retirement purposes.

Table 7

AN EXCERPT FROM ENDOWMENT LIFE INSURANCE APPROVED FOR THE PRIVATE PENSION SCHEME: AGE OF ELIGIBILITY FOR INSURANCE AND INSURANCE POLICY PERIOD.

Product name	Age of eligibility for insurance	Insurance policy period
China Life Insurance Company Limited (中国人寿保险股份有限公司)		
国寿鑫民宝两全保险	16 years - 62 years	Males: 8 or 10 years or until 60 years old Females: 8 or 10 years or until 55 years old
AIA Group Limited (友邦保险)		
友邦悦享未来两全保险	18 years - 55 years	24 years or until 55, 60, or 65 years old
Taiping Life Insurance Co., Ltd. (太平人寿保险有限公司)		
太平睿选稳赢两全保险 太平鑫多多两全保险 (互联网专属)	28 days - 70 years 18 years - 65 years	6 years 11, 15, 20, or 30 years

Note: The product information in this table is based on data collected on 6/26/2023 for comparison purposes. Please be aware that product features are subject to change.

One notable aspect that stands out when comparing various insurance products is their homogeneity. This has long been an issue faced by the insurance industry in China. To address this, insurance companies should delve into the specific challenges faced by consumers in terms of risk protection. By understanding these pain points, companies can effectively segment customer groups according to their unique needs and preferences, allowing for the customization of insurance products. It is crucial for insurers to harness the full potential of insurance as a risk protection tool, thus expanding the range of high-quality insurance products available to consumers.

In addition to insurers, banks, and fund management companies actively participate in offering a diverse array of products associated with individual pension plans. This holds true for both general retirement plans and those specifically approved for the private pension scheme. We will explore these offerings in greater detail in the following section.

2.4 OTHER PRODUCTS

2.4.1 BANKING SYSTEM

Commercial banks possess vast assets and ample financial resources. To fulfill their political and social responsibility in line with national strategic objectives, they are actively developing the third pillar of pension finance and introducing multiple wealth management products with pension themes. Firstly, these diverse pension financial products cater to the varied needs of different retirement levels, offering flexible choices for elderly individuals. This approach not only helps guide the elderly toward independent and sustainable pension financial concepts but also facilitates more rational retirement planning. This shift encourages a transition from traditional reliance on child support to active pension investments. Secondly, commercial banks' involvement in the third pillar pension investment allows them to establish a new dimension of pension finance services. Given the broad customer base and widespread branch networks of commercial banks, the coverage of pension financial products can be significantly expanded. Furthermore, leveraging the extensive investment experience and risk control capabilities of their specialized wealth management subsidiaries, commercial banks can provide long-term stability and returns to pension products through bonds and non-standard investments.

While the potential for development in commercial bank pension finance appears promising, certain challenges persist. Internally, the interwoven nature of different sectors within commercial banks and their wealth management subsidiaries leads to a complex process that hinders resource integration and the formation of collaborative efforts. Externally, pension finance interacts with both upstream and downstream industries and

services related to retirement. However, the absence of relevant standards and policies constrains the expansion and innovation of pension finance businesses. Additionally, most bank wealth management products have fixed terms of five years, creating a substantial disparity between the product lifespan and individuals' entire life cycles.

2.4.2 CAPITAL MARKET

Pension target date funds and pension target risk funds are the primary types of public offering funds involved in pension funds. Pension target date funds aim to achieve predetermined risk-return targets by a specific date, while pension target risk funds maintain a preset asset portfolio risk level by adjusting the proportions of various assets. These products are characterized by providing stable investment returns. Over the years, the market has increasingly embraced these innovative pension product models, recognizing them as successful endeavors by the capital market to support the development of the third pillar of retirement planning.

The capital market and long-term funds have a mutually beneficial relationship. Long-term funds, such as pension funds and social security funds, play a crucial role in stabilizing the capital market. They help address short-term capital structure deficiencies and reduce the risk of significant market fluctuations. Furthermore, by leveraging the fund's strengths in equity investment and enhancing its ability to serve the elderly, long-term funds can effectively serve as a ''ballast stone'' in the capital market. Although these funds' robust asset management capabilities offer customers stable and substantial investment returns, it's important to acknowledge the presence of high investment risks as a potential drawback.

2.5 INTERNATIONAL COMPARISON

The third pillar of a pension system consists of voluntary private pension plans (World Bank, 1994). We compare such plans in Japan, Germany, and the U.S., representing Asia, Europe, and North America, respectively. The comparison aims to highlight lessons China can learn from international experiences in developing private pensions.

Table 8 to Table 10 provides a comparison based on coverage, amount of contributions, withdrawal criteria and benefits, and taxation. The voluntary private pension plans examined in the three countries share a few similarities:

- relatively young (most of them established during the last two decades),
- preserved benefits, and
- tax incentives.

One notable feature of the Japanese iDeCo plan is the significant tax incentives provided at each stage, including contributions, investments, and benefits. Furthermore, the iDeCo plan in Japan interacts with the public pension system, as eligibility requires enrollment in the public pension, and contribution caps vary by the category of public pension in which one is enrolled.

In contrast, the current contribution cap for the private pension scheme in China is uniform. As we will discuss in Section 3, the demand-supply gap in the third pillar pension system in China varies considerably depending on the type of public pension in which one is enrolled. By linking the contribution gap to enrollment in the public pension, China can promote equity within its multi-pillar pension system.

Table 8

AN OVERVIEW OF VOLUNTARY PRIVATE PENSION PLAN IN JAPAN.

	Japan
Plan(s)	Individual-type defined contribution pension plan (iDeCo)*
Year of introduction	2002
Coverage	Those who are enrolled in the National Pension†
Contributions	The amount of maximum contributions depends on which category of National Pension one is enrolled in, ranging from JPY 144,000 for some of the Category II insured persons (e.g., public servants) to JPY 816,000 per year for Category I insured persons (e.g., self-employed)
Withdrawal criteria	• In principle, assets can be withdrawn no earlier than age 60 and no later than age 75 • If the total enrollment period is less than 10 years, the eligibility age of withdrawal will be moved back accordingly
Benefits	• Lump sum or annuity or a combination of lump sum and annuity • Annuity might be a fixed-term annuity that lasts for 5 to 20 years or a life annuity
Taxation	• The full amount of contributions are tax-deductible • Investment returns are tax-free • Lump sum withdrawals enjoy retirement income deduction and annuity withdrawals enjoy public pension deduction

* Nippon Individual Savings Account (NISA) is technically not part of the Japanese retirement system, but it can be used to achieve medium- to long-term investment goals such as retirement.

† The National Pension is a public pension system in Japan. The insured persons under the National Pension System are categorized into three types: Category I insured persons (all registered residents of Japan aged 20 to 59 years who are not in Category II or III insured persons, including agriculture, forestry, or fishery business operators, self-employed persons, students), Category II insured persons (who are enrolled in the Employees' Pension Insurance system or Mutual Aid Associations), and Category III insured persons (Category II insured persons' dependent spouses aged 20 to 59 years, who reside in Japan).

Table 9

AN OVERVIEW OF VOLUNTARY PRIVATE PENSION PLAN(S) IN GERMANY.

	Germany
Plan(s)	• Riester Pensions • Rürup Pensions
Year of introduction	• 2002 (Riester Pensions) • 2005 (Rürup Pensions)
Coverage	• Riester Pensions: those who are covered by the social insurance system* and subject to full tax liability, as well as civil servants, judges, soldiers, their spouses and disability pensioners • Rürup Pensions: anyone can purchase Rürup products, although the plan is intended for the self-employed
Contributions	• Riester Pensions: contribution levels are determined in the contracts with providers; contributions are subsidies by the government, and the subsidy amount depends on income and number of children • Rürup Pensions: contribution levels are determined in the contracts with providers
Withdrawal criteria	No earlier than age 63 for both plans
Benefits	• Riester Pensions: life annuity or a programmed withdrawal; possible to draw up to 30% of capital at the beginning of the drawdown phase • Rürup Pensions: life annuity; lump sum withdrawal not allowed
Taxation	• Riester Pensions: contributions and investment income are tax free; withdrawals are taxed • Rürup Pensions: contributions are moving toward greater tax exemption (100% after 2025); withdrawals are liable to tax

* Social insurance system in Germany covers employed persons, including apprentices; and under certain conditions self-employed persons; military personnel; caregivers; and persons receiving unemployment, sickness, and other benefits.

