

Working Paper Series on

CHINA

PENSION LIABILITIES AND REFORM OPTIONS FOR OLD AGE INSURANCE

Paper No. 2005-1

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WASHINGTON DC, USA**

May 2005

CURRENCY EQUIVALENTS

(Exchange Rate Effective May 1, 2005)

Currency Unit	=	China Yuan Renminbi (CNY)
1 CNY	=	US\$0.120824
US\$1	=	8.27650 CNY

FISCAL YEAR

January 1 to December 31

ABBREVIATIONS AND ACRONYMS

GDP	Gross Domestic Product
ILO	International Labor Organization
IPD	Implicit Pension Debt
MOF	Ministry of Finance
MOLSS	Ministry of Labor and Social Security
OECD	Organisation for Economic Co-operation and Development"
PAYG	Pay-as-you-go
PROST	Pension Reform Options Simulation Toolkit
SCORES	State Council Office for Restructuring Economic System
WTO	World Trade Organization

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Acknowledgements

This report has been prepared at the request of the Government of the People's Republic of China, in support of ongoing efforts to help build human capacity to improve the country's old age insurance system. The goals of this collaborative undertaking are to acquire the requisite actuarial knowledge for designing the system, to better understand its projected financial status, and to develop a scientific approach for quantifying the long term liabilities of such a system. It is hoped that through successful knowledge transfer, participants will become better equipped to analyze policy proposals and make logical reform recommendations, as well as be able to apply their newly acquired skills to their daily work in operational terms.

Background work to support this report was initiated in June 2001 when the World Bank entered into a three-year collaborative agreement with the Social Security Department of the Ministry of Finance (MOF), under the leadership of the Director General, Ms. Lu Heping and her staff, Mr. Yu Gongbin and Ms. Liu Fei. Representatives from various local finance bureaus were identified by MOF to participate in the Pension Reform Options Simulation Toolkit (PROST) workshop. Since the inception of the MOF/World Bank collaboration, 106 participants from 31 provinces have participated in the PROST training program.

The training program started with a review course on economics and actuarial concepts, which was followed immediately by an introductory workshop on how to navigate PROST. To overcome difficulties in obtaining age-wise and gender-wise data after the introductory workshop, some of the participants collaborated extensively with their local social insurance bureau counterparts. Thanks to the strenuous efforts of everyone involved in this exercise, nine locations were able to assemble most of the required data – Chongqing, Fujian, Guangzhou, Huaibei, Liaoning, Tianjin, Wuhu, Zhejiang and Ziyang. An advanced PROST workshop was subsequently held to provide participants who had successfully collected the required data with more hands-on experience on how to use PROST for generating projections and analyzing policy options. For the final phase of the program, participants from eight provinces and municipalities (Chongqing, Fujian, Liaoning, Tianjin, Weihai, Wuhu, Zhejiang and Ziyang) who had successfully generated projection outputs received further training to put together actuarial reports according to the International Actuarial Association Guidelines.

Based on the projection results submitted from six of the eight locations, an initial draft report was prepared in August 2003. This draft report was discussed at a seminar hosted by MOF in May 2004. Participants included representatives from MOF, local finance bureaus, Ministry of Labor and Social Security (MOLSS), Social Security Institute as well as academic institutions. To the extent possible, the substantial comments and valuable contributions from this high level seminar have been taken into consideration in the preparation of the final consolidated report.

Many individuals contributed to the process of consolidating this work, and we would like to thank them collectively for their diligence and dedication, without which this report could not have been produced. We would also like to acknowledge the technical expertise provided by government staff and professionals from the six provinces and municipalities, as well as the analytical work performed by World Bank staff. We owe special gratitude to the efforts of staff at the Finance and Labor Bureaus for the completion of the report, in particular Duan Yongpan, Lin Zhonglin, Lan Guangwei, Liu Zhen, Wang Xuemei, Wei Wu and Zhao Yaling, with additional assistance provided by Wang Xuemei from the Ziyang Finance Bureau who prepared many of the interim PROST calculations.

It is our hope that the publication of this report will shed more light on critical issues associated with China's old age insurance program, such as the magnitude of the pension debt, the sources of such a burden and implications for the future. We are optimistic that what began as a consolidation of the results of a three-year learning program for finance bureau staff can help to bring the important topic of old age security to the forefront of the reform agenda in China.

China

Pension Liabilities and Reform Options for Old Age Insurance

Executive Summary

Background

China has been spending an increasing proportion of its resources to support its old age insurance system in recent years. Subsidies from central and local budgets amounted to RMB31.84 billion in the year 2000, RMB35.3 billion in 2001, and RMB55.3 billion in 2002¹. Further increases are expected to continue in the foreseeable future unless some reform actions are undertaken. Despite the adoption of a multipillar design for its old age insurance system², there are ongoing debates on the appropriateness and affordability of such an approach. The recent Liaoning pilot, accompanied by attempts to “fully fund” the Individual Accounts with various sources of fiscal transfers, was widely promoted as a blueprint for improving benefit provisions and restoring fiscal sustainability. Yet, no long term actuarial cost analysis has been conducted to validate this claim. Recognizing that the situation is untenable, the Ministry of Finance (MOF) has been keen to examine more closely the financial status of the country’s old age insurance system and analyze its long term outlook.

This report is the culmination of a three-year long collaboration between the Social Security Department of the Ministry of Finance and the World Bank. The analytical work was done on projections that used the Bank’s Pension Reform Option Simulation Toolkit (PROST) and aims to: (i) quantify the long term pension liabilities nationwide; (ii) highlight the systemic problems that will need to be addressed; and (iii) suggest reform options to find a solution that is adequate, affordable, sustainable and robust³. The projections were based on data assembled from seven locations, representing approximately 18% of the covered membership. The collected information revealed a great deal of regional variation, both in terms of membership characteristics as well as general parameters on contributions, benefits, fund accruals and service recognition, which may or may not be representative of the country as a whole. It is generally acknowledged that projections of this kind are highly dependent on the assumptions used, so the results in this report should be viewed more as diagnostic indicators for the stock of outstanding pension liabilities rather than actual valuations.

Overview of Projection Scenarios

The study used three benchmarks to measure the fiscal sustainability of the pension system – the implicit pension debt (IPD), the financing gap, and the required contribution rate.

¹ The projection exercise presented in this report does not include any outstanding liabilities from pension systems that cover rural workers, civil servants and workers from state organizations and institutions.

² The multipillar design aims to transform China’s old age insurance system from a traditional pay-as-you-go defined benefit scheme to a partially funded program where an individual’s old age pension will consist of a public PAYG pension, a funded (partially or fully) individual account pension, and an employer-based voluntary pension.

³ Holzmann, Hinz, et al (2005).

Over and above the baseline scenario, 12 scenarios were constructed to demonstrate the effects of different projection assumptions and parametric reform measures. The Baseline and Scenarios 1-4 examine the fiscal conditions associated with different projection assumptions under the provisions of State Council Document #26. Scenarios 5-12 present the implications of various assumptions and parametric reform measures based on the provisions of Document #42 (the Liaoning pilot).

Summary of Projection Results – Baseline and Scenarios 1 to 12

Sustainability Benchmarks	Scenarios												
	Baseline	1	2	3	4	5	6	7	8	9	10	11	12
Implicit pension debt (as % of 2001 GDP)	141	120	145	141	141	132	112	131	132	121	117	110	110
Financing gap (as % of 2001 GDP)	95	103	127	79	222	64	62	32	52	16	-69	-103	-20
Required contribution rate (as % of wage bill)	37	41	39	36	45	35	37	33	34	32	27	25	25

Description of the Scenarios

- Baseline: System in line with Document #26 with high growth assumptions
- Scenario 1: Baseline with low growth assumptions
- Scenario 2: Baseline with low mortality assumptions
- Scenario 3: Baseline with high fertility assumptions
- Scenario 4: Baseline with low collection rates
- Scenario 5: System in line with Document #42 with high growth assumptions
- Scenario 6: Scenario 5 with low growth assumptions
- Scenario 7: Scenario 5 with low return on investments
- Scenario 8: Scenario 5 without funding of the Individual Accounts
- Scenario 9: Scenario 5 with Individual Accounts amortized based on life expectancy
- Scenario 10: Scenario 9 with delaying and unifying retirement age at 65
- Scenario 11: Scenario 10 with 100% price indexation from 2026
- Scenario 12: Scenario 11 with gradual reduction in the contribution rate

In addition, two further scenarios were constructed to highlight the implications of coverage expansion. Scenario 13 expands coverage on a much wider scale based on the provisions of Scenario 12 (essentially representing *modified* Liaoning provisions). Finally, Scenario 14 experiments with the “Think-piece” put forward by Gao – a staff member of the former State Council Office for Restructuring Economic System (SCORES), which proposes changing the multipillar system to a partially funded defined benefit system with expansion of coverage to nearly the entire urban workforce.

Key Findings

Under the existing old age insurance system, both the social pooling and the Individual Accounts are financially unsustainable. The main problems and the associated fiscal burden of the current system under the Baseline scenario (based on Document #26) can be summarized as follows:

- (i) aging demographics – with the system dependency ratio increasing from the current 34% to over 50% in about seven years and increasing further to 100% over a 30 year time span;
- (ii) highly decentralized and fragmented system – allows all sorts of discretionary policies making it difficult to effectively practice risk pooling/resource sharing and creating perverse incentives of non-compliance and false reporting to maximize provincial and central financial subsidies;
- (iii) faulty amortization factor – the amortization factor of 120 overestimates the monthly pension amount under the Individual Accounts by underestimating the average expected remaining life years after retirement thus leaving the additional costs to be financed by the government and future generations of workers; and
- (iv) increasing prevalence of early retirement – the numbers of early retirements have been increasing exponentially over the past few years acting as a “double edged sword” that reduces contribution revenues and increases pension expenditures.

Results of the sensitivity analyses (Scenarios 1 to 4) underscore the uncertainties associated with these types of projections. Key observations include the following: (i) lower than expected economic growth will increase the financing gap and hence the level of future contribution requirements; (ii) decrease in mortality rates will increase the cost of financing the old age insurance system, but its impact will depend on the pace and magnitude of the change; (iii) increase in fertility rates will ease the system’s aging demographics, but its effect will probably be gradual and marginal; and (iv) future levels of evasion, defaults and non-recovery of arrear payments will have the most direct and significant impact on the financial health of the system.

The Liaoning pilot (Scenarios 5) did not address many of the flaws identified within the existing system. Therefore, apart from the high transition cost required to “fully fund” the Individual Accounts, the system as a whole will have to rely permanently on financial support through transfers from the various levels of government. Although it is intended that the Individual Accounts should have full funding, because of the inherent deficiency and systemic leakage created, the actuarial imbalance in the annuity factor used to amortize the balance of the Individual Accounts would render this goal unattainable.

Furthermore, Document #42 stipulates that contributions under the Individual Accounts can be invested only in government debt instruments or term deposits with financial institutions, even though these instruments generally yield relatively low returns and in most cases do not outperform wage growth. These implications can be particularly devastating for retirees who are not eligible for the transition pension⁴, and for whom the portion of retirement income derived

⁴ Only individuals who participated in both the old and new systems are eligible for the transition pension designed to compensate for the service period prior to the Document #26 era when there were no Individual Accounts.

from Individual Accounts becomes all the more important. Given that China will likely continue to experience aggressive wage growth in the next decade or so, the eventual replacement rates generated by the Individual Accounts will tend to remain low in comparison, unless the funds in these accounts can be managed in ways that would increase the likelihood of targeted investment returns exceeding wage growth.

However, even though higher returns on investments have the potential to yield larger pensions under the Individual Accounts, this alone will not necessarily lead to greater income security. The possibility of attaining higher returns commensurate with risk exposure can only be realized within the framework of a dynamic market where efficient portfolio management can be practiced. This will require concurrent reforms in the capital market, financial institutions and the pension industry. In fact, analysis of the projections further indicated that while “full funding” under the Individual Accounts should have a positive effect on old age income security if higher returns can be realized, this will still not improve the financial sustainability of the system as a whole without implementing some of the reform options presented in this report.

Reform Options

Parametric Reforms

To improve the financial sustainability of the system, it is recommended that three parametric reforms be introduced in the short run. First, the Individual Account accumulations should be disbursed and amortized in line with life expectancy at retirement. The adjusted amortization calculation will eliminate the financial drain caused by the gap between the assumed duration of payment (approximately 11 years based on current interest rate) and the average years of survival after retirement (20 years for men and 27 years for women). Second, all special early retirement privileges should be eliminated, while retirement ages for both men and women should gradually increase and eventually unify at age 65. These measures will generate a “win-win” solution in terms of both revenue generation and benefit payouts. Workers will now have to contribute longer and will start receiving pension payments later over a shorter period of time. Third, the uncertainty of preserving the real value of pensions should be gradually removed by implementing automatic price indexation of pension benefits. Given the fact that China has been transforming from a centrally planned economy to one that is more market-based, sufficient time should be factored in to allow workers to earn market wages over the length of a full career.

The first two parametric reform measures described are critical for restoring the financial health of the system. If successfully implemented, the implicit pension debt will be reduced from 141% of GDP (Baseline) to 117% of GDP (Scenario 10) in 2001. Furthermore, if, as proposed in the third reform option, policy makers are prepared to make the commitment of automatically indexing pensions to 100% of price changes some years later (by the year 2026), sufficient savings can even be generated to reduce the overall contribution rate of the system, from 37% under the Baseline to 25% of contributory wage (Scenario 11). This in turn will restore workers’ confidence in the system and lower the cost of labor without compromising China’s competitiveness as a member of the World Trade Organization.

Coverage Expansion

The combined effect of urbanization and open market economy is such that the future urban workforce will likely be significantly larger than the present one. Scenarios 13 and 14 highlight issues associated with expanding pension coverage to a much larger urban workforce. Under these two scenarios, the implications of expanding two sustainable yet very different systems to

the entire urban workforce are examined. Scenario 13 is essentially the sustainable *modified* Liaoning pilot with a long term contribution rate of 25%. Scenario 14, on the other hand, is based on the radical suggestions put forward by Gao. With design features generally based on actuarially sound funding principles, it is estimated that the Gao proposal can be supported by an annual contribution rate of 12% of wages.

Policy makers will need to focus on restoring fiscal sustainability to the system prior to embarking on large scale systemic coverage expansion, above and beyond the “normal” expansion in coverage that is expected to occur as a result of continuing urbanization. Although targeted coverage expansion may help alleviate the short term cash flow problem, expanding a fiscally unsustainable system simply transfers the costs onto future generations who will then have to shoulder the increased pension debt. In fact, later deficits will be even larger, making it all the more difficult for reforms to be implemented in the future. Many of the OECD countries are now struggling with the consequences of mistakes made decades ago along these lines. In addition, it will be important for policy makers to be aware that, even if the expanded system were to become fiscally sustainable, different types of issues related to a fiscally sustainable and expanded system would still need to be addressed, such as whether the system should be funded, and if so, what would be considered a prudent funded ratio of assets to liabilities.

Future Developments

To operate an expanded system effectively, it will be necessary to have some level of pre-funding as well as an accumulation of an adequate contingency reserve to absorb economic, demographic and political shocks in the short and medium terms. It is also useful to remember that regardless of whether the funds are centrally managed or outsourced to private managers, a major challenge for managing any sizable reserve will be the ability to establish sound pension fund governance, with proper checks and balances against political and other influences.

Over the last three years, finance bureau personnel have been equipped with the necessary tools for estimating budget requirements and projecting pension liabilities. The intricate linkages of pension policies and costs are now well understood. As well, it is generally recognized and accepted that policy analysis using long term projections is both useful and valuable. Ongoing efforts to conduct studies of this type on a periodic basis, preferably once every two years, will allow the MOF to make informed decisions with regard to planning and resource allocation, and at the same time keep the country’s old age insurance system robust and viable.

I. Introduction

The Ministry of Finance (MOF) requested the World Bank's assistance to consolidate the experience of the Bank's collaboration with the Social Security Department of MOF, and to prepare a national projection of the outstanding stock of pension liabilities, using extrapolations from the projection work completed by the seven provinces and municipalities⁵. Given the highly decentralized administrative environment in China, it will invariably be a challenging task to engage in a projection exercise that relies on sample regional data for generating national level estimates and conducting aggregate analyses on the financial status of the old age insurance system of the country as a whole. It is inevitable that the results will be affected by factors such as diversity in pension provisions (contribution rates and benefit provisions), different levels of financial pooling, and most importantly, regional differences in economic and demographic development.

Not surprisingly, the information gathered from the seven locations, which accounted for approximately 18% of the covered membership, revealed a great deal of regional heterogeneity. On the other hand, with the exception of Chongqing and Ziyang (a small municipality in the province of Sichuan), what is clearly missing is the representation of the Western Region, a much poorer and economically less developed region than the rest of the country. As such, the aggregated data from the seven locations may or may not be considered representative of the country situation. In addition, with such regional variability in demographics, level of economic development and accumulated reserves, factors such as the lack of pooling of reserves and cash flow surpluses beyond the municipal level may greatly influence the true financial picture of the pension system. This report should therefore be viewed more in terms of providing diagnostic indicators for the stock of outstanding pension liabilities rather than actual valuations.

The results and conclusions presented are based on data collected by participants of the PROST workshop from the aforementioned seven provinces and municipalities. Data pertaining to the national accounts on pension incomes and expenditures was provided by the MOF. Additional historical information was obtained from statistical yearbooks and from the MOLSS website.

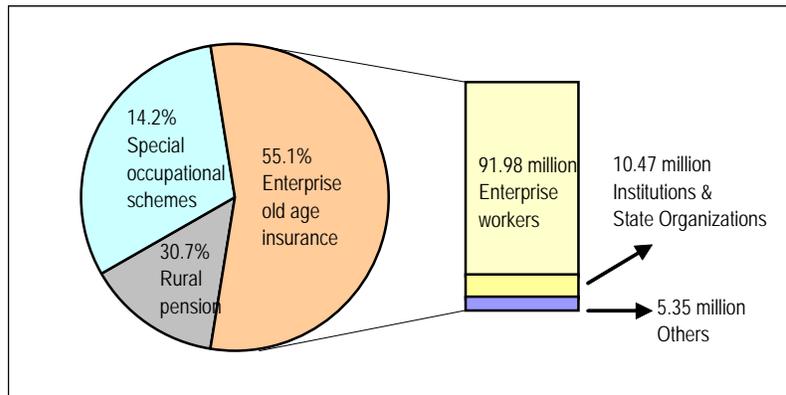
There are seven sections in total. Section I gives the background of the study. Section II describes the key provisions under the current old age insurance system. Section III reviews the membership information used for this projection exercise. Section IV establishes the projection parameters – data sources, macroeconomic trends and other projection assumptions. Section V summarizes the projection results with a synopsis of key findings and the outcomes of sensitivity analyses. Section VI analyzes and discusses the financial implications of alternative reform measures. Section VII presents major conclusions based on the analysis.

⁵ Valid data from seven locations was shared with the World Bank – Chongqing, Fujian, Liaoning, Tianjin, Wuhu, Zhejiang and Ziyang.

II. Key Provisions of the Old Age Insurance System

Broadly speaking, there are three types of government sponsored pension systems currently operating in China – a mandatory old age insurance system for enterprise workers⁶, special occupational schemes for civil servants and employees of state organizations and institutions⁷, and a voluntary pension insurance system for rural workers⁸. An estimated 196 million⁹ workers between the ages of 15 to 59 have access to some form of pension coverage in China¹⁰. Figure 1 shows the distribution of coverage under the three major systems. The purpose of this report is to project the liabilities and financial requirements of the mandatory old age insurance system (hereafter referred to as the Old Age Insurance System) for the 91.98 million enterprise workers indicated in the sidebar of **Figure 1**.

Figure 1: Coverage under Government Sponsored Pension Systems



Source: 2002 China Labor Statistical Yearbook and World Bank staff estimates

Old Age Insurance for Enterprise Workers

Since 1986, China has experimented with different ways of transferring responsibility for the provision of pension benefits from the company (generally a state-owned enterprise) to the municipality. In 1997, State Council Document #26 mandated a new policy framework which transformed the traditional pay-as-you-go defined benefit scheme to a two-tiered pension system. The new urban system combines social pooling or Basic Pension (the first tier) with Individual Accounts (the second tier) where costs are shared by enterprises and employees. Provisions under Document #26 proved to be somewhat difficult to implement because in the past enterprises maintained responsibility for most pension accounting and delivery of benefits,

⁶ Starting in 1999, workers employed by some state organizations and institutions as well as urban units began to participate in the Old Age Insurance System.

⁷ Civil servants and employees in state organizations and institutions are covered under separate, non-contributory pension insurance systems (although in a number of municipalities/provinces, these workers have started to participate in the Enterprise Old Age Insurance program). Typically, pension benefit at retirement amounts to 88-90% of final salary (assuming full career of 35 years or more). Expenditures under these systems are unfunded and are paid by the state or working units through budget allocations.

⁸ A voluntary pension insurance scheme for rural workers is administered by the Ministry of Labor and Social Security. Individual accounts are established for all participating workers, with reserves totaling approximately RMB19.9 billion in 2002.

⁹ Based on Bank Staff estimates from interviews with government officials from various ministries.

¹⁰ Proportion with some form of old age income protection accounts for 23.5% of China's working age population (ages 15 to 59).

whereas the migration to more centralized record keeping with disbursements at the municipal level is a relatively recent phenomenon. Even though the eleven industries and five sector funds have been successfully transferred to local management with some level of pooling achieved in certain municipalities, provincial pooling has not, as a rule, been implemented nationwide. (**Box 1** provides some background description on the emergence of industry funds and the evolution from industry pooling to provincial management.)

The system operates on a pay-as-you-go basis for the most part. The Basic Pension portion is financed purely on a pay-as-you basis out of the social pooling account. The Individual Accounts are essentially “empty accounts” for now, since most of the cash flow surplus has been diverted to supplement the cash flow deficits of the social pooling account. Document #26 sets out general parameters for contributions, benefits, fund accruals and service recognition (for those who have contributed under both old and new systems), with some latitude for regional variations. Discretionary parameters may include variables such as the contribution rate, the transition pension formula, or the year in which the individual account system commenced.

Document #26

The following is a summary of provisions under the status quo as per Document #26:

Coverage. Coverage under the old-age insurance program is applicable to all kinds of enterprises and their employees as well as individual workers in urban areas. Although current contributors are primarily from state-owned enterprises, a number of municipalities/provinces have successfully extended coverage to include workers in foreign enterprises, private firms, personal businesses as well as casual workers employed by urban enterprises.

Contribution Rates. Total contributions by enterprises are not supposed to exceed 20% of the contributory wage bill. Total contributions to Individual Accounts are set at 11% of wages. From a rate of at least 4% of wages in 1997, individual employee contributions are set to increase by 1% every two years thereafter, until the contribution rate reaches 8%. While the employee contribution rate will increase to 8% of wages, the enterprise contribution rate will decrease to 3%.

Contributory Wage. Employee contributions are subject to a minimum of 60% and a maximum of 300% of the local average economy wage. Those who earn less than 60% of the average economy wage will have to contribute on the basis of an earnings level equal to 60% of the local average economy wage.

Retirement Benefits. Retirement benefits are determined based on each worker’s status as of December 31, 1996. Workers who were already retired and were receiving pension payments in 1996 are referred to as *old men*. They will continue to receive their pension entitlements in accordance with the old defined benefit formula. Workers who started contributing after 1996 are referred to as *new men*. Their pension benefits will consist of two parts: (i) a monthly Basic Pension equal to 20% of the last year’s local average economy wage; (ii) a monthly pension payable from the Individual Account derived by dividing the accumulated account balance at retirement by 120¹¹. Workers who were not yet retired in 1996 but were already contributing to the old age insurance system in 1996 are referred to as *middle men*. Their pension benefits will

¹¹ Contributions to Individual Accounts are credited with interest annually based on nominal interest rates on one-year term deposits declared by financial institutions. In some locations, special bonus rates may be declared from time to time.

be determined on the same basis as the *new men*, and additionally, they will be entitled to a transition pension based on the formula:

$$(P * A * Q * M) + K, \text{ where}$$

P = the accrual factor (typically ranging from 1% to 1.4%)

A = average economy wage for the year prior to retirement

Q = an index of average contributory wage and is calculated as:

$(X_1/A_1 + X_2/A_2 + X_3/A_3 + \dots + X_n/A_n) / n$; where $X_1, X_2, X_3, \dots, X_n$ represent the individual's contributory wage levels for the years 1996, 1997, 1998 through to the year before retirement; and $A_1, A_2, A_3, \dots, A_n$ represent the average economy wage for the same years; and n is the length of contributory service, i.e., the years between the time Individual Accounts were first established (assumed to be 1996) through to the year before retirement.

M = length of service before the establishment of the Individual Account. For the purpose of this projection, 1996 is assumed to be the year when Individual Accounts were established.

K = fixed amount of supplement (this amount varies by province/municipality and could range from RMB0 to RMB120 per month). For the purpose of this projection, a monthly amount of RMB75 was used.

In many provinces/municipalities, it is common practice to provide the *middle men* who retired after 1996 with pension benefits that are the higher of the two – a pension determined using the calculation described above or a pension based on the old defined benefit formula.

Pensionable Wage. The reference wage used in determining the Basic Pension is defined as the local economy's average wage, including the wages of the *xia gang* workers in the year prior to retirement.

Normal Retirement Age. Age 60 for men and age 50 for women in general, but age 55 for women who are in managerial positions.

Termination Benefits. Workers with less than 15 years of contributory service will not be entitled to receive any Basic Pension. Accumulations under the Individual Accounts will be refunded as a single lump sum.

Indexation of Benefits. Although Document #26 did not indicate a specific level of post-retirement indexation, other State Council Documents made reference to indexation based on some percentage of increase in nominal wage. Historically, the level of indexation had been somewhere between 40% and 60% of the increase in regional average wage during the prior year¹². However, Document #26 did not specify whether the pension amounts derived from the Individual Accounts would be subject to the same level of post-retirement indexation.

¹² State Council Documents #33 (1991) and #6 (1995) both referred to indexation based on increases in average local wage levels. In addition, documents issued jointly by the Ministry of Labor and Social Security and the Ministry of Finance announced the actual level of indexation each year.

Liaoning Pilot

On December 25, 2000, Document #42 was passed as a pilot study to improve the effectiveness of the policy framework for old age income security. Key changes in provisions under the Liaoning pilot include:

- Contributions to the Individual Account are to be borne solely by employees and the rate is set to be 8% of contributory wage.
- Total contributions by enterprises are not supposed to exceed 20% of the contributory wage bill¹³. For workers employed under the self-employed category¹⁴, their employers are required to contribute only 10% of the contributory wage bill (roughly half of those required of the enterprises). Contributions from enterprises will no longer be allocated to the Individual Accounts. Contributions to Individual Accounts are to be borne solely by employees at the rate of 8% of contributory wages.
- All funds pertaining to the social pooling or Basic Pension account are to be managed separately from those of the Individual Accounts, and no subsidies for social pooling may be drawn from the Individual Accounts.
- Those with contributory service of 15 years or more will be entitled to a replacement rate of 20% of last year's local average economy wage. Additional years of contributory service will be credited at the rate of 0.6% per year.
- Individual Accounts will be disbursed monthly based on the accumulated balance divided by a factor of 120.
- For those with less than 15 years of contributory service, no Basic Pension will be paid. There will be lump sum refunds on the accumulated balance for these workers.
- Upon exhaustion of the individual's accumulated balance, any further pension entitlements under the person's Individual Accounts will become the responsibility of the social pooling funds.
- Indexation for the Basic Pension will be proposed jointly by the Ministry of Labor and Social Security and the Ministry of Finance based on the local level of cost of living and nominal wage growth of employed workers, to be approved by the State Council.

¹³ For municipalities that are contributing in excess of 20%, the objective is to gradually migrate towards the 20% target, but no immediate reduction to the contribution rate is mandated.

¹⁴ Definition of self-employed varies by location; generally refers to establishments that employ less than 5, 7 or 10 employees.

Box 1: From Industry Pooling to Provincial Management

Industry Pooling was originally introduced by the State Council in the early nineties for 11 industries that were centrally managed or national in nature. Three developments contributed to this decision:

- (a) After economic reform began in China in 1986, reforms of enterprises and their old age insurance schemes took place concurrently, with the latter starting as local pilots, gradually spreading from counties to municipalities and finally to the provinces. From the very beginning, it was not a unified system – key principles were stipulated by the central government, while policies and administrative issues were at the discretion of local governments. To date, only Beijing, Tianjin, Shanghai and Fujian actually practice provincial pooling; most of the remaining 27 provinces have pooling only at the municipal or even county level. This resulted in an old age insurance system that was highly fragmented, with different contribution rates and benefit levels within a province, thus making risk pooling and resource sharing difficult.
- (b) These 11 industries operate in different parts of the country as well as overseas, with their own policy frameworks and implementation systems. If the industries were to be dependent on local pooling, their old age insurance schemes would be subjected to different policies at the local level, resulting in fragmentation, not just in terms of contribution rates and benefit levels, but also management and assessment practices.
- (c) Contribution rates at the local level usually exceeded those of the industries, yet benefit levels were generally lower. If in fact the 11 industries were to be transferred to local pooling, not only would they have to pay higher contributions, they would also have to top up the difference between promised benefit levels and actual local benefit levels. In accordance with existing legislations, these industries pay tax to the central government, so this source of central revenue would decline if the industries were to be covered by local pooling.

By 1997, State Council realized that elevating industry pooling to *provincial management* would provide a viable solution by addressing the following issues:

- (a) International experience underscores the importance of establishing a unified national old age insurance system, but China's fragmented system would be a barrier to achieving this. If industry pooling and local pooling were to continue to coexist, it would be difficult to maximize risk diversification and to manage the system effectively. Thus, in 1997, State Council Document #26 introduced the concept of migrating local governments towards provincial pooling across the country, whereupon industry pooling can then be transferred to provincial management.
- (b) Most of the locations objected strongly to the implementation of industry pooling and requested its transfer to provincial management as soon as possible. The call for the abolition of industry pooling was often associated with grievances reported to the central government from the provinces. A typical example would be the case of Hainan province, where efforts were made to pass a law to circumvent Document #26 and to subsume industry pooling under provincial management.
- (c) With attempts to implement reforms, inherent problems of the system began to surface. The most critical issue was the revelation of arrears in payments, which led to some civil unrest. In their reports to the State Council, provincial leaders and the Ministry of Labor and Social Security attributed the cause to industry pooling, suggesting that it would eventually lead to fiscal unsustainability. This supports the submission that transferring industry pooling to provincial management can be a means to guarantee the timely payment of pensions.

III. Summary of Valuation Data

Information on contributors and pensioners was obtained through extrapolation from data used for pension projections prepared by seven provinces/municipalities¹⁵. The required data disaggregated by age and gender was highly decentralized and housed with local social insurance agencies, but since the data collection process was not officially mandated by the MOF, workshop participants had to make special efforts to obtain the necessary information from appropriate counterparts. It was quite evident that locations that had implemented provincial pooling and had advanced and consolidated database systems were able to produce more complete data sets. Ultimately, age-wise and gender-wise headcounts of contributors and pensioners were available from all seven locations. As such, the arithmetic sum of the age-wise and gender-wise structure of contributors and pensioners from these locations provided the basis for the assumption of the distribution of contributors and pensioners nationwide. Based on these sample distributions, the total numbers of contributors and pensioners were grossed up using the same proportions derived from the database on contributors and pensioners from the seven locations broken down by age and gender.¹⁶

Contributors. The total number of contributors in 2001 was reported to be 91.98 million according to the 2002 Labor and Social Security Statistical Yearbook¹⁷. Age-wise and gender-wise distributions from the seven locations were pro-rated to the reported total number of contributors (see **Figure 2**). Data from the seven locations showed that average ages varied between 35.4 and 41.5 for male contributors and between 34.0 and 39.0 for female contributors. The consolidated data set after the pro-rating yielded average ages of 39.2 for males and 37.2 for females. It should be noted that according to coverage statistics provided by each of the provinces/municipalities, the coverage rate (expressed as the number of contributors to the number in the general population aged 15 to 59)¹⁸ varied widely in these seven locations, from as low as 2.9% to a high of 21.3%.

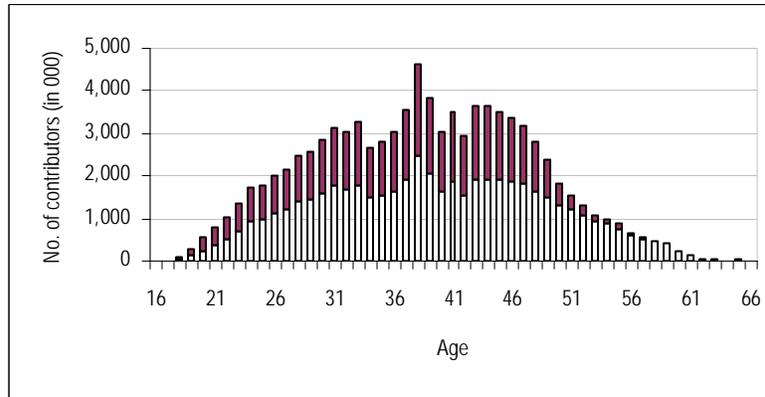
¹⁵ Age and gender distributions of contributors from seven provinces/municipalities were derived using information from social security databases. The combined number of contributors from the seven locations totaled 15.5 million -- approximately 17% of the total number of contributors nationwide in 2001.

¹⁶ Extrapolating distribution trends from the seven provinces/municipalities to the entire country has many deficiencies, but unless a more diversified and illustrative data set can be assembled, other extrapolation methods can only produce marginal gains in representation. Moreover, aggregating current balances from lower levels of financial pooling implicitly assumes that cash surpluses and deficits at the local levels could be used to offset one other, which is generally not the case in practice.

¹⁷ Total number of contributors used in the base case does not include workers from the civil service and from state organizations and institutions who are already participating in the old age insurance system.

¹⁸ Some of the municipalities indicated that no reliable information on the working age population (aged 15 to 59) could be obtained and that data was separate for urban and rural populations. To facilitate comparison, it was decided to express coverage rate as a percent of the general population aged 15 to 59.

Figure 2: Distribution of Contributors in 2001
Men (clear); Women (solid)



Source: Bank staff estimates based on extrapolated data from selected provinces/municipalities

Age-salary Distribution: According to the MOF, the average economy wage for China’s workforce (combined male and female) was reported to be RMB9,189 per year in 2001, although data from the seven locations showed wide variations – from a low of RMB5,760 to a high of RMB12,414¹⁹. The average economy wage at each location is also the reference wage used in determining the amount of Basic Pension. The MOF also reported a national average contributory wage of RMB8,053 per year for the year 2001, which represents only 87% of the average economy wage²⁰. There were large differences among the seven locations, from as low as 73.7% to as high as 95.2% of average economy wage. It is not clear why such heterogeneity existed among the various regions. The general belief is that the unverifiable contributory wage base is a major factor.