Table 10
AN OVERVIEW OF VOLUNTARY PRIVATE PENSION PLAN(S) IN U.S.

	U.S.
Plan(s)	• Individual Retirement Accounts (IRAs), which consist of several types • The two most prominent types are Traditional IRS and Roth IRS*
Year of introduction	• 1974 (Traditional IRA) • 1997 (Roth IRA)
Coverage	• Traditional IRA: anyone who receives taxable compensation can open and make contributions to a traditional IRA • Roth IRA: anyone who receives taxable compensation, subject to the annual income of the saver (expressed as the Modified Adjusted Gross Income, or MAGI)
Contributions	Traditional IRA and Roth IRA: up to $6,000 ($7,000 if you are age 50 or older) per person for 2021
Withdrawal criteria	Traditional IRA and Roth IRA: one can withdraw at any time; however, a 10% additional tax generally applies if withdrawal occurs before age 59½; withdrawal should begin no later than age 72 (70½, if born before July 1, 1949)
Benefits	• Lump sum or an income stream • The income stream is subject to the required minimum distribution†
Taxation	• Traditional IRA: contributions are often tax-deductible; earnings and capital gains are generally not taxed; withdrawals are fully taxable as income • Roth IRA: contributions are not tax-deductible (contributions are made with after-tax assets); earnings and capital gains are generally not taxed; withdrawals made after 5 years of participation and at or elder than 59½ are tax exempt

* Other types of IRAs include SEP IRA (SEP standing for Simplified Employee Pension), and SIMPLE IRA (SIMPLE standing for Savings Incentive Match Plan for Employees)
† The required minimum distribution is calculated by dividing the IRA account balance as of 31 December of the prior year by a distribution year determined by the IRS's Uniform Lifetime Table.

The plans in Germany demonstrate the most robust longevity risk protection due to their predominant use of life annuities as benefits. The private pension scheme in China offers longevity risk protection through exclusive commercial pension insurance products and annuity insurance products, which provide policyholders with the option to receive lifetime annuity benefits.

It is widely recognized that the voluntary annuitization market remains relatively limited worldwide (see e.g., Brown, 2009). Given this understanding, China could explore the possibility of implementing a form of compulsory annuitization similar to that in Germany. Such a measure would serve to enhance longevity risk management among retirees and contribute to a more comprehensive pension system.

The U.S. boasts the most well-established voluntary private pension plans, with contribution caps and withdrawal criteria having undergone changes over time. In Section 3, we project that the demand-supply gap of the third pillar pension in China will change over time due to various factors, including mortality improvement and consumption growth. As China's third pillar pension system continues to evolve, it becomes increasingly vital to promptly revise policies in order to ensure its effectiveness and relevance.

2.6 SUMMARY

Different financial institutions have their own strengths and weaknesses when it comes to offering pension financial products, leading to misplaced competition.

Banks have an extensive branch network, a large customer base, diverse investment options, a stable investment approach, and advanced financial technology management and risk control capabilities, making them a popular

choice among the elderly. However, banks face challenges in meeting the diverse retirement investment needs due to their traditional business model, complex processes, and lack of personalized products and services.

The capital market's involvement in pension financial products primarily revolves around public offering fund products, namely pension target date funds and pension target risk funds. These funds benefit from extensive investment research systems, delivering substantial investment returns. However, they come with higher investment risk compared to other products.

The insurance industry's main contribution to pension finance is through personal tax-deferred commercial pension insurance and other commercial pension insurance offerings. The insurance sector boasts strong risk control and management capabilities, well-developed pension products, and professional insurance capital management. Nevertheless, the process of declaring tax deductions for personal tax-deferred commercial pension insurance can be burdensome, and the variety of available products may be limited. Additionally, commercial pension insurance suffers from drawbacks such as opaque fund operation methods and relatively low yields.

Drawing from both mature foreign experience and the current state of development in China, it is crucial to harness the unique market advantages of the banking system, insurance industry, and capital market. This can be achieved through enhanced collaboration and resource integration among these sectors. The goal is to explore novel pension products and emerging retirement models that cater to diverse needs. A key focus should be on establishing standardized asset allocation models and investment products that span different economic cycles and offer long-term stability.

To foster innovation in pension finance, it is important to develop specialized financial products specifically designed for retirement purposes. These may include savings plans, insurance policies, funds, trusts, and other functional products that cater to the unique needs of pensioners. By effectively leveraging the potential of the third pillar of pension security, these initiatives can deliver a wide range of comprehensive financial services that enrich the retirement landscape.

Section 3: Estimating Demand-Supply Gap

After a qualitative analysis of current product offerings related to individual pension plans, we shift our focus to quantify the demand-supply gap in the third pillar of the pension system. The assessment aims to provide a clearer understanding of the market potential for commercial pension products.

We define demand as basic necessities of living in retirement, including food, clothes, living, daily necessities & services, transportation, entertainment, basic medical expenses, etc. The definition of demand is consistent with that of per capita consumption in the census data by the NBS. Note that the demand in our analysis does not take into account specialized old-age health costs such as long-term care costs, end-of-life care costs, etc.

We consider the pension supply from the first two pillars since the third pillar is still emerging as summarized in Table 11. We assume rural residents participate in the basic old-age pensions for urban and rural residents and that they do not participate in the second pillar. We assume urban residents participate in both the first pillar (basic old-age pensions for urban employees) and the second pillar (enterprise annuities for workers and occupational annuities for civil servants). We further assume that urban residents earn the average wage of employed personnel in all urban units (全口径城镇单位就业人员平均工资) while working.

Table 11
AN OVERVIEW OF THE THREE-PILLAR PENSION SYSTEM IN CHINA.

	Pillar I Basic old-age pension	Pillar II Occupational pension	Pillar III Individual pension plans
Plans	• basic old-age pensions for urban employees (城镇职工基本养老保险) • basic old-age pensions for urban and rural residents (城乡居民基本养老保险)	• enterprise annuities (企业年金) • occupational annuities (职业年金)	• tax-deferred commercial pension insurance (个人税收递延型商业养老保险) • exclusive commercial pension insurance (专属商业养老保险) • private pension scheme (个人养老金) • pension-related wealth management products (养老理财产品) • pension target fund of funds (养老目标基金)
Year of introduction	• 1997 for the basic old-age pensions for urban employees • 2009 for the basic old-age pensions for urban and rural residents	• 2004 for enterprise annuities • 2011 for occupational annuities	2018
Assets under management*	• 5.26 trillion CNY for the basic old-age pensions for urban employees • 1.14 trillion CNY for the basic old-age pensions for urban and rural residents	• 2.61 trillion CNY for enterprise annuities • 1.79 trillion CNY for occupational annuities	1.93 trillion CNY

* as of December 2021. The figures are obtained from MOHRSS (2022a) for the first two pillars and MOHRSS (2022b) for the third pillar.

We assume both urban and rural residents start participation in the first and/or second pillar at 25 years old. We follow the current policy to determine the retirement ages of urban residents, i.e., 60 for males, 55 for female civil servants, and 50 for female workers. For rural residents, since their eligibility age for receiving the basic old-age

pension from the first pillar is 60, regardless of gender, we set the retirement age to be 60 for both men and women.

To assess how the gaps vary over time and region, we consider multiple cohorts in both rural and urban areas across different provinces in China. These cohorts are defined based on their retirement years, ranging from individuals who have recently retired or will retire soon to younger generations who will retire in several decades. Table 12 provides an overview of the retirement years and corresponding birth years for the cohorts included in our analysis.

Table 12
THE RETIREMENT YEARS AND CORRESPONDING BIRTH YEARS FOR THE COHORTS INCLUDED IN OUR ANALYSIS.

Retirement year	Urban			Rural
	Males	Female civil servants	Female workers	
2022	1962	1967	1972	1962
2032	1972	1977	1982	1972
2042	1982	1987	1992	1982
2052	1992	1997	2002	1992
2057	1997	2002	2007	1997

The demand-supply gap is determined by comparing the expected present value (EPV) of consumption expenditure during retirement with the available pension wealth at that time. The pension wealth comprises the EPV of basic old-age pensions from the first pillar and the accumulated wealth from the second pillar. To calculate the EPV, assumptions regarding mortality and interest rate are necessary, and these assumptions will be discussed in Section 3.1 and Section 3.2 respectively. The computation of consumption expenditure is detailed in Section 3.3, while the determination of pension wealth available at retirement is explained in Section 3.4.

In addition to the demand-supply gap based on EPV, we also calculate demand-supply *tail gap* that captures individual longevity risk, i.e., in scenarios where an individual lives longer than his/her life expectancy.