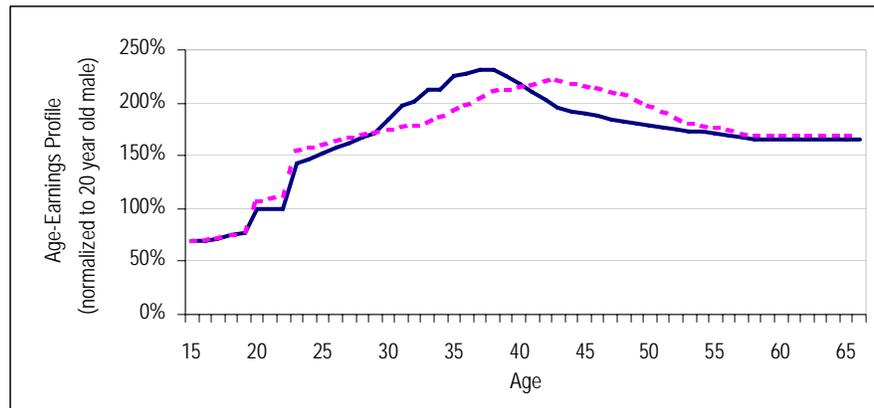
When age earnings profiles from the seven locations were examined, it was noted that even though published data on average wages of the provinces clearly showed significant disparity among regions, data from some locations exhibited a rather flat profile, with little variability between men and women or among different ages. In an effort to be consistent with the objective of this exercise to extrapolate applicable information for a national projection, it was decided that it would be more appropriate to use data from locations that showed greater age-related variability in their age earnings profile for the simulation (see Figure 3)²¹. The collected data also indicated that women between ages 20-30 seemed to have a marginally higher earnings profile than men. This was regarded as an anomaly inherent in the sample data that was not likely to be statistically significant or create sufficient distortion to have any major impact on the overall results.

¹⁹ The 2002 China Statistical Yearbook reported the average annual wage of the economy to be 10,870 RMB in 2001, excluding wages received by *xia gang* workers.

²⁰ Contributory wage is subject to a floor of 60% of average economy wage and a ceiling of 300% of average economy wage.

²¹ Earnings for male and female contributors of all ages were normalized relative to the earnings of a 20-year-old male contributor (considered as a proxy for minimum wage) and were expressed as percentages of the earnings of the 20-year-old male contributor.

Figure 3: Age-earnings Profile of Contributors
Men (solid), Women (dashed)



Source: Bank staff estimates based on extrapolated data from seven provinces/municipalities

It is worth noting that the age-earnings profile is a dynamic component that is particularly sensitive to labor market forces. As China continues to transform its labor market in line with the principles and needs of a market-based economy, it is expected that the workforce will become more highly skilled, and there will be more efficient allocation of human resources. With these structural changes alongside increased WTO access, new job opportunities and higher wages will likely emerge over time. Eventually, as coverage expands to include sectors other than the urban state-owned enterprises, it is anticipated that average wage levels will increase and the whole age-earnings profile will shift upwards.

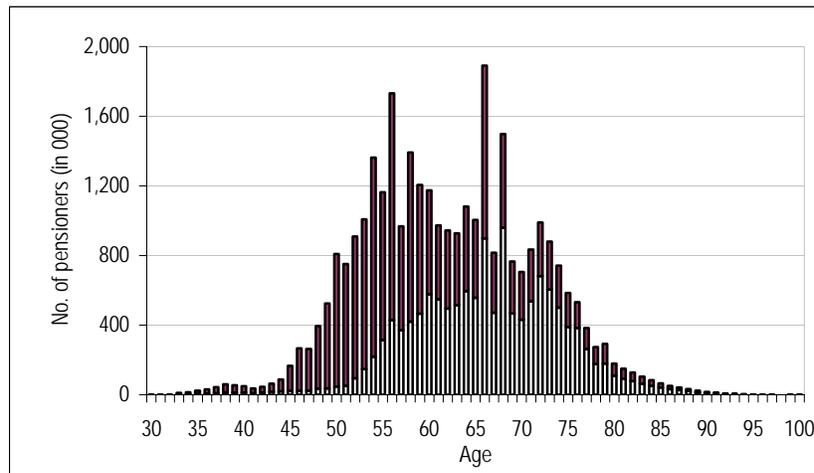
Old-age Pensioners: The number of old-age pensioners in 2001 was reported to be 31.65 million according to the 2002 Labor and Social Security Statistical Yearbook. The age-wise and gender-wise distributions of these pensioners were assumed to be similar to the aggregate distribution of the pensioners from these seven locations (see **Figure 4**)²². Information on the overall number of pensioners receiving pension payments under the Individual Accounts and their age structure was not available separately. This might have been due to the fact that the Individual Accounts were established only in 1996 and that the majority of pensioners who retired since 1996 were probably receiving payments determined by the “old” calculation method. As such, it was assumed that as of 2001, there were no pensioners drawing pensions from the Individual Accounts²³. Data from the seven locations showed that average ages for pensioners varied between 64.8 and 69.0 for males and between 58.4 and 62.5 for females. The consolidated data set after the pro-rating yielded average ages of 66.2 for males and 59.1 for females. However, it should be noted that the dependency rate²⁴ varied greatly among the seven locations, from 29.3% to 53.4%.

²² Age and gender distributions of old-age pensioners from the seven locations were extracted from the social security databases. The combined number of pensioners from the seven locations totaled 5.6 million – approximately 18% of the number of old-age pensioners nationwide in 2001.

²³ Since the base year of projection was set as 2001, and the earliest year of establishment of Individual Accounts was reported to be 1992, pensioners who retired since the date of establishment would likely have only small account balances. In addition, given the operation of parallel systems, it is conceivable that all of these pensioners would have received the higher benefits under the old system.

²⁴ The dependency rate is expressed as the number of pensioners to workers.

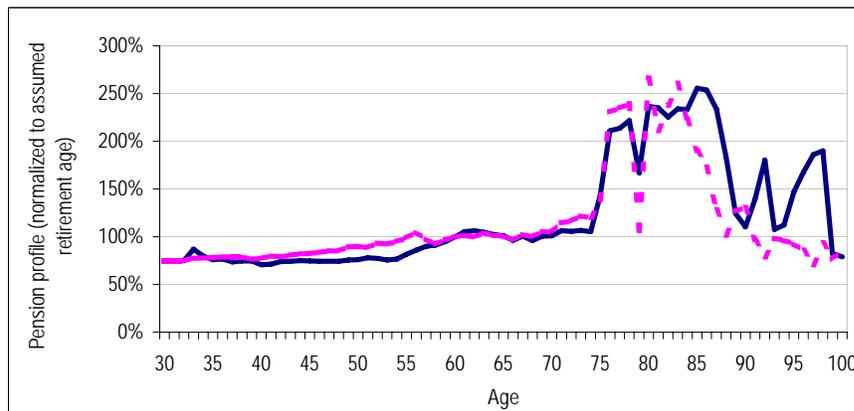
Figure 4: Age and Gender Distribution of Old-age Pensioners
Men (clear) Women (solid)



Source: Bank staff estimates based on extrapolated data from seven provinces/municipalities

Average Pension and Pension Profile: Based on the pension disbursements reported for 2001 (RMB209.14 billion) and a total number of 31.65 million pensioners²⁵, the average pension for the year 2001 was determined to be RMB6,608. Only three out of the four locations were able to compile data on the age-wise average amount of pension for men and women. **Figure 5** shows the sample distribution of average monthly pension for male and female pensioners normalized relative to the average pension payable to those at average retirement age.

Figure 5: Sample Distribution of Pension Payable by Age
Men (solid), Women (dashed)



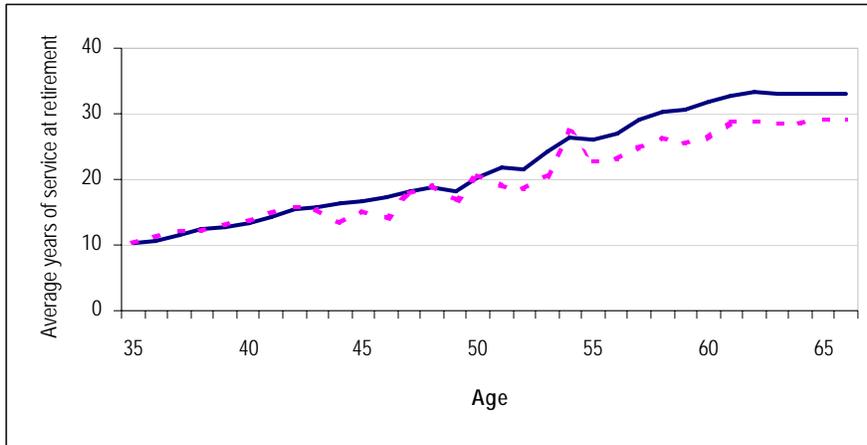
Source: Bank staff estimates based on extrapolated data from three provinces/municipalities

Retirement Pattern: The average retirement age and the length of service at retirement differed substantially among the seven provinces/municipalities. As expected, locations with more prevalent early retirement programs and/or problems with financially troubled enterprises had lower average retirement ages hence shorter lengths of service at retirement. Based on the statistics collected for these seven locations, men were found to retire on average around age 56 while women were found to retire around age 50 (hereon referred to as the assumed retirement

²⁵ Based on information reported in the statistical yearbook of the Ministry of Labor and Social Security.

age), although the statutory retirement ages are 60 for men, 55 for women in managerial or professional positions, and 50 for women in non-managerial types of services. Length of service at retirement averaged 27 years for men and 20 years for women²⁶. These averages were used as the basis for determining future retirement patterns (see Figure 6)²⁷.

Figure 6: Average Years of Service at Retirement
Men (solid), Women (dashed)



Source: Bank staff estimates based on extrapolated data from seven provinces/municipalities

²⁶ Given the prevalence of evasion, early retirement and various other leakages, it would not be reasonable to assume that individuals contributed fully from the time they entered the labor force to the time of retirement. The average length of service would reflect the interruptions in contributory years of service, whether they are due to temporary absences from the formal labor force or to evasions of contributions altogether.

²⁷ These statistics exclude those workers who started work in 1949 and who subsequently terminated employment or retired from the enterprises and are drawing full salaries in lieu of pensions.

IV. Projection Methodology and Assumptions

This section presents the overall structure of PROST, the projection methodology, a summary of the key assumptions used with the simulations as well as the financial flows of China's old age insurance system.

Pension Reform Option Simulation Toolkit (PROST)

A generic PC-based projection model developed by the Social Protection Unit of the World Bank, the Pension Reform Option Simulation Toolkit (PROST) – Version 10 was used to analyze China's old age insurance system. The PROST model was developed in VBA and can be used with the Windows 95/98/NT operating systems in conjunction with Office 97 or later platforms.

PROST has been used in some 50 countries to provide quantitative input for pension policy discussions. Outputs from PROST were satisfactorily benchmarked against a number of countries where micro actuarial models were used. As well, a copy of PROST was provided to the International Labor Organization (ILO) for testing against ILO's own projection model. Results from all such benchmarking/testing proved the PROST methodology to be sufficiently robust. At the same time, its flexibility has permitted easy adaptation to specific country circumstances for sensitivity testing and comparisons under a wide range of economic and policy scenarios. As is the case with any simulation model, the quality of the outcome from PROST depends largely on the nature and quality of the input data as well as the types of assumptions used for the simulations.

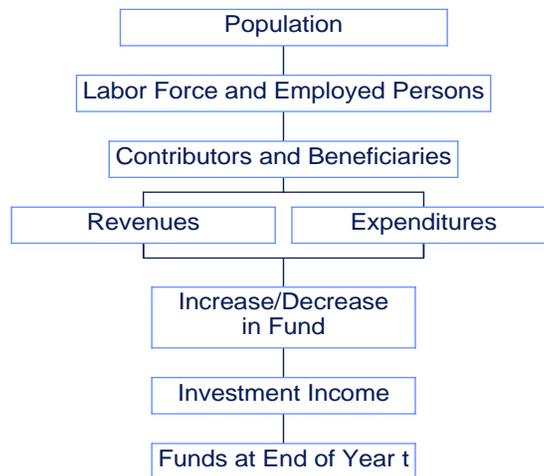
Later in this section, the key assumptions used and the data from which they were derived will be presented. It should be noted that given the nature and quality of currently available data, the output from this exercise should be viewed as a diagnostic guide rather than a quantitative analysis of the old age insurance system in China, and the results should not be quoted in absolute terms without proper reference to the underlying assumptions. Furthermore, due to the heterogeneous demographic and economic conditions in China, a macro-level projection of China's old age insurance system cannot be assumed to adequately reflect the variability in financial status of different regions and localities.

Data and assumptions used in preparing estimates for China's old age insurance system were based on information obtained from many sources. Some of the data came from material supplied by the MOF. Publications and statistical yearbooks providing economic, labor, social and demographic data were also used as references. Lessons learned from various pilot projects provided interesting examples of the diversity of possible pension policies – both in accordance with the parameters outlined in State Council Documents #26 and #42 and, as in some cases, in spite of these parameters. Discussions with government officials during training workshops conducted in collaboration with the MOF, the MOLSS, local finance bureaus and social insurance bureaus provided valuable insight into ways in which policies are actually administered and implemented in different regions.

Projection Methodology

PROST consists of an input workbook and five output modules. The input file/template is an Excel workbook with six embedded worksheets that contain a large number of defined variables. Each of the five output modules contains various Excel worksheets with graphical presentations of key results. PROST begins with a top-down approach, first projecting the population, then determining the size of the labor force and the number of employed persons. Depending on the method chosen, the number of contributors can be derived either from the general population or the labor force. Beneficiaries are determined based on the retirement pattern and the number of contributors in each age cohort. Revenues and expenditures are calculated by applying average wage levels of each age cohort against the number of contributors and pensioners in the same cohort. Financial flows can then be calculated based on the resulting revenues and expenditures.

Figure 7: Projection Methodology



The Input File

Data must be entered for the *base year* and the *end year* of the simulation horizon. Information for intervening years can be inserted if there are anticipated changes that may alter the linear relationship between the base year and the final year. The program is equipped to handle both “*stock*”-based as well as “*flow*”-based calculations. With the “*stock*” method, the current pools of contributors and beneficiaries are expressed as percentages of either the overall population or the total number of employed persons. From thereon, the numbers of new retirees and the newly disabled are derived based on the stock of contributors by age cohort, taking into consideration the assumed retirement age, length of service, and the historical retirement pattern. With the “*flow*” method, the increments/decrements of different categories are computed first. These increments/decrements are then aggregated with the beginning stock of contributors and beneficiaries.

Steps for entering data requirements under the input templates are summarized as follows:

- **General** Input information about the economy (inflation rate, real interest rate, real GDP growth, etc.) as well as parameters of the pension system (current benefit expenditures, retirement age, accumulated reserve fund, etc.).
- **Population** Input the age structure of the population in the base year along with age-specific fertility and mortality rates as well as migration information for the simulation horizon.
- **Labor** Input the labor force participation rates, unemployment rates, evasion/exemption rates and earnings profiles for the simulation horizon.
- **Pension** Input pension system information for the base year including the age structure of contributors and pensioners. Pension coverage rates and replacement rates for new beneficiaries according to the relevant formula(s) will also be required for the simulation horizon.
- **Reform** Input parameters that are relevant to the reform of the system such as switching patterns, acquired rights, replacement rates before and after the reform, and provisions under both notional accounts and a funded defined contribution system.
- **Profiles** Input profile data for specific individuals including gender, years of service, earnings and mortality profile.

The Output File

PROST generates five output modules. Each module contains a number of Excel worksheets and graphical summaries of key indicators. The output modules are arranged as follows:

- **Population Projection** Key output includes population pyramids, life tables (by age and gender), life expectancy changes and demographic indicators such as population dependency rates.
- **Demographic Structure** Projections of labor force, employment, contributors and beneficiaries, demographic structure, length of service at retirement, head counts of contributors and beneficiaries as well as calculated system dependency ratios.

Table 1: Projection of Life Expectancy Changes
(Average remaining years of life expected at specific ages)

	2001	2002	2005	2010	2020	2030	2040	2050	2075
Male									
Life Expectancy: At Birth	69.2	69.4	69.9	70.7	72.0	73.5	75.0	76.7	79.0
At Age 20	52.5	52.5	52.8	53.2	54.2	55.3	56.4	57.7	59.6
At Age 60	17.1	17.1	17.3	17.5	18.3	19.1	20.0	20.9	22.4
At Age 65	13.7	13.7	13.8	14.0	14.7	15.4	16.2	17.0	18.3
At Retirement	20.1	20.1	20.3	20.6	21.4	22.3	23.2	24.3	25.9
Female									
Life Expectancy: At Birth	72.6	72.8	73.5	74.5	76.0	77.6	79.4	81.3	84.2
At Age 20	55.1	55.2	55.6	56.3	57.6	58.9	60.4	62.1	64.7
At Age 60	18.7	18.8	19.1	19.5	20.5	21.6	22.8	24.1	26.2
At Age 65	14.9	15.0	15.3	15.6	16.5	17.5	18.6	19.8	21.7
At Retirement	27.1	27.2	27.5	28.0	29.1	30.3	31.7	33.1	35.5

Source: World Bank staff calculations based on PROST

Age-specific Fertility Rates: The age-specific distribution of fertility rates was provided by the World Bank Population Unit for the years 2000-2075. There was no consensus among demographers as to whether China's total fertility rate would continue to decline, remain at the current level of under 2.0, or increase to a minimum level of 2.1 to maintain zero population growth²⁸.

Sex Ratio at Birth: The number of males born per 100 females was assumed to remain constant at the current level of 117.03, consistent with the statistics published by the National Statistical Board. (**Box 2** provides some perspective on the likelihood of the sex ratio returning to the international norm of around 105-107 boys to 100 girls.)

Net Migration: The distribution of migration for the years 2000-2075 was provided by the World Bank Population Unit²⁹.