The demand and supply calculations are performed in nominal terms, while the demand-supply gap is presented in real terms to ensure comparability across different years. Converting nominal terms to real terms requires an assumption about inflation, which is discussed in Section 3.5. The results of the demand-supply gap are presented in Section 3.6.

3.1 MORTALITY

We use the SOA Mortality Tool, developed by Li and Hanewald (2022), to represent geographical mortality rates in China. The SOA Mortality Tool provides mortality rates for 12 sub-populations, which are stratified by region (central, east, and west), area (urban and rural), and gender (male and female).

3.1.1 INTEGER AGE INTERPOLATION

Mortality rates from the SOA Mortality Tool are 5-year age band specific. We use the local univariate polynomial regression method, which is detailed in Loader (1999) and Tomas (2012), to interpolate integer age mortality rates for each of the 12 sub-populations.

Let μ_i denote the mortality rate of age group i. We can express mortality rates using the following formula:

$$\mu_i = f(x_i) + \epsilon_i,$$

where x_i denotes the representative age of age group i, f is an unknown function to be estimated, and ϵ_i is an error term assumed to be white noise.

We approximate the unknown function f locally around x_i by a number of simple parametric functions. Assuming that f is k-th order continuous, we can approximate the unknown function by its Taylor expansion to the k-th degree. At any point x in the neighborhood of x_i, we have:

$$f(x) = \sum_{u=0}^{k} \beta_u(x_i)(x - x_i)^u,$$

where $\beta_u(x_i) = \frac{f^{(u)}(x_i)}{u!}$ is the coefficient of Taylor expansion.

A weighted polynomial regression is then run on all observations to estimate coefficients β by minimizing the following

$$\sum_{j=1}^{n} w(x_j - x_i)\left(f(x_j) - \sum_{u=0}^{k} \beta_u(x_i)(x_j - x_i)^u\right)^2,$$

where $w(x_j - x_i)$ is a weight function that depends on the distance between x_j and x_i.

See details in Tomas (2012) for statistical properties and diagnostic checks of this method.

3.1.2 OLD AGE EXTRAPOLATION

The SOA Mortality Tool provides mortality rates for ages up to 85+. To estimate mortality rates for advanced ages, we employ the Coherent Kannisto Method (see e.g., Ševčíková et al., 2016).

The scarcity and reduced accuracy of mortality data at advanced ages (85+) has given rise to a controversy regarding the continuation of mortality patterns beyond this threshold (Bourbeau & Desjardins, 2002; F. Huang et al., 2020; Jeune, 1999; Wilmoth, 1995). In response, Kannisto (1992) proposes the Kannisto Law, a mortality model designed to account for the deceleration shape characterizing the very old age groups. The Kannisto Law, as applied in numerous studies (Gavrilov & Gavrilova, 2019; Himes et al., 1994; F. Huang et al., 2020), is expressed as

$$\mu_x = c + \frac{ae^{bx}}{1 + ae^{bx}},$$

where μ_x is mortality rate at age x, and a, b and c are constants.

Building upon the Kannisto Law, Ševčíková et al (2016) develop the Coherent Kannisto Method that jointly estimates the parameters of the Kannisto Law across multiple populations. This method is designed to ensure the coherence of mortality rate gaps at advanced ages.

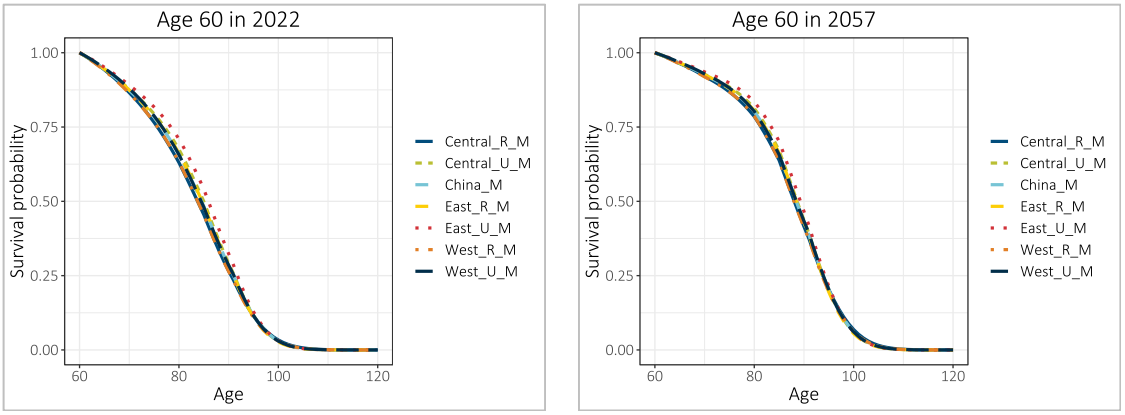
3.1.3 MORTALITY IMPROVEMENTS

Mortality improvements are important factors that we also take into account in the estimation of demand. The SOA Mortality Tool provides period mortality rates up to the year 2029. For short-term mortality improvements, we use mortality projections (2020 to 2029) from Li and Hanewald (2022); for long-term mortality improvements (2029+), we use the average of log mortality changes in 2025-2029. Due to the challenge in the ultra-long-term mortality projection, we project the mortality for 50 years and assume constant mortality thereafter. The cohort mortality rates, which take into account future mortality improvements, are used for projecting retirement needs.

Figure 1 to Figure 3 show the survival curves at retirement ages in 2022 and 2057, the first and the last year of retirement under our consideration. Each chart shows the regional differences in mortality. People in east urban areas (East_U_M and East_U_M) consistently have the lowest mortality rates compared to people in other areas. Comparing the two panels in each figure shows that the shape of the survival curve becomes more rectangular over time due to mortality improvement.

Figure 1

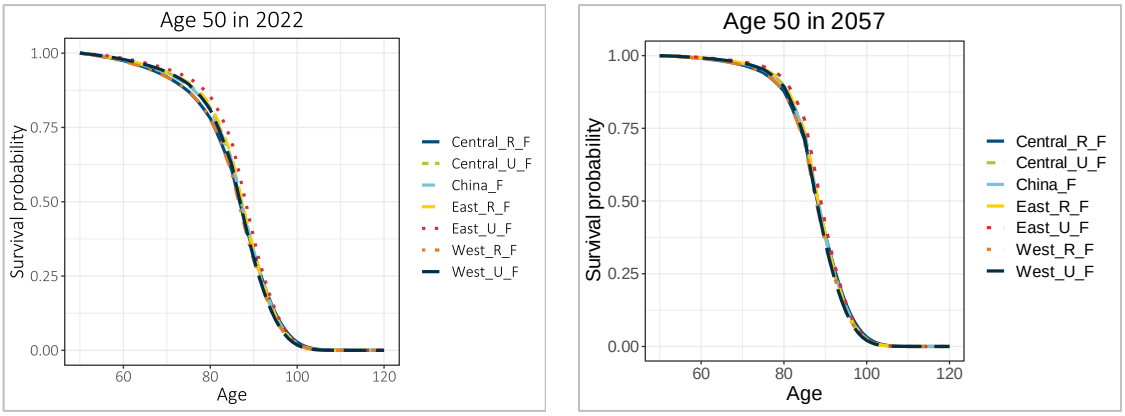
SMOOTHED COHORT SURVIVAL CURVES FOR MALES AT AGE 60.



(Left Panel) age 60 in 2022; (Right Panel) age 60 in 2057. In the legend, R stands for rural, U for urban, and M for males.

Figure 2

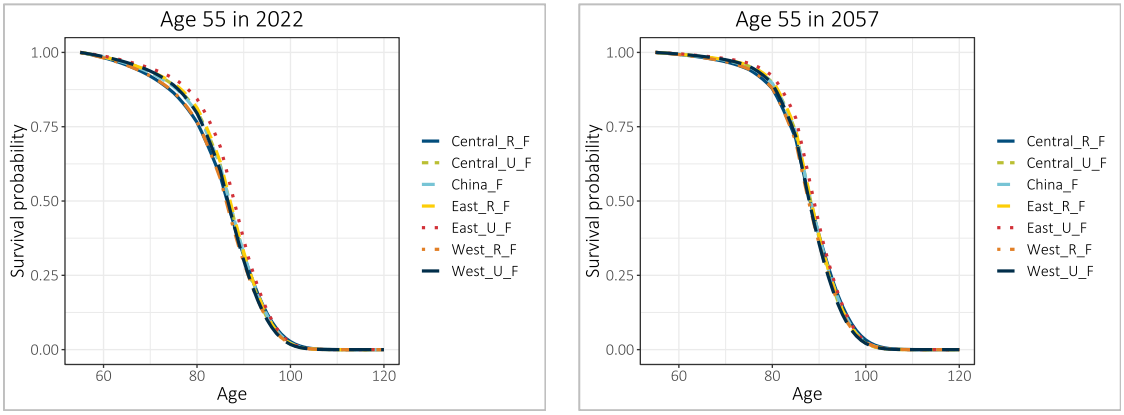
SMOOTHED COHORT SURVIVAL CURVES FOR FEMALES AT AGE 50.