Projected Population 2001-2075: Based on the above adjustments, the population of China is projected as follows:

$$P_t = P_0 + B - D + I - M$$

where, P_t is the population in year t ; P_0 is the population at the beginning of the year; B is the number of births in year t ; D is the number of deaths in year t ; I is the number of immigrants in year t ; and M is the number of emigrants in year t . **Table 2** shows the projected population and the corresponding population old age dependency rate³⁰.

²⁸ Tables of the age-specific fertility assumptions used are available upon request.

²⁹ Tables of the net migration assumptions used are available upon request.

³⁰ The ratio of older persons (generally considered to be age 65 and older) to working age individuals (ages 15 to 64).

Box 2: Sex Ratio at Birth

According to the Fifth National Census in China, there were 116.86 male to 100 female births in 2000, which clearly falls outside the international norm of 95 to 105 males to 100 females at birth. More importantly, census figures from different years revealed that this ratio had been increasing over time, as shown in the table below:

Year	Sex ratio at birth
1982	108.5
1987	110.9
1990	111.3
1995	115.6
2000	116.9

Source: China Population Bureau: S/5454

In fact, the comparatively high ratio seems to be the rule in the majority of the provinces, the only exceptions being the northwestern, southwestern and a number of under developed provinces where the ratio is closer to the international norm. When sex ratios are grouped by birth order, however, more skewed patterns emerge, with the male to female ratio increasing even further from first to second to third or subsequent births (see table below):

Sex Ratio at Birth by Birth Order

Year	First births	Second births	Third or subsequent births	Total
1990	105.2	121.0	127.0	111.3
1995	106.4	141.1	154.3	115.6
2000	107.1	151.9	159.4	116.9

Source: China Population Bureau: S/5454

The above statistics clearly indicates a strong predilection for males, which increases with birth order. Furthermore, analysis of birth ratio data suggests that this “statistically unlikely” trend tends to be associated with higher status in terms of wealth and influence. For example, the Development Research Center of the State Council (DRC) reported in a health policy seminar organized by the Ministry of Health that, in a survey from the province of Hainan, the overall sex ratio at birth was reported to be 126.16. When disaggregated, the ratios were 170, 222 and 250 respectively by administrative type employees, professionals and civil servants/party ranking officials. These observations suggest an association between socioeconomic privilege and a notable bias in favor of live male births, a tendency that becomes more exaggerated as birth order increases.

The conclusion is nevertheless counter-intuitive, implying that even high economic or educational status cannot be counted on to reduce the sex ratio bias at birth, and that unless some specific measures to discourage certain behaviors were to be implemented, this bias would probably continue to be exaggerated with growing affluence. Thus, of late, it has been reported that the government is considering a gradual relaxation of the “one child policy”, allowing women age 35 and over to have up to two children beginning in 2010, to be followed by a lowering of the 35 year age limit by one year every year thereafter.

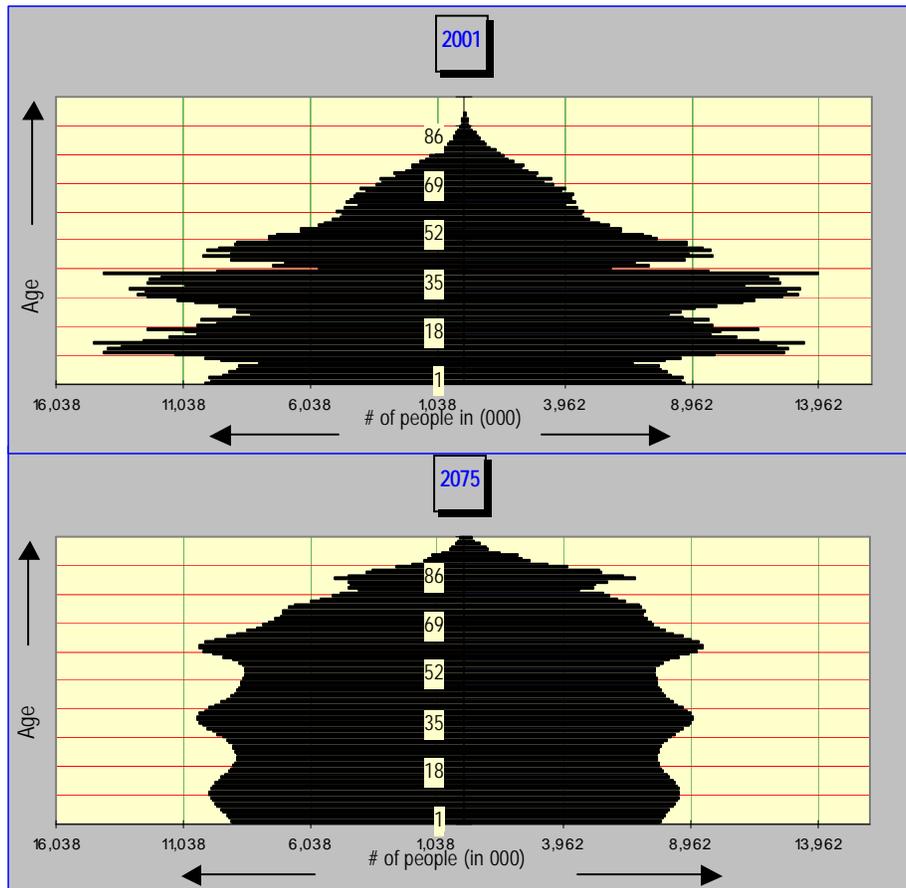
Table 2: Projected Population and Old Age Dependency Rate (2001-2075)

	2001	2002	2005	2010	2020	2030	2040	2050	2075
Total Population (in thousands)	1,289,613	1,298,078	1,322,392	1,365,987	1,449,267	1,482,915	1,512,276	1,512,006	1,486,422
Male	658,837	663,464	676,646	699,942	743,937	761,507	777,992	780,232	774,375
Female	630,776	634,614	645,747	666,044	705,329	721,408	734,284	731,774	712,047
Share	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
0 - 14	23.5%	22.6%	20.2%	20.0%	20.3%	17.7%	18.1%	18.3%	18.0%
15 - Ret. Age	59.0%	59.5%	60.4%	58.3%	52.3%	50.1%	46.7%	45.3%	44.9%
Ret. Age +	17.5%	17.9%	19.5%	21.7%	27.4%	32.2%	35.1%	36.4%	37.1%
Old Age Dependency rate	29.7	30.1	32.2	37.2	52.5	64.3	75.2	80.3	82.6

Source: World Bank staff calculations based on PROST.

The Aging Phenomenon: Results from the population projection show that China's population is expected to increase from 1,290 million in 2001 to approximately 1,486 million by 2075. At the same time, the population will be aging rapidly. This aging phenomenon is clearly demonstrated by comparing the population pyramid in 2001 with the pyramid in 2075 (see **Figure 8**).

Figure 8: China's Aging Population



Source: PROST Output File.

Workforce: Age-specific labor force participation rates and unemployment rates for the total population were calculated from information published in the 1999 Labor Statistics Yearbook. Since the projections expressed old age insurance coverage as a percentage of the total population, the assumption that there would be no systemic changes in labor force participation rates throughout the simulation period does not affect the overall dynamics of the projections.

Coverage: Over the 10 year period from 1993 to 2002, contributors from enterprises had been increasing gradually from 80 to around 90 million. However the number of pensioners increased at a much faster pace – from 18.39 million in 1993 to 33.33 million in 2002.³¹ **Table 3** presents the evolution of the enterprise contributors and pensioners from 1993 to 2002. While some of this increase could be explained by increased longevity and general aging of the population, a more problematic phenomenon was the noticeable increase in the prevalence of early retirements³².

Table 3: Evolution of Enterprise Contributors and Pensioners (1993-2002)

Year	Contributors		Pensioners	
	No. (in millions)	% change from 1993	No. (in millions)	% change from 1993
1993	80.08	-	18.39	-
1994	84.94	6.1%	20.79	13.1%
1995	87.38	9.1%	22.41	21.9%
1996	87.58	9.4%	23.58	28.2%
1997	86.71	8.3%	25.33	37.7%
1998	84.76	5.8%	27.27	48.3%
1999	86.55	8.1%	28.6	55.5%
2000	91.24	13.9%	30.11	63.7%
2001	91.98	14.9%	31.65	72.1%
2002	90.90	13.5%	33.33	81.2%

Source: 2002 China Labor Statistical Yearbook and the website www.molss.gov.cn.

At present, the coverage rate (defined as the number of enterprise contributors to working age population) under the current old age insurance system is around 12%³³. Under the baseline scenario, it was assumed that there would be no systemic coverage expansion, thereby allowing a more accurate assessment of the overall sustainability of the system free from any exogenous influence. In reality however, some municipalities/provinces have already begun to expand coverage to private, foreign-owned enterprises and the self-employed in urban areas as a means of collecting more revenue to finance the deficits. Yet, given the rapid urbanization phenomenon in China, it is anticipated that there will be a natural expansion in coverage under the old age insurance system by virtue of the growth in size of the urban population. Publications on China's population statistics projected that urban population would increase from the current level of 30% to roughly 58% by the year 2050³⁴. Another factor that is expected to ultimately affect coverage is the emerging international trend whereby civil servants and employees of State organizations

³¹ 2002 Minister of Labor and Social Security Statistic Bulletin and 2002 China Labor Statistical Yearbook.

³² According to records from the Ministry of Finance, the numbers of early retirements were 262 million in 1999, 342 million in 2000 and 475,000 in 2001.

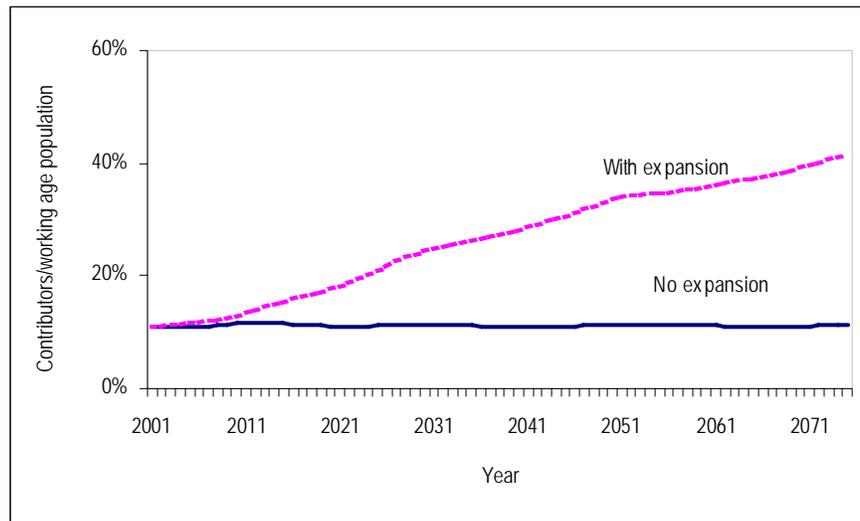
³³ Excludes some 3.9 million civil servants and employees of state organizations and institutions who currently participate in a separate pension system as well as approximately 60 million rural workers who belong to voluntary insurance schemes under the auspices of the Ministry of Labor and Social Security.

³⁴ 1998 China's Population, Statistical Bureau.

and institutions are gradually being integrated into the national old age insurance system instead of being provided with separate pension schemes.

Taking into account these emerging trends, one of the scenarios included in this projection exercise assumes that coverage in the old age insurance system will be expanded to at least 80% of the urban population, i.e., a coverage rate in excess of 40% of the total population ages 15 to 59 (see **Figure 9** for the assumed coverage rate from 2001 to 2075). Since rural workers have been participating in some form of pension insurance scheme separate from the existing old age insurance system, the implicit assumption is that these rural workers will continue to do so, perhaps on an even larger scale.

Figure 9: Assumed Coverage Rate (Contributors/Working Age Population, Ages 15-59)

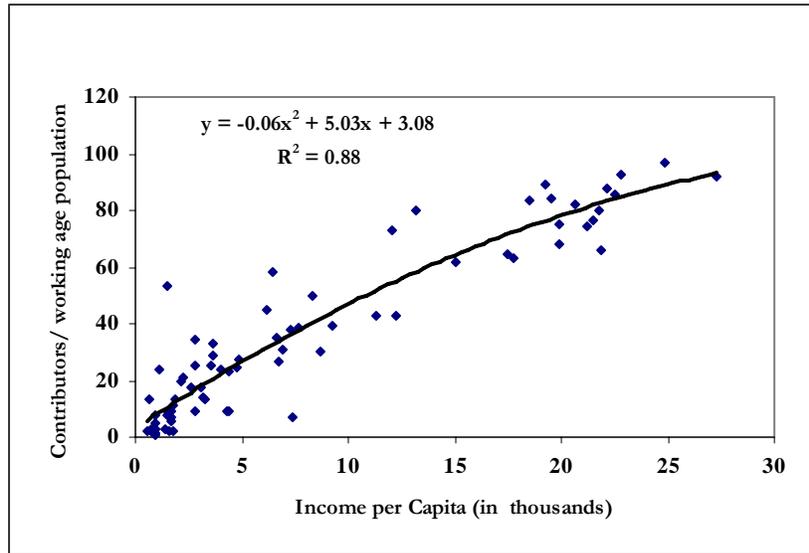


Source: World Bank staff estimates

Based on the hypothesis that pension coverage correlates highly with income per capita (in purchasing power parity terms), China's old age insurance system should reach a coverage rate closer to 90% of the working age population in 50 years when China's income per capita is projected to reach well in excess of US\$30,000³⁵. Such an increase in coverage is deemed highly probably in part due to the gradual inclusion of workers who would otherwise be covered under the special occupational schemes. The rest of the coverage expansion will stem from China's transitioning to a more urban-based economy and the successful expansion from state-owned-enterprises to collective, private, foreign-owned enterprises and the self-employed in urban areas, resulting in 80% of its urban population being covered under the old age insurance system. When the expanded urban coverage is combined with the coverage for rural workers (who are expected to continue to participate in either the existing voluntary pension insurance scheme or versions thereof), the overall level of coverage will be more or less in line with that shown in **Figure 10**.

³⁵ Palacios and Pallares-Miralles (2000), International Patterns of Pension Provision.

Figure 10: Coverage Rate and Income Per Capita



Source: Palacios and Pillares-Miralles (2000)

Retirement Pattern. Based on the collected statistics, it was assumed that men would retire on average around age 56 with 27 years of service, and women around age 50 with 20 years of service. In estimating the impact of gradually increasing and unifying retirement at age 65 (by the year 2022 for men and 2034 for women in all employment categories), further assumptions on behavioral patterns were made:

- (i) any retirement prior to the current assumed retirement age would continue to observe the retirement pattern under the base case (approximately 50% of the retirees);
- (ii) of those who had reached the assumed retirement age under the base case, 20% would elect to retire prior to the statutory retirement age effective in the year of retirement; and
- (iii) 50% of those who had reached the assumed retirement age and had elected not to retire early would now remain as contributors until they reached their statutory retirement age.

Macroeconomic Assumptions: Economic indicators used for years 2001-2002 are based on actual data. For years 2003 and after, macroeconomic assumptions used by PROST were derived based on input from staff in the macro policy unit, and taking into account historical indicators and projections from expert sources. **Table 4** summarizes the key economic assumptions under two growth scenarios – one high case and the other low case. GDP in 2001 was assumed to be RMB9,593.3 billion. Real wage growth was assumed to be at parity with the growth in GDP per capita. These economic parameters were used in conjunction with assumptions pertaining to the population and the labor force with regard to coverage anticipation and simulation of future financial conditions. Under the no coverage expansion scenario, the age-earnings distribution of contributors was assumed to observe the profile shown in **Figure 3**. However, under the coverage expansion scenario, factors such as urbanization and inclusion of private enterprises would necessarily affect the age-earnings profile. Given these dynamics, the earnings of workers from mid-career onwards were assumed to increase gradually until they are 50% higher than the assumptions used under the no expansion scenario. It is expected that the higher age-earnings profile would be reached by the year 2030 and would remain at that level throughout the projection period.

Table 4: Key Economic Assumptions (% per annum)

High Case

Macroeconomic Trends	2001	2002	2003	2004	2005	2006	2010	2020	2030	2040	2075
Real GDP Growth	7.3%	8.0%	9.1%	7.7%	7.2%	7.0%	6.5%	5.5%	5.0%	4.0%	4.0%
Real Wage Growth	15.2%	7.3%	8.4%	7.0%	6.5%	6.3%	5.8%	5.2%	4.8%	3.8%	4.1%
Inflation Rate	0.7%	-0.8%	1.5%	2.6%	3.0%	3.5%	3.0%	3.0%	3.0%	3.0%	3.0%
Real Discount Rate	1.5%	2.8%	0.5%	1.0%	2.0%	2.0%	3.0%	3.0%	3.0%	3.0%	3.0%

Low Case

Macroeconomic Trends	2001	2002	2003	2004	2005	2006	2010	2018	2026	2030	2075
Real GDP Growth	7.3%	8.0%	8.1%	6.7%	6.2%	6.0%	5.5%	4.5%	4.0%	3.0%	3.0%
Real Wage Growth	15.2%	7.3%	5.5%	5.5%	5.5%	5.4%	4.8%	4.0%	3.8%	2.8%	3.1%
Inflation Rate	0.7%	-0.8%	2.7%	2.0%	3.0%	3.5%	3.0%	3.0%	3.0%	3.0%	3.0%
Real Discount Rate	1.5%	2.8%	0.0%	1.0%	2.0%	2.0%	3.0%	3.0%	3.0%	3.0%	3.0%

Source: Bank staff estimates

Evolution of Contributors and Pensioners. Based on the coverage assumptions and the retirement patterns described above, **Table 5** illustrates the demographics of the old age insurance system and its dependency rates in selected years during the period 2001-2075 under the baseline scenario.

Table 5: System Demographics and Dependency Rates of the Old Age Insurance System Baseline (2001-2075)

	2001	2002	2005	2010	2020	2030	2040	2050	2075
Total Contributors (in thousands)	91,980	93,723	98,280	104,651	100,346	99,472	93,712	90,640	88,268
Male	53,456	54,590	57,431	61,149	61,275	60,842	59,389	56,525	55,263
Female	38,524	39,133	40,848	43,502	39,071	38,629	34,323	34,115	33,005
Old Age Pensioners (in thousands)	31,650	36,321	45,053	57,327	79,863	98,963	110,950	115,785	117,192
Male	13,634	15,166	17,836	21,604	30,521	41,326	50,371	56,471	61,982
Female	18,016	21,155	27,217	35,723	49,342	57,637	60,579	59,314	55,210
System dependency ratio	34.4	38.8	45.8	54.8	79.6	99.5	118.4	127.7	132.8

Source: World Bank staff calculations based on PROST

Table 6 illustrates the demographics of the system under the expanded coverage scenario, where pension coverage will reach at least 80% of its urban working age population by 2075.

Table 6: System Demographics and Dependency Rates of the Old Age Insurance System Coverage Expansion (2001-2075)

	2001	2002	2005	2010	2020	2030	2040	2050	2075
Total Contributors (in thousands)	91,980	94,895	103,194	115,117	150,520	198,943	222,565	249,260	307,794
Male	53,456	55,273	60,303	67,264	91,913	121,685	141,048	155,444	192,278
Female	38,524	39,622	42,891	47,852	58,606	77,259	81,517	93,816	115,516
Old Age Pensioners (in thousands)	31,650	36,410	45,739	60,291	93,151	129,208	161,523	183,462	201,285
Male	13,634	15,210	18,172	23,086	37,267	57,322	77,432	93,956	109,984
Female	18,016	21,201	27,567	37,205	55,884	71,886	84,090	89,506	91,301
System dependency ratio	34.4	38.4	44.3	52.4	61.9	64.9	72.6	73.6	65.4

Source: World Bank staff calculations based on PROST

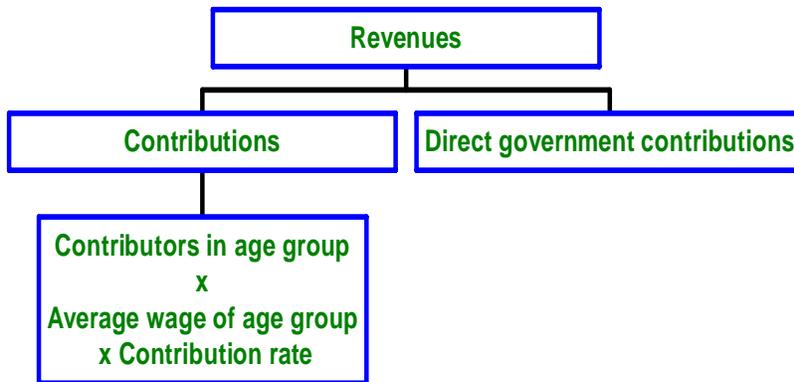
It should be noted that under both scenarios, the dependency ratios continue to increase throughout the projection period. However, when the dependency ratios in **Table 5** and **Table 6** are compared, it is obvious that as a result of coverage expansion (the combined effect of the inclusion of workers from other sectors and the urbanization process) which adds more contributors to the system, the burden of supporting the pensioners is less onerous under the **Table 6** scenario.

Pension System Financial Flows

To project the financial flows of China's old age insurance system, revenues and expenditures had to be determined first. Finances for the Basic Pension scheme (including transition pensions for the *middle men*) and the Individual Accounts were projected separately and outputs on key indicators were summed to give the final results.

Revenues: The following chart gives a schematic view of the calculation of revenues and sources. Contribution revenues were calculated based on the prescribed national average contribution rate (see description below), average earnings of each age cohort, and the number of contributors in each cohort. Government contributions (by local and central governments) were provided only on an ad-hoc basis to supplement any current deficits.

Figure 11: Calculation of Revenues



Prescribed Contribution Rates

(i) Basic Pension – Annual contribution rates to the Basic Pension vary from province to province and often differ among municipalities. According to the Ministry of Finance, the contribution rate to the Basic Pension nationwide in 2001 was estimated to be around 19.29%; it was assumed to be 20% for projection purposes. Under the Liaoning pilot, contribution rate for the Basic Pension was assumed to be 23% (transferred from the reduction of the contribution rate under the Individual Accounts).

(ii) Individual Accounts – The contribution rate to the Individual Accounts was supposed to be phased in from 1997 on, starting at 4% until it reaches 11%, but information on collection since inception indicated that the national average fell way below the statutory rate³⁶. For the purpose of this projection, the contribution rate to the Individual Accounts is assumed to be at 11% per annum since 1996, and is assumed to remain constant for the duration of the simulation period under the base case. Under the Liaoning pilot, contribution rate to the Individual Accounts is assumed to be 8% per year, on the premise that the difference between the previously prescribed rate of 11% and the newly established rate of 8% is included as an incremental rate for the Basic Pension. The combined contribution rate will therefore remain at 31% for both the baseline scenario and the Liaoning pilot.

For the purpose of this projection, no differentiation was made between employer and employee contributions. Only total contributions to the Basic Pension and Individual Accounts were considered.

Collection Rates

Historically, the Ministry of Labor and Social Security reported that the collection rate averaged around 90% over the last few years, while contributions in arrears amounted to 7.2% of contribution revenue each year. Collection rates reported by the seven locations ranged from a low of 60% to a high of 91%³⁷. These reported rates were purportedly calculated based on a formula that expressed actual collections (less accumulated arrears and one-time contributions remitted by reformed/bankrupt enterprises) as a percentage of budgetary contribution revenue determined on the basis of the reported pensionable wage bill³⁸. Based on information provided by the Ministry of Finance, it was determined that a collection rate of 70% would be closer to the amount of actual funds collected, after taking into consideration defaults and amounts in arrears. However, with improvements in monitoring and technological advancements, collection rates would likely improve over time. For this projection, the collection rates were assumed to be 70% in 2001, 72% for the years 2002-2006, 75% by 2010, 80% by 2020, eventually reaching 85% by 2030 and remaining steady at that level through to the end of the projection period.

³⁶ Based on information provided by the Ministry of Finance, in 2001, enterprises contributed an average of 19.69% of contributory wage bill, while individuals contributed 5.6%. Since Document #26 called for a total credit of 11% of contributory wage by 2001, the shortfall of 5.4% (11% less 5.6%) was assumed to be made up by contributions from the enterprises, making the effective contribution rate to the total pension system 25.09%.

³⁷ The collection rates reported by locations were derived by multiplying the contribution rate and the actual contributory wage bill which excluded the contributory wages of those who should have been contributing but did not.

³⁸ Contributory wage bill was reported by each enterprise and consolidated by the local social insurance bureaus. Anecdotal reports by participants from finance bureaus indicated that enterprises generally under-reported this figure, which would produce a higher than actual collection rate.

Repayment of contributions in arrears

Based on information from the seven locations, it was estimated that every year, recovery of contributions in arrears could be somewhere in the order of 5% to 8% of the current year's contributions. For the purpose of this projection, it was assumed that the debt recovery, expressed as a percentage of current year contributions, would amount to 5.75% in 2001, 8% per year between 2002 and 2006, then gradually returning to a 5% level by 2010 and remaining steady thereafter due to anticipated improvement in collection rates as indicated above.

Expenditure. The following chart **Figure 12** gives a schematic view of the determination of benefit amounts and other sources of expenditure. Pension entitlements for the newly retired are determined based on the provisions described in the previous section. Pension entitlements for the existing stock of pensioners were derived based on the extrapolated pension profile from the seven locations.

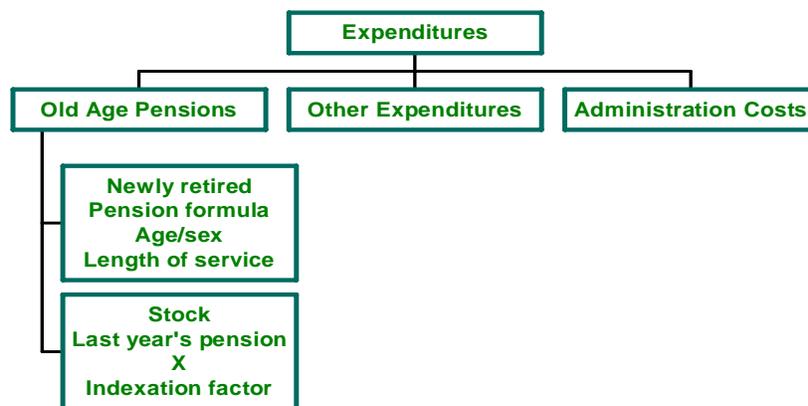
Post-retirement Indexation

All pension payments were assumed to be indexed to 60% of nominal wage growth each year until 2025. From 2026 to 2075, pension payments were assumed to be indexed to 100% of price changes.

Other Expenditures

Death benefits and lump sum payments were estimated to be around 5% to 10% of total pension payments each year. In the case of China, administration costs are not considered part of the expenditures for the old-age insurance system.

Figure 12: Calculation of Expenditures



Fiscal Balance. From the revenue and expenditure payment streams, current balance and fund reserve were calculated.

Current balance is defined to be the difference between revenues and expenditures plus investment income, if any.

Fund reserve is normally determined based on the following:

$$A(t+1) = A(t) * (1+r(t)) + I(t) - E(t)$$

where, A(t) is the amount of fund reserve at the beginning of the year

A(t+1) is the amount of fund reserve at the end of the year

r(t) is the assumed portfolio return for the year t

I(t) is the revenue for the year t

E(t) is the expenditure for the year t

Furthermore, in any year when total revenues (combined revenue for the Basic Pension and the Individual Accounts) fall short of expenditures, the deficit will first be financed through the accumulated fund reserve, before any external funding from either the local or central government will be provided³⁹. In reality, it will be very difficult to implement such a policy. Firstly, national pooling does not exist. Secondly, provinces/municipalities with significant reserves may not be the ones that are experiencing shortfalls in cash flow, while those with heavy cash deficits may not have sufficient reserves. It is important to keep in mind that the purpose of this exercise is to provide an estimation of the overall fiscal condition of the national old age insurance system. As such, the methodology is not meant to be used as a budgeting tool for yearly estimates. In fact the only feasible way to arrive at an accurate picture of the national fiscal status of the old age insurance system is to perform a bottom-up simulation, which involves aggregating cash flow requirements from the lowest level of pooling.

Fund Reserve. At the beginning of 2001, the combined fund reserve from all provinces and municipalities was estimated to be around RMB854 billion (1.4% of GDP). For simplicity, the entire reserve was recorded as belonging to the Individual Accounts since the Basic Pension portion for most locations had been in deficit for some time.

Return on Investments. Historically, nominal interest rates on deposits of financial institutions had been quite low. **Table 7** presents the historical interest rates declared on one-year term deposits of financial institutions between 1991 and 2001. These were also the rates used for crediting interest to the Individual Account balances, although in some locations, special bonus declarations were made from time to time.

³⁹ Under the Liaoning pilot, revenues collected for the Basic Pension and the Individual Accounts were accounted for separately, so contribution revenues to the Individual Accounts would not be available for subsidizing deficits in the Basic Pension portion.

Table 7: Interest Rates on Deposits of Financial Institutions (1991-2001)

Year	Interest rate (in %)	
	Nominal	Real
1991	7.6%	4.0%
1992	7.6%	1.1%
1993	11.0%	-3.2%
1994	11.0%	-10.6%
1995	11.0%	-5.2%
1996	7.5%	-0.8%
1997	5.7%	2.8%
1998	3.8%	4.6%
1999	2.3%	3.7%
2000	2.3%	1.8%
2001	2.2%	1.5%

Source: 2002 China Statistical Yearbook

In view of the fact that the reserves, if any, in the Individual Accounts of the seven locations were mostly invested in one-year bank deposits, it was assumed that the return on investments would remain relatively low for the short term, not to exceed 2% p.a. in real terms through to 2006. On the other hand, with the assumption that an asset allocation policy using diversified portfolio management approach would be developed and fully implemented by 2010, the return on investments would be expected to increase to 3% p.a. in real terms for the remainder of the projection period.

V. Summary of Financial Projections and Key Findings

Fiscal Sustainability Benchmarks

Fiscal sustainability refers to the financial soundness of the system, now and in the future⁴⁰. It is a widely accepted practice to measure the fiscal sustainability of pension systems with various benchmarks. The following three commonly used benchmarks were used to test the financial soundness of China's old age insurance system:

- Financing gap;
- Implicit pension debt; and
- Required contribution rate

The *financing gap* is a measure calculated by summing the net present values of the current balances, i.e., revenues less expenditures, throughout the projection period (in this case, 2001-2075). This is a particularly useful indicator when considering the financing requirements of an ongoing pension system that has reached maturation. For systems that are still expanding, using the financing gap as a fiscal sustainability benchmark can be misleading, since the projection period may include only contribution income from the newly covered workers without reflecting the total payout period for these workers when they retire. As with all calculations using net present values, this measure is highly sensitive to the discount rate used in the calculation and should be quoted with prudence. However, as long as the macroeconomic assumptions adopted for the projection are dynamic and internally consistent, expressing the financing gap as a percentage of the base year GDP may be a useful indicator.

Implicit pension debt (IPD) is a measure of the present value of projected liabilities under the pension system and covers those who are already receiving payments from the system as well as those who have any acquired rights at a particular date. This is a useful indicator to measure the stock of all outstanding liabilities. It is also a common indicator used by the international community and fiscal affairs experts when comparing the maturation and fiscal burden of different pension systems. As is the case with calculating the financing gap, this is an indicator that is highly sensitive to the discount rate used in the calculation⁴¹. Hence, with the proviso that macroeconomic assumptions are on balance sound and internally consistent, expressing the implicit pension debt as a percentage of the current year's GDP should be a reliable indicator of fiscal burden. Nevertheless, it should still be used with prudence when making comparisons with other pension systems. It is especially important to keep in mind when performing cross country comparisons that factors such as coverage, dependency rate and generosity of benefits can all affect the level of IPD.

⁴⁰ Some experts believe that the horizon for the future should be to perpetuity.

⁴¹ If real wage growth rates were to increase at a faster pace than the GDP growth rate, or if interest rates were to fall below the GDP growth rate, the size of the future IPD would increase even more significantly.

Box 3: Implicit Pension Debt

The implicit pension debt (IPD) is a concept that is increasingly being used by the international community and fiscal affairs experts when discussing and comparing pension systems. While literature on the subject is available, there is no real consensus on the definition of IPD or the methodology for its measurement. Broadly speaking, IPD is understood as the government's obligation to pay benefit entitlements in present value terms. The provision covers everyone who has an acquired right under the pension system, i.e., those who are current pensioners as well as those who are still contributing, but with entitlements accrued in respect of years of service and contributions to date.

Bearing in mind that there are no universally accepted guidelines on setting projection assumptions or prescribed methods for determining the IPD, readers should exercise considerable caution when interpreting IPD calculations, especially when making comparisons with other pension systems. The ultimate size of the IPD is affected by factors other than the amount of benefits promised by the system, such as demographics and economic variables. For instance, the choice of a discount rate is particularly important since it is used to determine the net present value of the obligation to pay (see **Figure 14**). Thus, it is easy to see why cross country comparisons do not produce meaningful results when, in addition to incompatible systemic characteristics, the assumptions used in measuring the IPD are not subject to comparable standards. Even when comparing IPD calculations within the same system, valid conclusions can be made only if comparable methodology and identical economic assumptions (such as the discount rate for net present value calculations and wage growth) are being used.

The World Bank had engaged in exercises to measure China's IPD on several occasions in the past. In 2000, Dorfman and Sin assessed the IPD using the World Bank's PROST software and estimated that it was around 95% of the GDP in 1998. It is important to note that between 1998 and 2001, China was experiencing deflation and interest rates were relatively low. Many economists at the time projected that the deflationary scenario would be over by 2001, and that interest rates would return to a more normal level of around 3% in real terms. In reality, the low (or zero) inflation scenario did not reverse itself until well into 2003, and not before real interest rates had dropped to unprecedentedly low levels. The IPD quoted in Dorfman and Sin (2000) was determined using the much higher nominal interest rates based on estimates prepared by the World Bank's macroeconomics department in China at that time. Therefore, despite the use of identical methodology (the PROST software), the discrepancy that resulted primarily from a difference in the assumed interest rate created the impression that the IPD in 2002 was significantly higher (141% of GDP) than the figure published in the 2000 report (95% of GDP).

Generally speaking, comparing IPDs is not meaningful, and a careful analysis of the assumptions and conditions surrounding specific IPD assessments will show why. Thus, in the case of another report with Yan Wang and several academics as co-authors, the assessment of China's IPD was based on the general equilibrium model, which used a totally different approach in its estimation process and did not take into consideration parameters such as the demographics and coverage of the target population. As such, comparisons with results generated from an actuarial model like PROST are not valid. In the case of an even earlier 1994 World Bank projection prepared prior to the enactment of Document #26, it was based on data extrapolated from hypothetical scenarios of emerging dependency ratios, and a relatively high real discount rate (with an average of around 5% per annum) was used. Clearly, attempts to make comparisons with other projections will offer little in terms of lessons learned.

Another useful indicator for measuring the fiscal sustainability of a pay-as-you-go arrangement is the *required contribution rate*. This is the contribution rate that will allow the system to manage on a cash flow basis whereby expenditures can be met solely through revenues (contributions plus investment income), without any additional financing to supplement the shortfalls. In the case where there are cash deficits and no other financing is possible, the *required contribution* will have to be set at a rate such that fiscal balance can be maintained. This will be the rate at which contributions must be made (regardless of whether they are levied against the employee, employer or the Government) to forestall any negative current balance. The usefulness of this indicator is also subject to the same limitations described under the financing gap, with regard to its applicability in the case of systems that have reached maturation or are close to maturation. For systems that have not reached maturation and where coverage is still being expanded, focus should be directed towards determining the long term actuarially balanced contribution rate.