(Left Panel) age 50 in 2022; (Right Panel) age 50 in 2057. In the legend, R stands for rural, U for urban, and F for females.

Figure 3

SMOOTHED COHORT SURVIVAL CURVES FOR FEMALES AT AGE 55.



(Left Panel) age 55 in 2022 and (Right Panel) age 55 in 2057. In the legend, R stands for rural, U for urban, and F for females.

Table 13 presents the remaining life expectancy at retirement based on the smoothed mortality rates. Notably, residents in the eastern urban area have the longest life expectancy. Note that the increase in life expectancy slows down due to our assumption about mortality improvement.

Table 13

REMAINING COHORT LIFE EXPECTANCY AT RETIREMENT IN DIFFERENT YEARS.

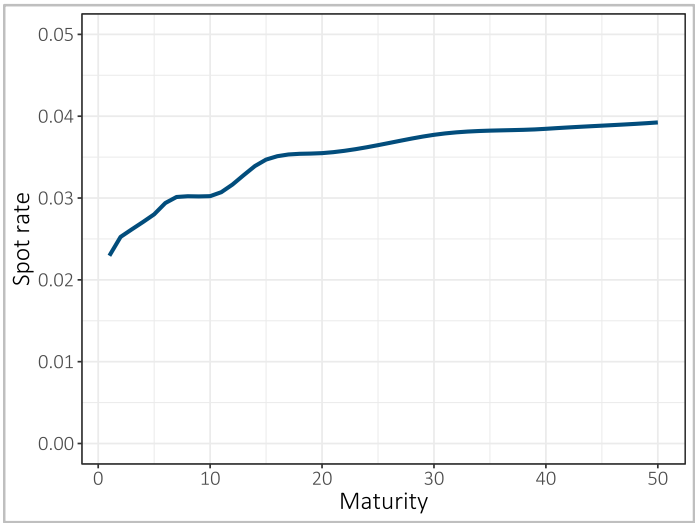
	Year				
	2022	2032	2042	2052	2057
Male, Age 60					
Central Urban	23.6	25.0	26.2	27.1	27.3
Central Rural	22.9	24.3	25.7	26.6	26.9
East Urban	24.5	25.8	26.9	27.7	27.9
East Rural	23.4	24.8	26.0	26.9	27.1
West Urban	23.4	24.8	26.1	27.0	27.2
West Rural	22.8	24.2	25.6	26.5	26.7
China	23.4	24.8	26.0	26.9	27.1
Female, Age 50					
Central Urban	35.8	36.7	37.3	37.6	37.7
Central Rural	35.3	36.3	37.1	37.5	37.6
East Urban	36.9	37.7	38.2	38.5	38.5
East Rural	36.0	36.9	37.5	37.8	37.9
West Urban	35.6	36.4	37.1	37.4	37.5
West Rural	35.0	36.0	36.8	37.1	37.2
China	35.8	36.7	37.4	37.7	37.8
Female, Age 55					
Central Urban	30.7	31.5	32.2	32.6	32.7
Central Rural	30.1	31.1	32.0	32.5	32.6
East Urban	31.8	32.5	33.1	33.5	33.6
East Rural	30.9	31.7	32.4	32.8	32.9
West Urban	30.4	31.3	32.0	32.4	32.5
West Rural	29.9	30.8	31.7	32.2	32.3
China	30.6	31.5	32.3	32.7	32.8

3.2 INTEREST RATE

We use the 750-day moving average government bond yield curve to calculate the present value of future cash flows in retirement. Figure 4 shows that the curve has an upward trend and levels off at around 4%.

Figure 4

DISCOUNT CURVE USED TO CALCULATE THE PRESENT VALUE OF FUTURE CASH FLOWS IN RETIREMENT.



3.3 DEMAND

We use personal consumption expenditures per capita, adjusted for the retired population, to estimate the pension demand. The adjustment is to allow for the empirical finding that retirees tend to spend less than workers. The estimation process has three steps. We first obtain the overall personal consumption expenditures per capita, stratified by province and the rural-urban area within each province, from the NBS (National Bureau of Statistics of China, 2023a, 2023b). We then estimate two adjustment factors, one for rural and one for urban, using the data from the China Health and Retirement Longitudinal Study (CHARLS) and the NBS. Lastly, we multiply the adjustment factor with the figures obtained in the first step to obtain an estimated pension demand in each region.

The adjustment factor is the ratio of the average consumption expenditure of individuals aged 60 and above to the national average. We obtain the former from the CHARLS data. To make the consumption expenditure comparable across different years, we use the nominal consumption growth at the national level (separately for urban and rural areas) and express it in terms of the 2022 level.

Figure 5 presents the average consumption expenditures per capita based on the CHARLS data. There is a noticeable difference between rural and urban residents, indicating the need to distinguish between these areas. Additionally, Figure 5 indicates the presence of outliers in the CHARLS data. To obtain a more robust estimate, we use the winsorized mean, where observations exceeding the 97.5th percentile are replaced by the value at the 97.5th percentile, and observations below the 2.5th percentile are replaced by the value at the 2.5th percentile (i.e., 95% winsorization).

Figure 5

AVERAGE CONSUMPTION EXPENDITURES PER CAPITA (VALUE OF 2022 CNY) FOR RURAL AND URBAN RESIDENTS IN THE CHARLS DATA.

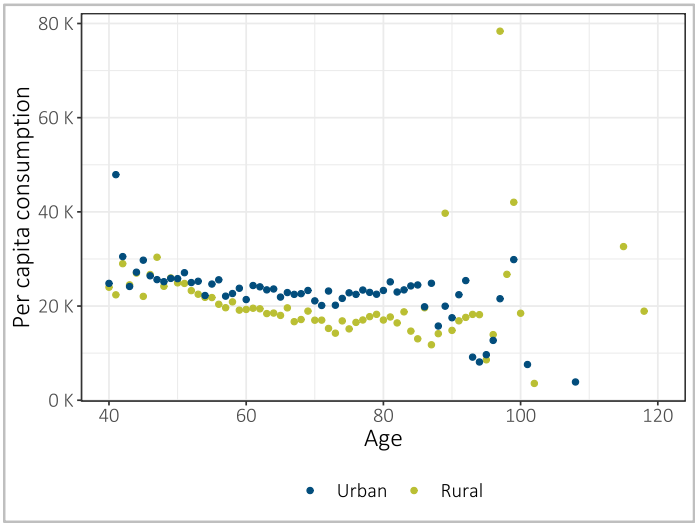


Table 14 shows per capita average consumption expenditures derived from CHARLS data, along with corresponding ratios. The analysis indicates that rural residents aged 60 and above have similar consumption expenditure levels as the national average, while urban residents tend to have lower post-retirement spending. Figure 6 illustrates the estimated annual retirement consumption in rural and urban areas for each province. We use the assumption for future consumption growth from Wang (2018), displayed in Table 15.

Table 14

THE NATIONAL AVERAGE ANNUAL CONSUMPTION EXPENDITURE PER CAPITA (VALUE OF 2022 CNY).

	Data Source		Ratio
	CHARLS	NBS	
Rural	16,697	16,632	100.4%
Urban	21,279	30,391	70.0%

Note: CHARLS stands for the China Health and Retirement Longitudinal Study; NBS stands for the National Bureau of Statistics of China.

Figure 6

ESTIMATED ANNUAL CONSUMPTION DURING RETIREMENT IN BOTH RURAL AND URBAN AREAS FOR EACH PROVINCE.