Summary of Projection Results

It would be appropriate to emphasize again that the purpose of these fiscal sustainability benchmarks is to provide a comparison of the relative magnitude of the effects of different pension policy measures under various scenarios. Therefore, as stated earlier, results from projections of this nature should not be quoted in absolute terms without proper reference to the underlying assumptions and limitations.

Baseline Scenario – Status Quo

Implicit Pension Debt (IPD). Based on the existing pension provisions and under a no coverage expansion scenario, current IPD (i.e., the present value of projected accrued liabilities) amounts to some 141% of the GDP for 2001, or approximately US\$1.6 trillion. Twenty-six percent (26%) of this figure pertains to the accrued liabilities of individuals already retired. Taking into consideration the two-tiered system, liabilities on behalf of pensioners and contributors with vested rights under the Basic Pension portion accounted for 111% of the GDP, and liabilities for those with rights under the Individual Accounts accounted for 30% of the GDP. As can be seen in **Figure 13**, the IPD under the Basic Pension becomes a declining share of the total IPD over time. This is primarily due to the fact that the liabilities accrued to the *old men* and the *middle men* (who are entitled to higher replacement rates) have been discharged as they die off, leaving only the liabilities of the *new men* (with maximum entitlements of 20% of average economy wage)⁴². On the other hand, the debt under the Individual Accounts becomes an increasing share of the total IPD. This is because more and more of the new pensioners will retire with entitlements under the Individual Accounts⁴³.

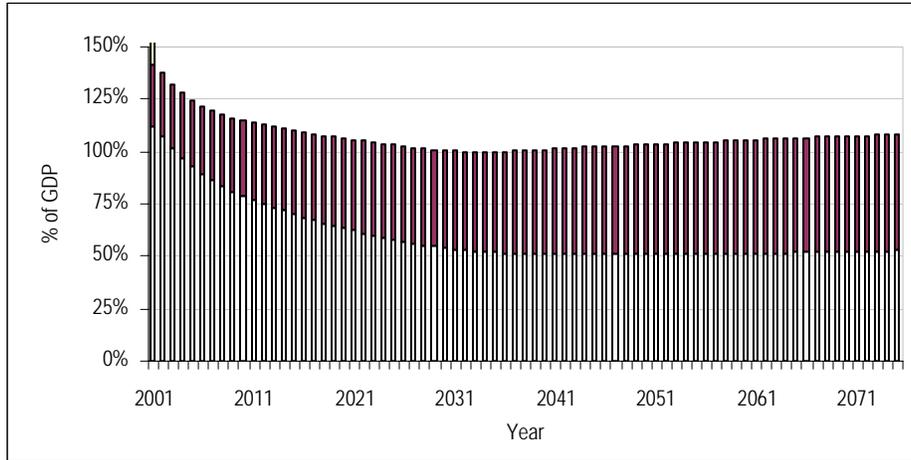
Increasingly, fiscal affairs experts are placing emphasis on the size of the IPD of a country and view the obligations as being similar to those for bonded debt. Nevertheless, it would not be relevant to compare IPD numbers between China and other countries. The IPD for China measured in this report represents liabilities associated with the enterprise workers only (roughly 12% of the working age population), and excludes all outstanding liabilities from the other

⁴² The term “old men” refers to those who were receiving pension payments in 1996; “middle men” refers to those who were not yet retired, but had started contributing to the old age insurance system in 1996; “new men” refers to those who started contributing after 1996.

⁴³ Since the individual accounts only became effective in 1996, it is not surprising that most pensioners/workers have little in terms of accumulated balance in their accounts by 2001.

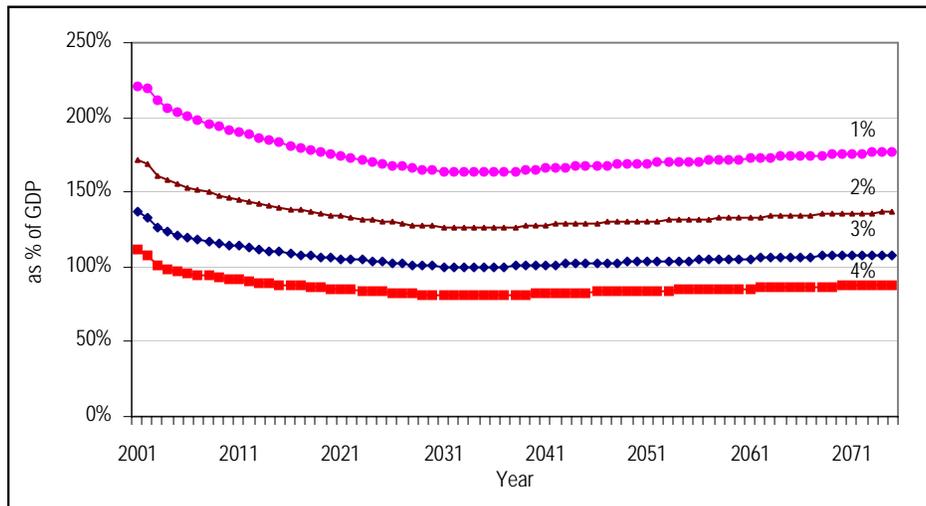
pension schemes (the non-contributory scheme for civil servants and employees in state organizations and institutions as well as the voluntary scheme for rural workers).⁴⁴

Figure 13: Implicit Pension Debt (2001-2075)
Basic Pension (clear), Individual Accounts (solid)



Source: World Bank staff calculations based on PROST

Figure 14: Comparison of IPD Calculations under Different Real Discount Rates



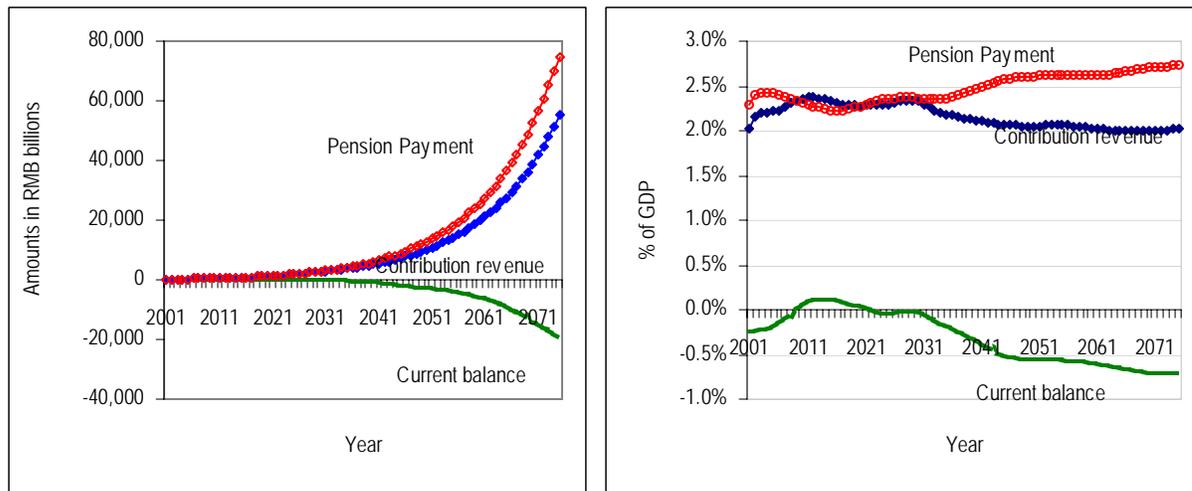
Source: World Bank staff calculations based on PROST

Figure 14 illustrates the sensitivity of IPD calculations under different discount rate scenarios and underscores the point that comparing IPD numbers across systems must be approached with great caution.

⁴⁴ IPD for OECD type countries which provide universal coverage to almost the whole working age population generally ranged from 80% to 225% of GDP.

Current Balance. Currently, on an annual basis, China is paying approximately 2.2% of GDP to meet its pension obligations, but contribution revenues amount to only 2% of GDP (1.4% of GDP from the Basic Pension portion, and 0.6% of GDP from the Individual Accounts). This results in a cash deficit of 20 basis points of GDP after offsetting the deficit of the Basic Pension portion against the cash surplus under the Individual Accounts (including earned investment income). If such a deficit were to be financed solely out of contributions (without any supplemental source of funding) during the year, the required contribution rate to balance the cash flow would have to be increased from the average statutory level of 31% (20% for the Basic Pension and 11% for the Individual Accounts) to 37% of contributory wage. Looking ahead, this deficit situation is projected to deteriorate even further. The left graph in **Figure 15** shows the contribution revenues, the pension payments and the resulting current balance in nominal terms.

Figure 15: Financial Flows of the Baseline (in nominal terms and as % of GDP)



Source: World Bank staff calculations based on PROST

As explained earlier, quoting long term financial projections of this type in nominal terms without providing some sense of relative magnitude is not meaningful. The right graph in **Figure 15** shows the same pension variables, but expressed as percentages of nominal GDP. It can be seen that with the exception of the 10-year period between 2009 and 2018, when marginal cash surpluses can be expected, it is anticipated that the system will experience deficits throughout the projection period, reaching as high a level as 70 basis points of GDP starting from 2066.

Financing Gap. For most of the years during the projection period, it is anticipated that revenues will fall short of expenditures. In net present value terms, the sum of these yearly shortfalls is known as the financing gap of the system. Under the baseline scenario, this financing gap is expected to be around 95% of the GDP for 2001.

Required Contribution Rate. If the financing gap of 95% of the 2001 GDP were to be financed by increasing the contribution rate immediately so as to completely avoid having deficits in any one year, total enterprise and employee contributions would have to be increased from the average statutory 31% to 37% of the contributory wage bill (22% for the social pooling or Basic Pension portion and 15% for the Individual Accounts) for the 2001-2075 period.

Sensitivity Analyses

While every effort has been made to ensure internal consistencies of macroeconomic assumptions in order to produce meaningful results, the fact remains that many of the key assumptions are highly uncertain and volatile. **Table 8** uses four different scenarios to illustrate how financial projections are affected by the assumptions used. A new set of projection assumptions was imposed on the baseline provisions of the existing old age insurance system to construct each of the four scenarios. To facilitate comparison, the same three fiscal sustainability benchmarks are used.

- Scenario 1 - Low growth economic scenario, in which growth in the economy was expected to be one percentage point below that of the baseline, in real terms.
- Scenario 2 - Low mortality, whereby mortality rates were assumed to decrease by 5% viz. the baseline for each age cohort, resulting in an increased longevity at age 60 of approximately 1 year for men and 0.8 years for women by 2075.
- Scenario 3 - High fertility, whereby fertility rates were assumed to increase more rapidly to the level of 2.1 by 2020 instead of 2030 under the baseline.
- Scenario 4 - Low collection rates, a scenario in which collection rates were assumed to remain low at the current level of 70% throughout the projection period; repayment of contributions in arrears would only be 3% of current year contributions from 2002 onwards (instead of 5%-8% per year).

Table 8: Comparison of Fiscal Sustainability using Different Projection Assumptions

Scenarios	Financing gap (2001-2075)			Implicit Pension Debt			Sustainable CR as % of wages
	in millions RMB	in millions US\$	as % of 2001 GDP	in millions RMB	in millions US\$	as % of 2001 GDP	
	1	9,904,924	1,199,143	103%	11,504,172	1,392,757	
2	12,196,570	1,476,582	127%	13,918,036	1,684,992	145%	39%
3	7,622,856	922,864	79%	13,545,363	1,639,874	141%	36%
4	21,343,998	2,584,019	222%	13,561,282	1,641,802	141%	45%
Baseline	9,147,428	1,107,437	95%	13,561,282	1,641,802	141%	37%

Source: Bank staff estimates based on PROST⁴⁵

⁴⁵ US\$1 is equivalent to 8.26 RMB and this is assumed to be constant over time.

The Liaoning Pilot

Based on the provisions of Document #42, **Table 9** presents a comparison of the fiscal sustainability benchmarks under three different scenarios.

- Scenario 5 - Growth assumptions as in the baseline scenario – the Liaoning pilot
- Scenario 6 - Low growth assumptions
- Scenario 7 - Same as Scenario 5, but return on investments remained at 2% p.a. in real terms through to 2075.

Table 9: Comparison of Fiscal Sustainability Benchmarks under the Liaoning Pilot

Scenarios	Financing gap (2001-2075)			Implicit Pension Debt			Sustainable CR as % of wages
	in millions RMB	in millions US\$	as % of 2001 GDP	in millions RMB	in millions US\$	as % of 2001 GDP	
	5	6,098,285	738,291	64%	12,695,163	1,536,945	
6	5,942,955	719,486	62%	10,765,321	1,303,308	112%	37%
7	3,049,143	369,146	32%	12,542,304	1,518,439	131%	33%
Baseline	9,147,428	1,107,437	95%	13,561,282	1,641,802	141%	37%

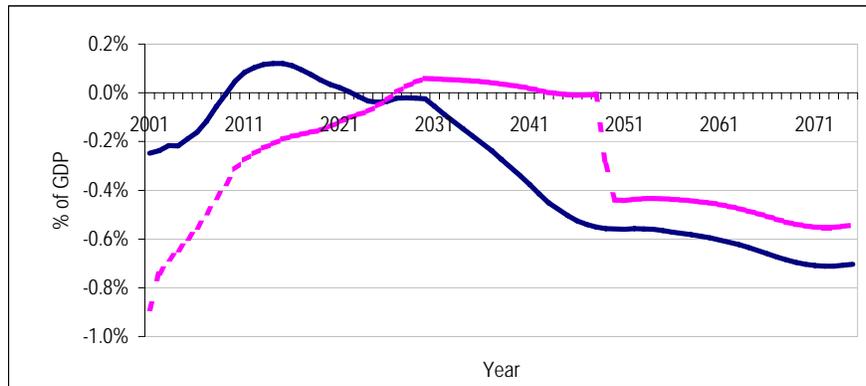
Source: Bank staff calculations based on PROST

Assuming that there will not be any behavioral changes in terms of length of service and retirement pattern between the baseline and the provisions of Document #42, it can be expected that workers retiring under the provisions of Document #42 will likely receive: (i) slightly bigger pensions from the Basic Pension portion; and (ii) a 27% reduction in pensions from the Individual Accounts (accumulations will now be at 8% of contributory wage per year instead of 11% per year). The small reduction in the IPD between the two sets of pension provisions is due primarily to smaller entitlements from the Individual Accounts. Although incremental accruals are possible under the Basic Pension formula (0.6% for each year of contributory service in excess of 15 years), judging from past behavior, it is unlikely that too many workers will have much longer service than the current average of 27 years for men and 20 years for women.

However, due to the prohibition of using contribution revenues from the Individual Accounts to offset deficits under the social pooling account or Basic Pension, the trajectory of the current balance exhibits a very different pattern from the baseline. It is important to emphasize that under the Liaoning pilot the current balance pertains only to the social pooling account⁴⁶, whereas under the baseline scenario, current balance represents the combined current balance of social pooling and Individual Accounts.

⁴⁶ This reflects the provision that once the funds of the Individual Accounts have been exhausted, any outstanding liabilities will be passed on to the social pooling account.

Figure 16: Comparison of Current Balance under the Baseline and Scenario 5 (Liaoning Pilot)
 Baseline (solid), Liaoning pilot (dashed)

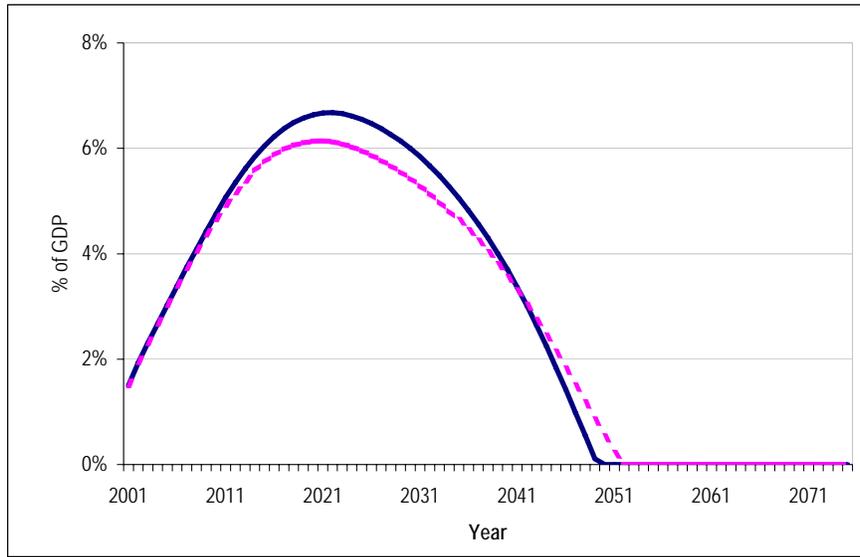


Source: Bank staff calculations based on PROST

Figure 16 compares the current balance under these two scenarios (Baseline viz. Scenario 5 – the Liaoning pilot). The difference between the two current balances in the years 2001-2025 represents the cost inherent in transforming the current system (under the provisions of Document #26) to the Liaoning pilot system (under the provisions of Document #42), with the proviso that cash surplus from the Individual Accounts cannot be used to cover the deficits in the social pooling account. After 2025, there will be a period of about 20 years when social pooling under the Liaoning pilot will experience small cash surpluses. This is because pensions that are being paid from the Individual Accounts beyond the 10-year amortization period can still be funded through the fund reserves. However, as soon as the fund reserves under the Individual Accounts have been exhausted, whereupon all outstanding liability under the Individual Accounts must be borne solely by the social pooling account, cash deficits will resume.

During the accumulation phase of the Individual Accounts, there will be a moderate accumulation of fund reserve. **Figure 17** compares the build up of such a reserve under the two different scenarios for return on investments – 3% p.a. viz. 2% p.a. in real terms. As expected, the accumulated reserve under the 2% return scenario falls short of the 3% return scenario. It may seem surprising to find the accumulated reserve lasting marginally longer under the 2% scenario (viz. the 3% scenario). The reason for this is that pensions derived from the 2% accumulation will be relatively smaller, and will therefore represent a slightly smaller drain on the reserve.

Figure 17: Fund Reserve of the Individual Accounts under the Liaoning pilot
ROI 3% real (solid), 2% real (dashed)



Source: World Bank staff calculations based on PROST

Summary of Key Findings

China's old age insurance system covers only approximately 12% of the country's working age population. Currently, it is costing the government 20 basis points of GDP each year to finance the cash deficit, which is expected to keep rising. Faced with this emerging financial burden, the government acknowledges that the system has a number of flaws and there is a need for reform. The key issues that will have to be addressed are analyzed below.

Baseline Scenario – Status Quo

Aging Demographics. In 2001, the system dependency rate was around 34% (i.e., for every 100 workers, there were 34 pensioners). This is projected to increase to 50% in about 7 years, and then further increase to 100% in just 30 years' time. Given the pay-as-you-go nature of financing, the dependency rate is critical to the analysis of the fiscal sustainability of a pension system. The following equation shows how one can use the dependency rate to infer the contribution rate that is required to fund for the promised replacement rate when pensions are indexed to wages and financed by payroll tax:

$$CR = \text{system dependency rate} \times RR$$

Where: CR = contribution rate as a percentage of wages

RR = replacement rate at retirement, expressed as a percentage of average wage

Under this relationship, it can be observed that if the replacement rate (RR) is averaging at the current level of 60% of average wage, the contribution rate required to balance the system when the dependency rate is 34% will have to be around 20.4% (i.e., 34% of 60%). Hence, when the dependency rate reaches 50%, it follows that the contribution rate required to balance the system will have to be at least 30%. In addition, evasions, defaults, arrears and other tactics to defraud the system will increase the required contribution rate even more. Results from Scenario 4 draw

attention to the costs associated with non-compliance, non-recovery of defaults and payments in arrears.

Highly Decentralized and Non-unified System. China's old age insurance system started at the county/municipal level and had never been a unified system. Although the central government has traditionally been responsible for setting the broad policy framework, there is a lot of latitude for specific policy parameters and administrative details that are left to the discretion of the local authorities. With the exception of a small number of areas that have actually implemented provincial pooling, most others are still highly decentralized with pooling only at the county/municipal level. As a result, a lot of discrepancies exist, such as in the contribution rate, transition pension provisions, or other variables, making risk pooling and resource sharing much more difficult. This situation is exacerbated by the fact that under the current reporting structure, those counties/municipalities with cash surpluses have every incentive to retain the funds in local accounts, while counties/municipalities with cash deficits try to maximize the supplements that can be obtained from the provincial and central financing authorities.

Prevalence of Early Retirement. As shown in the data provided, about 20% of the male pensioners are below age 60, while over 30% of the female pensioners are under age 55. Furthermore, according to information provided by the Ministry of Finance, there has been an obvious surge in the early retirement trend – with early retirements comprising 15% of the newly retired in 1999, 16% in 2000 and 21% in 2001. Reasons given for early retirements include special occupation (54.8% of early retirees) and disability or sickness (27.7% of early retirees)⁴⁷. This trend is exacerbated by the fact that the minimum service requirement for pension entitlement is set at 15 years. Most workers would look upon contributions beyond the minimum 15 years as an additional tax since there would be no commensurate increase in their pension entitlement. Early retirement is actually a “double-edged sword” in the sense that it reduces contribution revenues (retired workers no longer contribute) and increases expenditures (retired workers start drawing pensions earlier and continue to do so for a longer period).

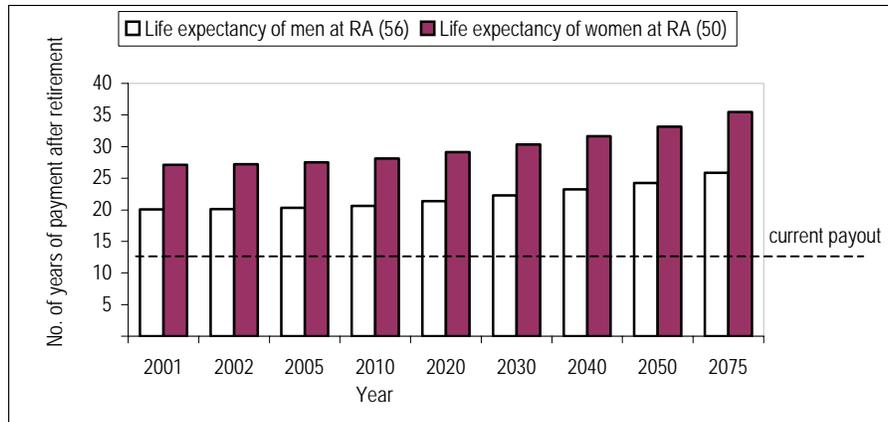
Long Drawn Out Transition. Document #26 provides broad guidelines for gradually transitioning the *middle men* into the two-tiered old age insurance system without actually mandating the specific parameters (see section on provisions). Up to now, many locations are maintaining parallel systems i.e., calculating pension entitlements under the old system and the transitional formula), and routinely granting new retirees pension benefits that amount to the greater of the two provisions. As a result, the average replacement rates of the existing pensioners remain relatively high, at around 60% of average economy wage. The continued existence of these obligations from the past – made up of a large stock of pensioners entitled to high replacement rates – is a major reason why a high contribution rate has become a necessary burden that is being shouldered by the current generation.

Individual Accounts and the amortization factor. Perhaps the most detrimental flaw of the system is the actuarial imbalance of amortizing the Individual Account balances by a factor of 120 regardless of the worker's retirement age. At the current level of interest rate (nominal interest rate of around 2% p.a.), an amortization factor of 120 is equivalent to a present value factor that

⁴⁷ Anecdotal reports by participants at the workshops indicated that fraudulent reporting of all types were quite common. It was also noted that there was a general lack of incentive or human capacity for these local finance bureaus to audit and uncover such fraudulent activities.

assumes a payment period of just under 11 years⁴⁸. **Figure 18** compares the average expected years of remaining life at retirement for men and women against this amortization factor.

Figure 18: Projection of Life Expectancy Changes (Years at Retirement Age)



Source: Bank staff estimates

Given that life expectancy at average retirement age is around 20 years for men and 27 years for women, there is a distinct gap between life expectancy (hence the expected number of years of actual pension payment after retirement) and the assumed payout period of just under 11 years. Such a differential in the number of years translates to a significant financial drain on the system. Under these circumstances, the account balance at retirement will most certainly be exhausted after the 11th year if pension payments are assumed to be paid for life, but are calculated using the 120 factor. Upon depletion of the account balance, the shortfall can only be borne by the government through budget transfers or by future workers in the form of an increase in the contribution rate. Either method cannot be sustained in the long term.

Sensitivity Analysis

Results of the various sensitivity analyses summarized in **Table 8** underscore the uncertainties associated with these types of projections.

Economic Growth. Section IV highlighted the fact that real wage growth is assumed to be at parity with the growth in GDP per capita, while annual contribution revenue is directly linked to the contributory wage bill each year. When wages decline, so will contribution revenue. Pension expenditures on the other hand are not as directly correlated with future wage levels. Post-retirement pension indexation and replacement rates of future pensioners (entitlements that are linked to future wage levels) will of course decline in line with wage levels, and this explains why the IPD under the low economic growth scenario is smaller than that of the baseline scenario. However, there is an existing stock of pensioners (representing 26% of accrued liabilities) whose pension amounts have already been determined and will have to be paid out for many more years to come. With the contribution revenue now lower than the baseline, and with only a partial

⁴⁸ Using the formula for calculating the present value of an annuity certain that excludes the probability of survival, $(1-v^n)/i^{(12)}$, where $v=1/(1+i)$, i = interest rate payable annually, $i^{(12)}$ = interest rate payable monthly, and a nominal interest rate of 2% per annum, the number of months of amortization (n) can be determined through an iterative process by equating 120 (10 years expressed in number of months) to the present value factor using different values of n . The higher the prevailing interest rate, the higher the resulting value of n .

decrease in future pension expenditures, it is expected that the financing gap, and therefore the required contribution rate, will be higher than under the baseline.

Mortality. When life expectancy increases, it is logical that liabilities will go up, and future deficits will increase as a result. Estimations under the hypothetical scenario that life expectancy at age 60 will increase by nearly a full year for both men and women indicate that over the long term, the cost of the system will rise by two additional percentage points in the contribution rate.

Fertility. Historically, demographers have tended to over-estimate the fertility rate. However, there is no consensus at the moment among demographers as to whether China's total fertility rate would continue to decline, remain at the current level of under 2.0, or increase to the minimum level of 2.1 required to maintain zero population growth. Regardless, the impact of fertility rate on pension systems takes a long time to realize and unless the change is quite drastic, the effects will be relatively marginal and will not likely have any significant impact in the short to medium term.

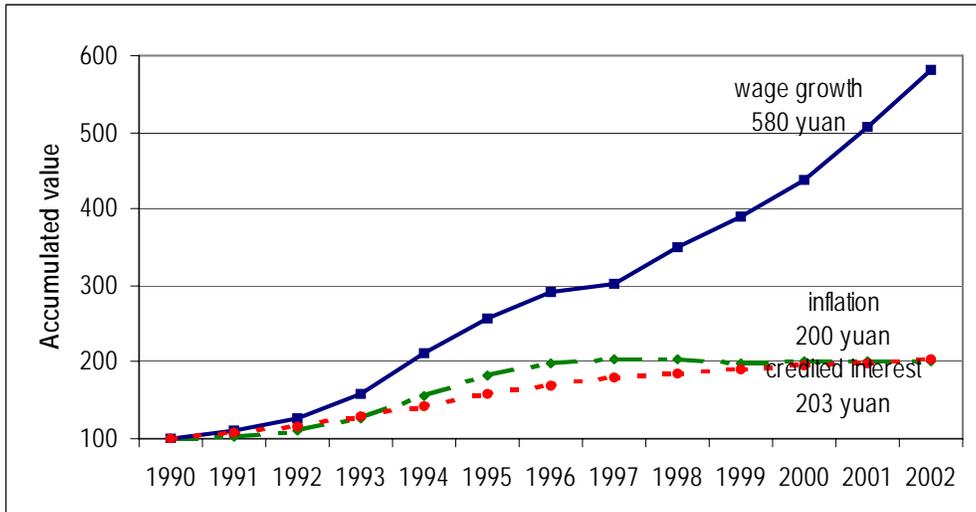
Collection, Defaults and Arrears. It is clear that there are costs associated with evasions, default payments and non-recovery of contributions in arrears. The mere assumption that compliance remains at the current 2001 level will significantly increase the financing gap. The increase in contribution rate will cost the system seven percentage points more.

The Liaoning Pilot

Continuing actuarial imbalance with Individual Accounts. Document #42 aimed to improve and refine the old age insurance system, but it did not address many of the flaws highlighted above. Although the lowering of the contribution rate under the Individual Accounts helped to reduce the deficit marginally, it did not remove the biggest impediment of the system – the actuarial imbalance created when determining the pension payout under the Individual Account system. As a result of this inherent actuarial imbalance, the Individual Accounts, by definition, can never be fully funded. Furthermore, even though the preservation of contribution revenues within the Individual Account system can help reduce the overall size of the deficits in the long run, the transition cost in the first 25 years should not be underestimated.

Conditions for Funding the Individual Accounts. Although it is not possible to attain full funding of the Individual Accounts under the provisions of Document #42, the conditions and merits of actually funding for these accounts should be clearly rationalized. The relative advantage of pay-as-you-go versus fully funded programs hinges on whether the rate of earnings growth plus labor force growth is higher or lower than the return on investments of the reserves. If the return on investments can generally exceed the rate of earnings growth by at least 2 to 3 percent, then full funding makes sense (unless population growth is more than 2 to 3 percent). Under these circumstances, because of the productivity of capital, the same benefits can be paid to each succeeding generation with a lower contribution rate under full funding. In the case of China, for the past 11 years, wage growth has been growing at a much faster pace than the nominal interest rates on deposits at financial institutions. **Figure 19** compares the growth of 100 yuan invested at the beginning of 1990 and the accumulated value by the end of 2001 using growth rates from nominal wage increases, inflation and nominal interest rates declared by banks. Taking into consideration these trends and the requisite conditions for make funding worthwhile, it is imperative to maximize portfolio returns relative to risk by establishing a governance structure, operating procedures as well as incentives that will facilitate prudent investment decisions.

Figure 19: Comparison of Historical Growth – Wage, Inflation, Bank Deposit



Source: 2002 China Statistical Yearbook

VI. Major Reform Options and their Implications

Recognizing the fiscal unsustainability of its old age insurance system, China has been contemplating reforms to its pension system for some time. Although the design of the Liaoning pilot was promoted as a blueprint for improving benefit provisions and restoring fiscal sustainability, its implementation fell short of addressing several critical system flaws.

Reform Scenarios

Based on the findings described in Section V, and assuming that the general benefit design and the target replacement rate specified under Document #42 represent the preferred option in China, a number of parametric reform scenarios will be examined in this section. Additionally, a more radical approach will be considered.

- Scenario 8 - Document #42 without funding (i.e., maintaining the current practice of using cash surplus from the Individual Accounts to offset deficits under the social pooling account); growth parameters are assumed to be identical to those outlined for the baseline scenario.
- Scenario 9 - Scenario 5 (the Liaoning pilot) with Individual Account accumulations amortized based on life expectancy.
- Scenario 10 - Scenario 9 plus gradually delaying and unifying retirement age (age 65 by 2022 for men and age 65 by 2034 for women).
- Scenario 11 - Scenario 10 but post-retirement pension indexation will switch from 60% of nominal wage increase to 100% of inflation starting from the year 2026.
- Scenario 12 - Scenario 11 with gradual reduction in the contribution rate to the social pooling account until it reaches the required contribution rate.
- Scenario 13 - Scenario 12 with coverage expansion to 80% of the urban population.
- Scenario 14 - Structural reform based on Gao's Think-piece.

It should be pointed out that whenever policy alternatives are considered solely on a cash flow basis, without due regard to the long term fiscal sustainability of the system, the reform may well be realized at the expense of future generations who will have to shoulder the increased pension debt. In fact, later deficits will be even larger. Many of the OECD countries are now struggling with the consequences of mistakes made decades ago. Hence, when analyzing pension policies, it is important to ensure that the most dynamic system – one that is at the same time *adequate*, *affordable*, *sustainable* and *robust* – can be established before expanding the system for wider coverage⁴⁹.

⁴⁹ *Adequate* refers to both absolute and relative levels of retirement income. *Affordable* refers to the financing capacity of individuals and society without interference from more pressing consumption needs. *Sustainable* refers to the financial soundness of the scheme, now and in the future, without the requirement to make unplanned increases in contributions or reductions in benefits. *Robust* refers to the capacity to

China's current old age insurance system attempts to finance retirement income from two different sources – a pay-as-you-go redistributive defined benefit system and a “funded” defined contribution arrangement. It has the overall composition of a *robust* system. In this section, different parametric reform options are first examined to put the current system on a more fiscally sustainable footing (as measured by the same benchmarks described in the previous section). Then, comparisons are made to seek out the system that provides adequate retirement income for workers on a more affordable basis within the identified fiscally sustainable parameters. It is only after such a dynamic system has been established that it will be considered prudent to expand coverage. Scenarios 9 and 10 present the results of the various parametric reform options. Scenario 11 illustrates the fiscal projections after modifying the sustainable system to meet the criteria of adequacy and affordability. Scenario 12 examines the effects of expanding the modified system under Scenario 11 to a wider population base. Finally, Scenario 13 summarizes the more radical systemic reform proposed by the State Council.

Parametric Reforms

Table 10 summarizes the key results of the various parametric reforms under these provisions.