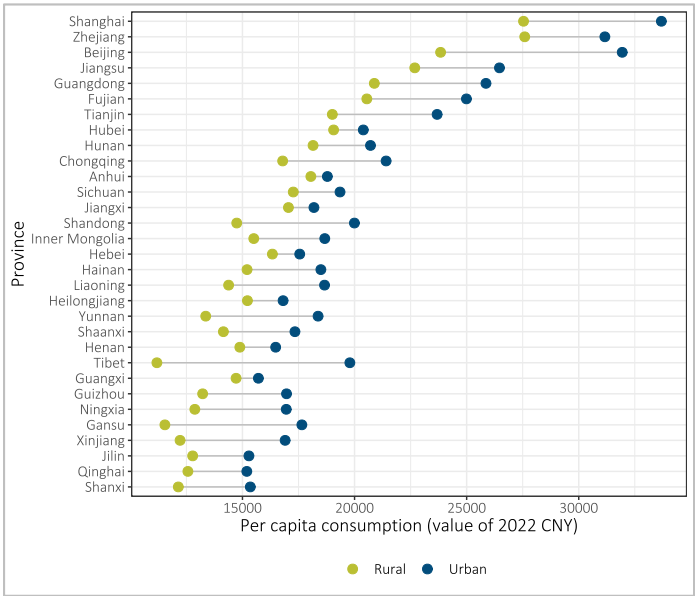


Table 15

ASSUMPTION FOR FUTURE ANNUAL CONSUMPTION GROWTH.

2022 - 2030	2031 - 2040	From 2040
6%	5%	4%

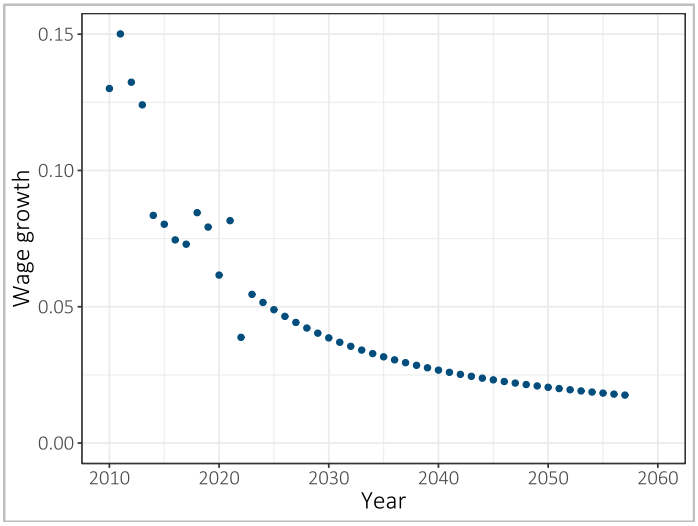
Note: The figures are inflation adjusted.

3.4 SUPPLY

We begin by forecasting the wage growth of urban residents, as it directly influences their pension income from the first pillar and accumulated wealth from the second pillar. Our assumption is that urban residents earn the average wage of employed personnel across all urban units. This average wage is calculated as a weighted average, taking into account the wages in both the public and private sectors. The weighting is based on the number of employees in each sector. The detailed forecasting procedure can be found in Appendix A. Figure 7 shows the actual and forecast annual growth rate.

Figure 7

ACTUAL (2010-19) AND FORECAST ANNUAL GROWTH RATE OF THE AVERAGE WAGE OF EMPLOYED PERSONNEL ACROSS ALL URBAN UNITS.



We collect the average wage data for each province in 2021 from the provincial Human Resources and Social Security Bureau. To estimate the average wage for other years, we use the annual growth rates presented in Figure 7. In the case of the years preceding 2010, we assume a fixed annual growth rate of 13%.

3.4.1 PILLAR I

Urban residents

The public pension received by urban residents comprises two components[2]: basic pension and individual-account pension. The amount of basic pension is determined based on several factors, including the average wage of employed personnel in all urban units during the year preceding retirement, the career-average wage, and the contribution period. Under our wage earnings assumption, retirees receive an additional 1% of the average wage for each year of contribution. The amount of the individual-account pension depends on the account balance at retirement and the age of retirement. The assumptions required to calculate the account balance are listed in Table 16.

Table 16

ASSUMPTIONS ABOUT THE INDIVIDUAL-ACCOUNT PENSION FOR URBAN RESIDENTS.

	Workers	Civil servants
Starting year*	1997	2015
Contribution rate*	• 1997 -- 2005: 11% • 2006 onwards: 8%	8%
Interest rate†	4%	4%

* The assumption is based on government policies.

† We follow the assumption made in Fang (2022a) and Wang (2017).

[2] To maintain our focus on the primary factors impacting cross-generational differences, such as mortality improvement, we have chosen to exclude the third component known as the transition pension. This component specifically applies to individuals who lacked an individual account when they initially entered the workforce, namely female workers and males in the first cohort under analysis.

The amount of public pension is determined in the year of retirement and then adjusted annually to keep up with inflation. We follow the assumption made in Fang (2022a) and Fang (2022b) and use a growth rate of 4.5%.

Rural residents

The current structure of basic old-age pensions for urban and rural residents resulted from the consolidation of the Urban Resident Pension (introduced in 2011) and the New Rural Resident Pension (introduced in 2009) in 2014. Accordingly, we assume that the rural residents included in our analysis began their participation in the first pillar in 2009.[3]

The public pension received by rural residents consists of a basic pension and an individual-account pension. The amount of public pension is determined by the local government and adjusted annually. We obtain the figures for each province from the National Social Insurance Public Service Platform[4] and assume an annual growth rate of 4.89% based on historical data[5].

Participants in the individual account system have the flexibility to choose their contribution level from multiple options established by the local government. Each contribution level includes both personal payment and government subsidy components. In our analysis, we assume five contribution levels (Table 17) to capture various socioeconomic statuses. We follow the assumption in Huang (2015) and assume an interest rate of 3% in the individual account.

Table 17

THE FIVE CONTRIBUTION LEVELS ASSUMED FOR RURAL RESIDENTS.

	Personal payment	Government subsidy	Total contribution
Level I	200	40	240
Level II	500	60	560
Level III	1,000	80	1,080
Level IV	2,000	100	2,100
Level V	5,000	200	5,200

3.4.2 PILLAR II

The second pension pillar in China consists of enterprise annuities and occupational annuities. Table 18 provides a list of the assumptions necessary to calculate the accumulated wealth from the third pillar. It should be noted that the assumed starting years are a few years later than when the programs were initially introduced. During the early years, these programs underwent policy adjustments to enhance their effectiveness, and the assets under management were relatively small, resulting in potentially volatile investment returns. For enterprise annuities, we select 2007 as the starting year, as this is when the Ministry of Human Resources and Social Security began collecting performance data. Regarding occupational annuities, we choose 2015 as the starting year since the most recent regulations were released in that year.

[3] The first cohort retiring in 2022 will have fewer than 15 years of contributions, which falls below the minimum requirement to qualify for the public pension. Our assumption is that they will make a one-time payment in their final contribution to meet the 15-year contribution requirement.

[4] https://si.12333.gov.cn/20635567.jhtml?menuguide=1 [Accessed 5/19/2023]

[5] The central government's minimum standard for basic pension rose from 55 CNY per month in 2009 to 93 CNY per month in 2020.

Table 18

ASSUMPTIONS REQUIRED TO CALCULATE THE ACCUMULATED WEALTH FROM THE THIRD PILLAR.

	Enterprise annuities	Occupational annuities
Starting year	2007	2015
Contribution rate*	12%	12%
Investment returns	6.58%†	5.29%‡

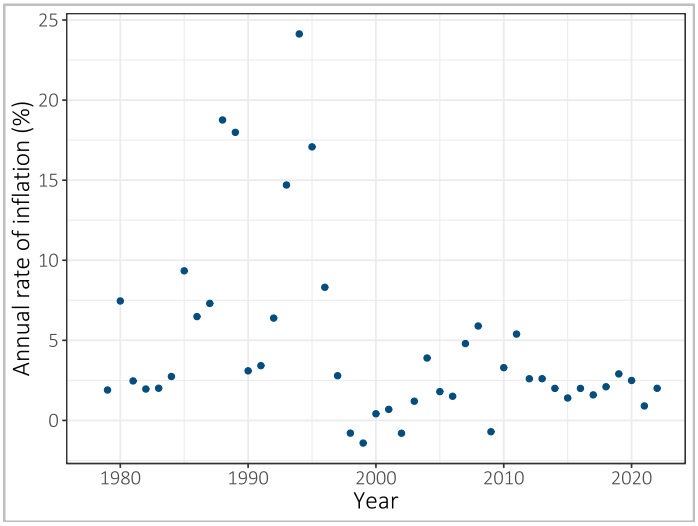
* The 12% contribution rate follows the current government policy.
† This figure represents the average historical return from 2007-22 (MOHRSS, 2023b).
‡ This figure represents the average annual investment return until the end of 2022(MOHRSS, 2023a).

3.5 INFLATION

Figure 8 displays the annual inflation rates over the past four decades. Following a period of high inflation in the late 1980s and early 1990s, the inflation rate has been relatively stable in the new millennium. For our analysis, we adopt an annual inflation rate of 2.3%, which represents the average inflation between 2002 and 2022. It is worth noting that China joined the World Trade Organization in December 2001, and it is commonly accepted to use 2002 as a reference point (see e.g., Girardin et al., 2017).

Figure 8

ANNUAL RATE OF INFLATION IN CHINA: 1979 -- 2022.



3.6 DEMAND-SUPPLY GAP

We present the results from the provinces of Beijing, Liaoning, Zhejiang, Henan, and Sichuan, chosen for their diverse geographical and socioeconomic characteristics. These provinces also represent different regions for mortality modeling, with Beijing, Liaoning, and Zhejiang in the east, Henan in the central region, and Sichuan in the west.

Our analysis includes two types of gap results: one that represents the overall expectation and another that focuses on tail risk. The latter is referred to as the "tail gap." In calculating the tail gap, we consider future cash flows until an individual's chance of survival from retirement age is less than 5%. This allows us to capture scenarios where individuals live longer than their life expectancy at retirement.

3.6.1 URBAN RESIDENTS

Table 19 presents a projection of the gap between the demand and supply for workers. There is a notable difference between men and women. Female workers are projected to face a greater shortage of funds for retirement compared to their male counterparts, primarily due to factors such as early retirement and longer life expectancy. The table shows lower balances for females in the second pillar (Pillar II), except for urban workers retiring in 2022 and 2032, where the assumption of the implementation of enterprise annuities after these cohorts entered the workforce equalizes the years of contributions. Additionally, considering the longer lifespan of females, they require a higher level of financial resources to support themselves throughout retirement, leading to higher future expenditure figures in Table 19.

Table 19 indicates that younger generations are more likely to have insufficient funds from the first two pillars. This is partly due to mortality improvement, as younger generations have longer life expectancies and therefore require more funds for retirement. Our assumption that the growth rate of the public pension is slower than the rate of consumption also contributes to the increasing gap between demand and supply over time.

Regarding regional differences, residents in Zhejiang are more susceptible to experiencing a deficit in pension funds compared to residents in other provinces. This is attributed to a relatively high level of consumption expenditure and a lower mortality rate, which increases the likelihood of facing a demand-supply gap.

Table 19

PROJECTED DEMAND-SUPPLY GAP FOR URBAN WORKERS RETIRING IN VARIOUS YEARS.

	Male					Female				
	Pillar II	Pillar I	Cons	Gap	Tail gap	Pillar II	Pillar I	Cons	Gap	Tail gap
Beijing										
2022	216	1,707	1,483	440	250	216	1,875	2,585	-494	-1,184
2032	560	2,623	2,445	739	407	560	2,653	4,010	-797	-1,824
2042	1,117	3,342	3,830	629	-303	814	3,167	6,030	-2,048	-3,759
2052	1,509	3,825	5,809	-474	-2,442	948	3,347	8,916	-4,621	-7,508
2057	1,631	3,929	7,095	-1,535	-4,277	975	3,344	10,819	-6,500	-10,207
Liaoning										
2022	130	1,025	866	288	195	130	1,126	1,510	-254	-646
2032	337	1,576	1,429	483	316	337	1,593	2,343	-413	-999
2042	671	2,007	2,238	440	-73	489	1,902	3,523	-1,132	-2,115
2052	906	2,297	3,394	-190	-1,307	569	2,010	5,209	-2,630	-4,300
2057	980	2,360	4,145	-806	-2,375	586	2,008	6,321	-3,727	-5,876
Zhejiang										
2022	151	1,195	1,447	-102	-592	151	1,312	2,522	-1,059	-1,921
2032	392	1,836	2,386	-158	-917	392	1,856	3,912	-1,664	-2,914
2042	782	2,339	3,737	-617	-2,053	570	2,216	5,884	-3,098	-5,045
2052	1,056	2,677	5,668	-1,935	-4,411	663	2,342	8,700	-5,694	-8,798
2057	1,141	2,749	6,923	-3,033	-6,266	683	2,340	10,557	-7,535	-11,435
Henan										
2022	115	881	733	263	185	115	970	1,278	-193	-523
2032	300	1,359	1,217	442	298	300	1,378	1,996	-318	-809
2042	597	1,739	1,916	419	-38	435	1,652	3,014	-927	-1,753
2052	807	1,997	2,918	-114	-1,124	507	1,748	4,465	-2,210	-3,617
2057	872	2,053	3,568	-643	-2,067	521	1,747	5,420	-3,152	-4,964
Sichuan										
2022	138	1,042	851	329	250	138	1,151	1,485	-197	-584
2032	358	1,611	1,416	552	402	358	1,635	2,321	-328	-906
2042	713	2,064	2,235	542	24	520	1,960	3,507	-1,028	-2,005
2052	963	2,375	3,410	-72	-1,240	605	2,074	5,195	-2,516	-4,190
2057	1,041	2,442	4,171	-687	-2,345	623	2,072	6,306	-3,611	-5,771

Note: The figures are denoted in 1,000 CNY (2023 value). ''Pillar II'' represents the accumulated wealth in the second pillar. ''Pillar I'' represents the expected present value of the public pension. ''Cons'' represents the expected present value of consumption expenditure. ''Gap'' is calculated as ''Pillar II'' plus ''Pillar I'' less ''Cons.'' ''Tail gap'' captures the scenarios where an individual lives longer than his/her life expectancy.

Table 20 displays the projected demand-supply gap for civil servants. While a gender disparity exists, it is less significant than that observed among urban workers due to a narrower retirement age gap between genders. The regional differences and cohort effects remain consistent with those observed in Table 19.

Table 20

PROJECTED DEMAND-SUPPLY GAP FOR CIVIL SERVANTS RETIRING IN VARIOUS YEARS.

	Male					Female				
	Pillar II	Pillar I	Cons	Gap	Tail gap	Pillar II	Pillar I	Cons	Gap	Tail gap
Beijing										
2022	109	1,479	1,483	105	-232	109	1,656	2,083	-318	-869
2032	365	2,340	2,445	260	-242	365	2,524	3,264	-375	-1,141
2042	741	3,147	3,830	57	-986	741	3,286	4,938	-911	-2,178
2052	1,182	3,825	5,809	-801	-2,769	993	3,670	7,334	-2,670	-4,919
2057	1,267	3,929	7,095	-1,899	-4,641	1,038	3,700	8,908	-4,170	-7,146
Liaoning										
2022	65	889	866	87	-94	65	994	1,217	-157	-467
2032	219	1,405	1,429	196	-74	219	1,516	1,907	-172	-603
2042	445	1,890	2,238	97	-483	445	1,973	2,885	-466	-1,187
2052	710	2,297	3,394	-386	-1,503	597	2,204	4,285	-1,484	-2,777
2057	761	2,360	4,145	-1,025	-2,594	623	2,222	5,205	-2,359	-4,077
Zhejiang										
2022	76	1,035	1,447	-336	-929	76	1,159	2,032	-797	-1,530
2032	255	1,637	2,386	-493	-1,372	255	1,766	3,185	-1,163	-2,185
2042	519	2,202	3,737	-1,017	-2,531	519	2,299	4,818	-2,000	-3,570
2052	827	2,677	5,668	-2,164	-4,640	695	2,568	7,156	-3,893	-6,444
2057	887	2,749	6,923	-3,287	-6,521	726	2,589	8,692	-5,377	-8,637
Henan										
2022	58	763	733	88	-73	58	852	1,024	-113	-373
2032	195	1,212	1,217	190	-49	195	1,306	1,617	-116	-474
2042	396	1,637	1,916	117	-404	396	1,707	2,459	-356	-955
2052	632	1,997	2,918	-289	-1,299	531	1,911	3,663	-1,221	-2,302
2057	678	2,053	3,568	-837	-2,261	555	1,928	4,452	-1,969	-3,409
Sichuan										
2022	70	903	851	122	-58	70	1,009	1,188	-109	-412
2032	233	1,437	1,416	254	-13	233	1,547	1,878	-98	-515
2042	473	1,943	2,235	181	-412	473	2,023	2,858	-362	-1,066
2052	755	2,375	3,410	-280	-1,449	634	2,266	4,258	-1,359	-2,639
2057	809	2,442	4,171	-920	-2,577	663	2,285	5,175	-2,228	-3,939

Note: The figures are denoted in 1,000 CNY (2023 value). ''Pillar II'' represents the accumulated wealth in the second pillar. ''Pillar I'' represents the expected present value of the public pension. ''Cons'' represents the expected present value of consumption expenditure. ''Gap'' is calculated as ''Pillar II'' plus ''Pillar I'' less ''Cons.'' ''Tail gap'' captures the scenarios where an individual lives longer than his/her life expectancy.

3.6.2 RURAL RESIDENTS

There are notable differences between rural and urban residents regarding pension supply. Rural residents lack pension benefits from the second pillar, unlike their urban counterparts. Moreover, the basic pension received by rural residents is determined by the local government and is not linked to the average wage, resulting in relatively lower amounts. These factors contribute to the existing urban-rural disparity in pension provision.

Examining rural residents across all contribution levels, we find that their pension income from the first pillar is insufficient to cover their consumption expenditure. Table 21 presents the findings for residents at the medium contribution level (Level III). The correlation between the contribution level and the amount of public pension received indicates that a higher contribution level leads to a smaller gap between the demand and supply of pension benefits.

Table 21

PROJECTED DEMAND-SUPPLY GAP FOR RURAL RESIDENTS RETIRING IN VARIOUS YEARS.

	Male				Female			
	Pillar I	Cons	Gap	Tail gap	Pillar I	Cons	Gap	Tail gap
Beijing								
2022	352	1,046	-694	-1,408	390	1,173	-783	-1,408
2032	489	1,739	-1,250	-2,445	527	1,876	-1,349	-2,252
2042	665	2,742	-2,077	-3,909	699	2,865	-2,166	-3,469
2052	837	4,180	-3,343	-5,991	867	4,294	-3,427	-5,545
2057	933	5,114	-4,181	-7,390	963	5,229	-4,266	-6,844
Liaoning								
2022	89	631	-542	-1,067	98	708	-610	-1,067
2032	130	1,049	-919	-1,768	140	1,132	-992	-1,634
2042	179	1,655	-1,475	-2,743	189	1,729	-1,540	-2,443
2052	191	2,522	-2,331	-4,132	199	2,591	-2,392	-3,832
2057	195	3,085	-2,891	-5,057	202	3,155	-2,953	-4,693
Zhejiang								
2022	112	1,210	-1,098	-2,132	124	1,358	-1,235	-2,132
2032	161	2,013	-1,852	-3,516	174	2,171	-1,998	-3,255
2042	222	3,174	-2,952	-5,431	234	3,316	-3,082	-4,848
2052	248	4,838	-4,591	-8,090	257	4,971	-4,713	-7,510
2057	260	5,919	-5,659	-9,858	268	6,052	-5,783	-9,154
Henan								
2022	88	637	-549	-1,156	95	707	-612	-1,156
2032	128	1,067	-939	-1,836	137	1,143	-1,006	-1,766
2042	177	1,691	-1,514	-2,848	186	1,759	-1,573	-2,638
2052	189	2,588	-2,398	-4,446	197	2,652	-2,455	-3,975
2057	193	3,169	-2,976	-5,438	200	3,234	-3,034	-4,865
Sichuan								
2022	87	735	-648	-1,364	94	808	-714	-1,309
2032	127	1,231	-1,103	-2,162	135	1,305	-1,170	-2,000
2042	176	1,949	-1,774	-3,347	184	2,008	-1,824	-2,984
2052	188	2,983	-2,795	-5,018	194	3,025	-2,831	-4,480
2057	191	3,652	-3,461	-6,130	197	3,688	-3,491	-5,477

Note: The figures are denoted in 1,000 CNY (2023 value). ''Pillar II'' represents the accumulated wealth in the second pillar. ''Pillar I'' represents the expected present value of the public pension. ''Cons'' represents the expected present value of consumption expenditure. ''Gap'' is calculated as ''Pillar II'' plus ''Pillar I'' less ''Cons.'' ''Tail gap'' captures the scenarios where an individual lives longer than his/her life expectancy.

Section 4: Advancing Insurers' Role in Third Pillar Development

From our analysis in Section 2, we observe that insurance companies, while leveraging their expertise in long-term risk management, can further enhance their contributions to the third pillar pension system. Our assessment in Section 3 underscores the importance of developing the third pillar to fill the gaps left by the first two pillars, especially for women, younger generations, and rural residents. Building on these insights, this section offers a set of recommendations for insurers to bolster their role in the third pillar. These recommendations include ecosystem building (Section 4.1), bank-insurance cooperation (Section 4.2), policy alignment (Section 4.3), and risk mitigation (Section 4.4).

4.1 ECOSYSTEM BUILDING

The retirement ecosystem represents a prominent trend that emerges from the integration of traditional resources and modern technology. By combining interrelated services on a single platform, it seamlessly caters to customer needs, making it a valuable asset in market competition and industry development. Former vice chairman of the China Insurance Regulatory Commission, Zhou Yanli, emphasized the importance of a comprehensive development pattern for China's pension financial market, involving multiple subjects, diverse financial products, and the fulfillment of varied pension needs.[6]

4.1.1 BUILDING AN INTEGRATED PENSION SYSTEM ECOSYSTEM

The pension system ecosystem thrives on the diversity of products and services. Through the integration of resources such as products, services, expertise, technology, capital, and talent, it forms a cohesive business chain with a closed-loop structure. This ecosystem encompasses various models, such as the pre-model, extended model, heightening model, and deep-cultivation model, catering to different business types and characteristics.

The pre-model focuses on risk reduction management and combines "risk prevention + insurance services" to create a pension ecosystem. This approach simultaneously protects the interests of customers and insurance companies, achieving a win-win outcome.

The extended model extends insurance services beyond pure financial offerings, incorporating areas such as healthcare, pension services, and wealth management. Insurance becomes an indispensable tool in providing these services, improving customer service quality and efficiency. Examples include "health insurance + health service" and "endowment insurance + pension service." These businesses address large-scale markets, involve multiple stakeholders, and align with customer needs and public health policies.

The heightening model focuses on establishing a comprehensive insurance protection network that revolves around the functions of assisting individuals in challenging situations, providing medical treatment for the sick, and supporting aging individuals. This model begins by considering factors such as the population covered, protection items, protection amount, and protection period. It aims to create an ecosystem model that centers on the provision of insurance products and services, ensuring a robust and well-rounded protection framework.

The deep cultivation model begins with identifying valuable customers and involves a thorough exploration and understanding of their needs. It then extends the customer chain, product chain, and service chain, creating a customer development model that progresses from individual points to connected lines, expanding to broader

[6] Speech at the 2023 Tsinghua Wudaokou Global Financial Forum on May 21.

surfaces, and ultimately forming a comprehensive customer base. This approach serves as an optimal strategy to transition from incremental market growth to engaging in existing market competition effectively.

4.1.2 INTEGRATING PENSION AND HEALTH SERVICES

In response to the pension and health challenges, several large life insurance companies have developed comprehensive business chains and service ecosystems covering various aspects of life, including aging, illness, and end-of-life. The objective is to offer customers tailored solutions and warm services when they encounter difficulties. By connecting the capital chain, service chain, and physical chain of pension services, insurance companies provide customers with a holistic package of pension planning and professional pension services.

For instance, they provide financial support for customers' retirement through pension insurance while offering suitable services for the elderly through professional retirement communities. These services encompass community property management, butler services, room service, catering, and other essential daily-life services. Additionally, they provide entertainment, leisure activities, social connections, and lifelong learning opportunities. Insurance companies also offer basic medical care, health management, fitness programs, first aid services, and various forms of healthcare such as life assistance, clinical nursing, rehabilitation therapy, and other professional nursing services.

4.1.3 FOSTERING SYNERGY BETWEEN INSURANCE AND THE SENIOR CARE INDUSTRY

Insurance companies have a natural fit with the senior care industry and can leverage their advantages in elderly care finance. By developing diverse elderly care products, they can meet the varying needs of customers of different ages, bridging the gap between the elderly care industry and insurance protection. Insurance capital, with its stable returns and long investment horizon, plays a significant role in driving the development of the senior care industry.

In the industry chain, senior care finance serves as a vital link connecting downstream consumers (dynamic elderly, assisted living elderly, disabled, and dementia patients) with mid- and upstream support industries. The upstream support industries primarily encompass senior care products (daily living, medical devices, healthcare, pharmaceuticals) and senior care finance.

The midstream sector, which is the pillar industry, includes senior care real estate and senior care services. Senior care services encompass various aspects of elderly life, such as diet, living assistance, cleanliness, health management, and cultural and sports entertainment. Senior care real estate provides high-quality services tailored to the needs of the elderly, acting as the pinnacle of the industry chain. It relies on continuous support from senior finance, senior services, and senior supplies.

4.2 BANK-INSURANCE COOPERATION

Bank-insurance cooperation has reached an advanced level in the product sales ecosystem through extensive exploration and practice. This model, encompassing various combinations such as "credit + insurance," "customer + insurance," "salary + insurance," and "team + insurance," has emerged by understanding the bank's core business and integrating it into its ecosystem.

Insurance companies and banks have independently established their ecosystems and are moving toward a future cooperation model of "ecology + ecology." Banks focus on customer bank card transactions and asset allocation, while insurance companies revolve around insurance policies and targets. The complementary nature of their ecosystems generates wealth for banks, aided by the coupling of insurance companies' management and healthcare ecosystems.

In addition, bank-insurance cooperation plays a vital role in addressing the pension needs of rural residents. With insufficient funds received from the first two pillars of pension systems, rural residents require third-pillar products. Through bank-insurance cooperation, these products can be made accessible to rural communities, providing additional retirement savings options and bridging the income gap. Leveraging the wide coverage of commercial banks and collaboration with insurance companies, this cooperation helps enhance the long-term financial security of rural residents.

4.3 ALIGNMENT WITH GOVERNMENT INITIATIVES

The third pillar pension system in China has received significant support from various government policies. A key focus of the 14th Five-Year Plan is the promotion of the construction of the third pillar, encompassing personal savings investment pension insurance, commercial insurance, and innovative pension financing.

Moving forward, it is essential to align with government initiatives and promote the development of personal pensions that align with China's unique circumstances. This involves leveraging government policy support, encouraging voluntary individual participation, and adopting market-oriented approaches. Linking these personal pensions with basic endowment insurance and enterprise/occupational annuities will enable the fulfillment of supplementary functions in the realm of pension security.

It is essential to establish strong links between the third pillar and existing components of the pension system, such as basic endowment insurance and enterprise/occupational annuities. By integrating these elements, the third pillar can effectively serve as a supplementary layer, enhancing the overall effectiveness and coverage of the pension security framework in China.

4.4 RISK MITIGATION

Retirement income product providers are typically faced with two key risks: longevity risk (i.e., risk of pensioners living longer than assumed annuity mortality tables); and investment risk (i.e., risk of investment returns lower than guaranteed return). Insurers and reinsurers can play an important role in risk mitigation in the pension system, through utilizing their long-established expertise in pricing, transferring, and managing longevity risk and investment risk.

Pension risk transfer transactions are commonly used by pension providers in the U.S. and the UK to help mitigate or write off their risks. Typical transactions include buy-in, buy-out, or through derivatives in the capital market (such as longevity swaps and interest swaps). Insurers and reinsurers in the two markets have been active participants and/or third-party consultants in these transactions.

Allowing for these risk transfer transactions not only helps risk mitigation for pension product providers but also helps develop an efficient market for estimating longevity risk, which is not well understood or estimated for the Chinese population. Insurers and reinsurers have expertise in mortality modeling and quality mortality data, which equip them with building blocks to play a role in risk mitigation, as direct participants (buyer or seller) or third-party service providers.

Section 5: Concluding Remarks

Given China's rapid demographic changes, its pension system is facing imminent challenges. While the first pillar grapples with financial burdens and the second with coverage issues, the third pillar emerges as a potential means to strengthen the financial stability of China's pension system. Actuaries are central to this transformation, leveraging their expertise to boost insurance companies' involvement and ensure the pension system's long-term viability.

Our exploration of the current commercial pension landscape, complemented by comparisons with voluntary pension plans from countries like Japan, Germany, and the U.S., highlights the opportunities to strengthen China's third pillar. The pronounced demand-supply gaps, especially among women, younger individuals, and rural residents, amplify the need. We propose the creation of a cohesive retirement ecosystem and emphasize the importance of fostering stronger ties between the banking and insurance sectors, especially to benefit marginalized rural areas. The transformative potential of the third pillar is clear, and with informed strategies, China can ensure a resilient pension framework for future generations.

Section 6: Acknowledgments

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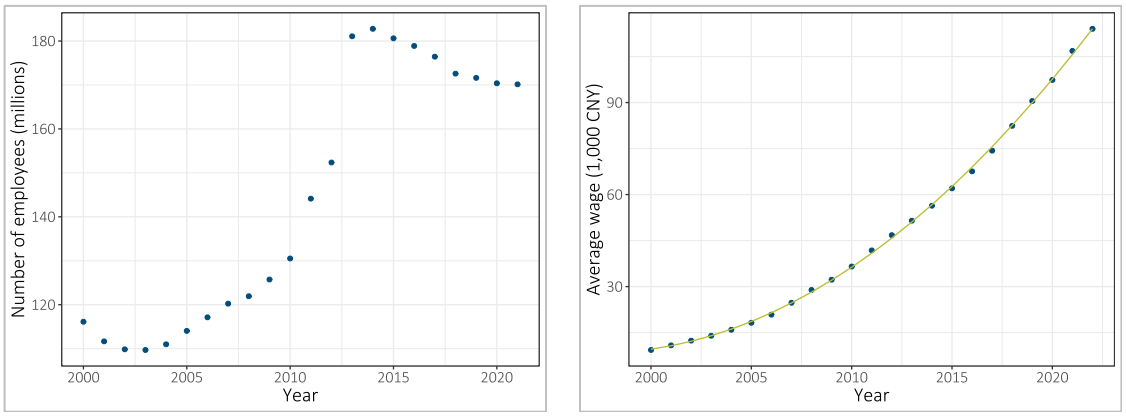
Appendix A: Forecasting the Wage Growth of Urban Residents

The average wage of employed personnel across all urban units is defined as a weighted average of the wages in both the public and private sectors. Accordingly, we forecast the wages in each sector and the corresponding number of employees.

The left panel of Figure 9 illustrates the number of employees in the public sector. After peaking in 2014, it gradually declined and stabilized at around 170 million. Hence, we assume the employee size in the public sector will remain at 170 million. In the right panel of Figure 9, we display the actual and fitted average wage in the public sector. We fit a second-degree polynomial to the data and use the fitted model to project the average wage in the public sector.

Figure 9

PUBLIC SECTOR IN CHINA.

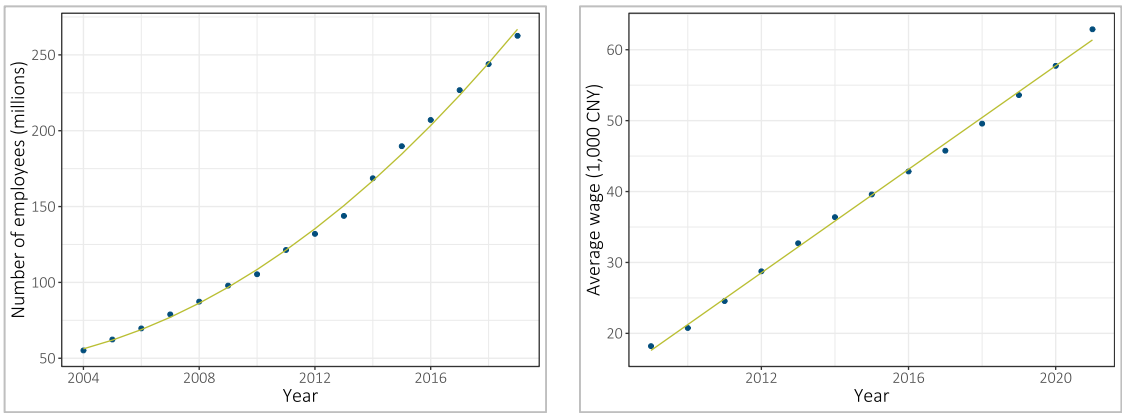


(Left Panel) number of employees; (Right Panel) actual and fitted average wage.

For the private sector, we fit a second-degree polynomial to the number of employees and a linear model to the average wage. As shown in Figure 10, both models accurately represent the data. These fitted models are utilized to forecast the size and average wage in the private sector.

Figure 10

PRIVATE SECTOR IN CHINA.



(Left Panel) actual and fitted number of employees; (Right Panel) actual and fitted average wage.

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