Table 10: Comparison of Parametric Reform Scenarios

Scenarios	Financing gap (2001-2075)			Implicit Pension Debt			Sustainable CR as % of wages
	in millions RMB	in millions US\$	as % of 2001 GDP	in millions RMB	in millions US\$	as % of 2001 GDP	
8	5,016,047	607,270	52%	12,695,163	1,536,945	132%	34%
9	1,524,571	184,573	16%	11,624,366	1,407,308	121%	32%
10	(6,591,271)	(797,975)	-69%	11,238,619	1,360,608	117%	27%
11	(9,886,907)	(1,196,962)	-103%	10,552,630	1,277,558	110%	25%
5	6,098,285	660,304	64%	12,695,163	1,536,945	132%	35%

Source: Bank staff calculations based on PROST

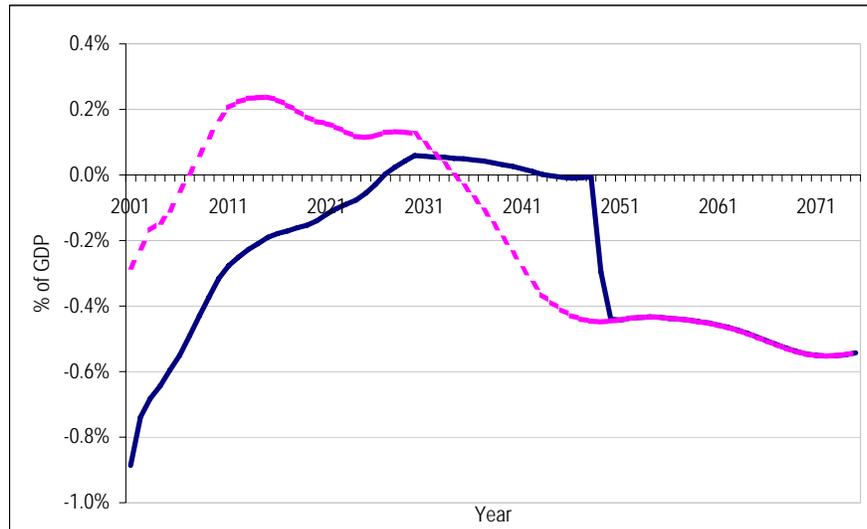
Scenario 8. Officials from the MOF expressed interest in projecting the financial implications if, instead of complying with the current management rules under Document #42⁵⁰, the provisions under the Liaoning pilot (Scenario 5) were altered to permit the use of cash surpluses from the Individual Accounts to offset deficits under the social pooling account. As can be seen from **Table 10**, the key fiscal sustainability indicators under Scenario 8 are quite similar to those for Scenario 5. The IPD has to be identical in both scenarios, since there are no differences in the obligations. However, from a cash flow perspective, the current balances under the two scenarios deviate significantly in both timing and magnitude in the first 40 years, and then become identical after the reserve funds have been depleted (see **Figure 20**). The financing gap is slightly smaller under Scenario 8, reflecting the fact that the deficits are not as severe in the first 30 years, since flows from the Individual Accounts can be used to bail out the social pooling account. But then the situation worsens from 2032 to 2050 until the reserve funds have been exhausted. Yet, in terms of the required contribution rate, there is only a marginal difference of one percentage point. This is because the investment earnings (or the return on investments in any year) are expected to

withstand major shocks by diversifying the economic, demographic and political risks so that retirement income is financed from different sources.

⁵⁰ Provisions are such that funds under the social pool are to be managed separately from the Individual Accounts, and no subsidies for social pooling are to be drawn from the Individual Accounts. However, upon exhaustion of the accumulated balance, further pension entitlements will have to be paid through the social pooling funds.

flow through and be credited directly to the Individual Accounts. The main difference is that individuals can enjoy the greater security that their accounts are now backed by real assets and, depending on investment performance, may be credited with interest at a rate higher than the one-year deposit rate of financial institutions.

Figure 20: Comparison of Current Balance under Scenarios 5 and 8
Scenario 5 (solid), Scenario 8 (dashed)



Source: Bank staff calculations based on PROST

Scenario 9. As underscored in the previous section, the most detrimental flaw of the system is the actuarial imbalance of amortizing the Individual Account balances by a factor of 120 regardless of the worker's retirement age. Scenario 9 examines the impact of converting the Individual Account balance based on an amortization period equal to the expected number of years of payment after retirement (i.e., the average life expectancy at retirement). This will immediately put the system on a much more sound footing financially since the pension benefits are now directly linked to the account accumulations without relying on the social pooling funds to make up the shortfalls when pensioners survive beyond the assumed 11 years. From a financial perspective, this translates to the ability to reduce the required contribution rate from 35% of wages (under Scenario 5) to 32% of wages. As well, the IPD is expected to decline from the original level of 132% of GDP to 120% of GDP in 2001. These reductions, in terms of both future costs and accrued liabilities, are possible because a major source of financial drain – supplementing the pension payments for those who survive more than 11 years after retirement – has been eliminated.

Scenario 10. The previous section highlighted the prevalence of early retirement and its adverse effect on the financial status of the system. Scenario 10 examines the impact of gradually delaying retirement age and unifying it at 65 for both men and women (by 2022 for men and by 2034 for women) after the amortization methodology has been modernized. Delaying the retirement age always creates controversy, regardless of the country, and it has to be assumed that there will be sufficient political will to eliminate the practice of granting early retirements regardless of the reasons given. Another important fact to keep in mind is that this option can only be effective if there is also a strong capacity for monitoring compliance. It cannot be automatically assumed that because the retirement age has been delayed, people will systematically keep working and continue contributing to the system. Very often, workers will try

to evade or migrate to working for the informal sector.⁵¹ It is interesting to note that the change suggested here is very gradual, increasing the retirement age by six months for every year, phased out over a 20 year period for men and over a 32 year period for women. Based on conservative estimates (i.e., that only a portion of the workers will continue to work and contribute to the old age insurance system), implementing such a provision will reduce the IPD from 132% of GDP (under Scenario 5) to 117% of GDP in 2001. The required contribution rate will also decline, from 35% of wages to 27% of wages. Hence, by implementing the two reform options – amortizing the Individual Accounts using life expectancy and delaying retirement age to 65 – the required contribution rate can be reduced by nine percentage points.

Scenario 11. Most OECD countries and some developing countries adjust pensions for increases in cost of living, but they differ as to how the adjustments are made. In China, the level of post-retirement indexation is not specified. Some State Council documents indicate that post-retirement pensions are indexed based on 40%-60% of the increase in regional average wage during the prior year. In practice, however, it is not uncommon to see flat rate, across-the-board increases being granted. This means that pensioners get to share, in part, rewards from productivity gains, but they also become susceptible to the consequences of real per capita income drops⁵². This effect is particularly relevant for the unique circumstances surrounding China's present economic transformation. For the current generation of pensioners, they have been earning relatively low wages throughout their working lives despite robust economic growth in the last quarter century. Now that China is transitioning to a more market-based economy, with different kinds of new job opportunities as well as rapid wage growth, partial wage indexation will allow the current generation of pensioners to share in the higher real income as wages rise. On the other hand, wage indexation can become quite expensive, and when wages stabilize over the long term, pensioners may have to face a reduction in purchasing power in the case of negative real income growth. It is much more difficult for pensioners to adapt to falling real incomes since their consumption habits are already established. Hence, there should be a more transparent and predictable methodology to index pension benefits. Under price indexation, pensions move with the change in price level while the real value of the pension remains unchanged, thus allowing the pensioners to maintain a relatively stable standard of living after retirement, regardless of the level of inflation⁵³. In the case of deflation, however, one would rarely see an actual reduction in pension benefits under a price indexation policy. During these times, pensions tend to remain constant until inflation catches up to the point when a positive adjustment is warranted. Given the pros and cons of the two indexation approaches, and the unique characteristics of the period of economic development China is going through, equity could be improved by partially indexing pension to wages as a transitional arrangement, say for 25 years, by which time new pensioners will have fully benefited from a working career with market-based wages. Thereafter, the policy can be switched to full price indexation, say after 2025. Scenario 11 examines the impact of changing the policy from partial wage indexation to full price indexation, beginning in the year 2026. In view of the assumptions specified in **Table 4**, that 60% of nominal wage growth is generally slightly higher than 100% of inflation throughout the projection period, there will be some marginal savings. The IPD will be reduced from 132% of GDP (under Scenario 5) to 110% of GDP in 2001 while the required contribution rate will decline to 25% of wages.

⁵¹ There is generally no empirical evidence to show that the practice of granting early retirement actually reduces unemployment. On the contrary, the cost of maintaining the current practice of early retirement as a substitute for taking care of surplus workers drives the old age insurance contribution rate up which in turn increases labor costs.

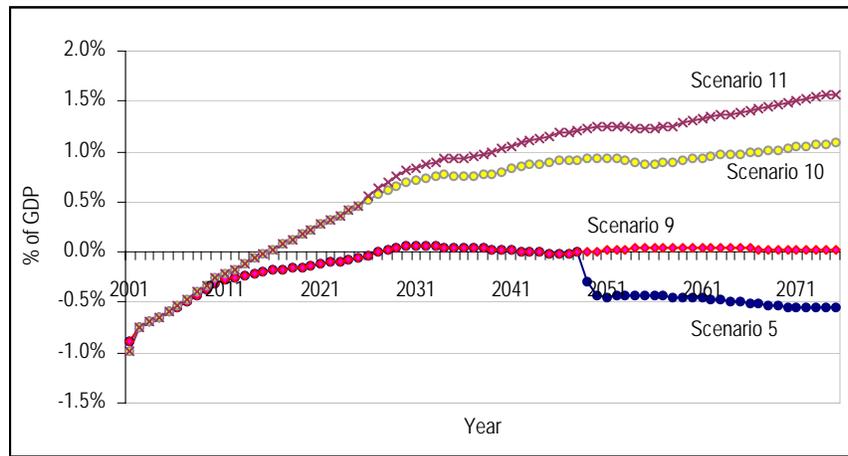
⁵² Austria and Mexico are among the countries using wage indexation.

⁵³ Canada, the United Kingdom and the United States index pensions to prices.

Parametric Reforms within the Status Quo. Several conclusions can be drawn from the projections under Scenarios 9 and 10. First, after changing the amortization methodology, the Individual Accounts are now actuarially balanced, can be self-financing, and will no longer need to draw on the social pool in future years. Second, delaying retirement age will further reduce the cost of providing the Basic Pension and actually generate some savings each year. Third, the combination of the two parametric reforms can lower the required contribution rate to 27% of the contributory wage bill (19% for the Basic Pension and 8% for the Individual Accounts).

Figure 21 compares the cash balances under each of the four scenarios – Scenarios 5, 9, 10 and 11. These scenarios assume that under Document #42, any deficits that arise under the Individual Accounts will be covered by the social pooling. As such, the current balances for these scenarios reflect only those under the social pooling account.

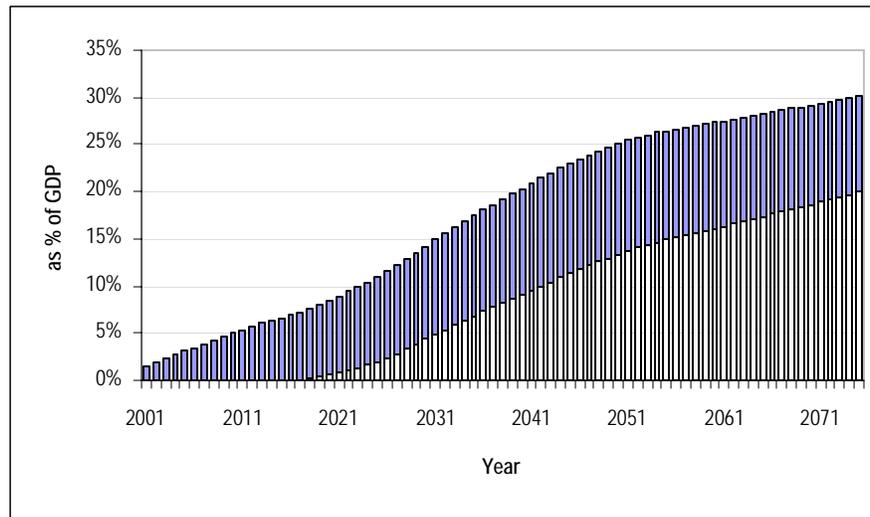
Figure 21: Comparison of Current Balances under Scenarios 5, 9, 10 and 11



Source: World Bank staff estimates based on PROST

Figure 21 clearly shows that prior to 2011, regardless of which scenario, there will be cash deficits under the social pooling account. This reflects the unavoidable cost of transition which varies from close to 1% of GDP in the early years to around 0.3% of GDP by 2010. Thereafter, under Scenario 10, the effects of the two reform actions will begin to be realized, and will quickly move the system into a positive cash flow position. Switching from 60% wage indexation to 100% price indexation will provide additional savings from the year 2026 on, thus further reducing the required contribution rate from 27% under Scenario 10 to 25% under Scenario 11. Since the required contribution rate under Scenario 11 is projected to be around 25% of the contributory wage bill (17% for the social pooling/Basic Pension and 8% for the Individual Accounts), the cash surpluses indicate that the assumed statutory contribution rate of 31% can be lowered by as much as 6% over the projection period.

Figure 22: Fund Reserves under Scenario 11
Social Pooling (clear), Individual Accounts (solid)



Source: World Bank staff estimates based on PROST

Figure 22 illustrates the composition of the fund reserves being accumulated – close to 30% of GDP by 2075. With such a build up of reserves within a mature system, an immediate observation is that the system is “overcharging” for the benefits it is paying out, not to mention the problem of how to address a host of governance and capital market related issues in managing such a sizeable pool of assets. In the following section, alternatives on how best to adjust for this over-pricing will be examined.

Modified Liaoning Pilot

It would appear that China’s old age insurance system under Document #42 could be rendered financially sustainable in the long term provided two specific parametric reforms were to be undertaken: (i) maintain actuarial balance when disbursing the accumulation of the Individual Accounts; and (ii) unify retirement age at 65 for both men and women while eliminating all specially authorized early retirements. An equally important aspect to consider is what the impact of these reform actions will be from the worker’s perspective once the subsidy has been removed. **Table 11** compares the total replacement rates⁵⁴ generated by the accumulation of the Individual Accounts using the factor of 120 viz. the rates under the life expectancy methodology, plus entitlements under the Basic Pension. Also shown in **Table 11** is the percentage reduction in the overall pension benefits as a result of this change in calculation method.

⁵⁴ Defined as the amount of pension at retirement divided by the average economy wage.

Table 11: Comparison of Replacement Rates under the Two Amortization Methodologies

Age at retirement	Replacement rate from Basic Pension	Replacement rate from individual accounts using amortization of:		Total replacement rate		% reduction in pension amount
		Factor of 120	Life expectancy at retirement	before change	after change	
40	18.9%	8.6%	3.0%	27.5%	21.9%	20.4%
45	19.5%	12.0%	4.7%	31.5%	24.2%	23.2%
50	21.6%	14.9%	6.4%	36.5%	28.0%	23.3%
55	24.8%	17.5%	8.5%	42.3%	33.3%	21.3%
60	27.2%	19.9%	11.1%	47.1%	38.3%	18.7%
65	28.7%	22.4%	14.6%	51.1%	43.3%	15.3%

Source: World Bank staff estimates

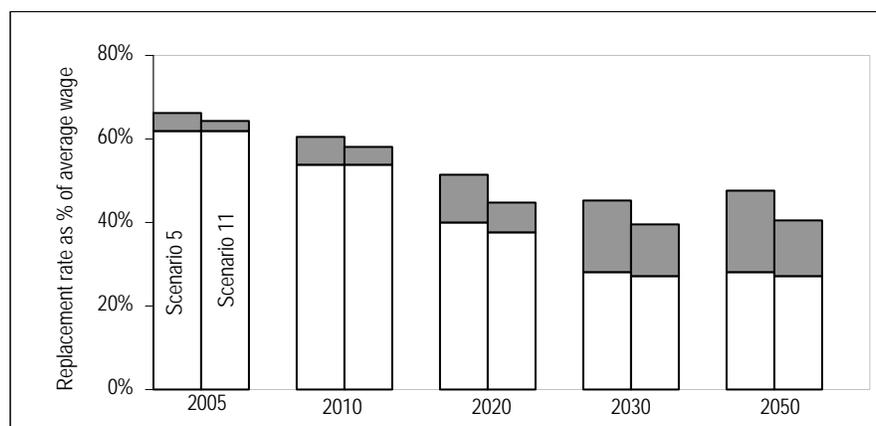
- Assumptions:
- 1/ Annual contribution rate of 8% p.a. to the Individual Accounts
 - 2/ Accumulation period equal to the average years of service of male worker
 - 3/ Interest credited in accordance with the high case macroeconomic assumptions in Table 4

The size of the reduction associated with the change in the amortization methodology ranges from 15.3% for those who retire at age 65 to 20.4% for those who retire as early as age 40⁵⁵. As expected, the lower the retirement age, the higher the reduction due to the change. Since the government is no longer subsidizing the differential between the expected number of remaining years at retirement and the constant amortization factor, workers will now have to bear the consequence of the new amortization methodology. Changing the amortization methodology now (or as early as possible) will probably not create much dissatisfaction given the fact that the accumulated balances in the Individual Accounts are relatively small and that very few workers are actually receiving benefits through these accounts. Hence, the overall impact of the new methodology on the total pension entitlement of cohorts retiring over the next few years will be rather minimal.

Figure 23 illustrates the evolution of total replacement rates provided by the combination of Basic Pension and Individual Accounts for a male worker retiring at age 60 under the current provisions of Document #42 (Scenario 5) and under the reformed system (Scenario 11). As expected, the replacement rates decline over time under both scenarios. This overall declining trend is primarily due to the phasing out of the transition pension (by the year 2025) as calculated under the rules for *middle men*. As to the difference between Scenario 5 viz. 11, the lower replacement rate is caused by the adoption of the new amortization rule for the accumulations under the Individual Accounts – using life expectancy at retirement instead of the “factor of 120” rule. However, partially offsetting the reduction is the fact that starting from the year 2026, pensions derived from the Individual Accounts will be based on a price-indexed pension instead of a wage-indexed pension, which will yield a slightly higher pension under the specified assumptions. In short, under the steady state (i.e., for the years 2030 and after), the replacement rate that a 60 year old male worker can expect will be around 40% of the average economy wage.

⁵⁵ In calculating the account balances, the full term of accumulation for each retirement age was assumed to be equal to the average years of service at retirement.

Figure 23: Evolution of Replacement Rates at Retirement (Men Aged 60)
Basic Pension (clear), Individual Accounts (solid)



Source: World Bank staff estimates

It then becomes a question of public policy as to whether 40% should be considered an adequate replacement rate in China. However, one should not lose sight of the fact that this may not be an “affordable” arrangement⁵⁶, for this type of pension arrangement costs 31% of wages each year for the duration of a working career. Two key factors contribute to this unattractive arrangement. First, under the current investment pattern of Document #42, contributions to the Individual Accounts are supposed to be invested only in government debt instruments or term deposits with financial institutions. These instruments generally yield relatively low returns and in most cases do not outperform wage growth. This implication is especially significant in view of the fact that China has been experiencing aggressive wage growth, a phenomenon that will likely continue in the foreseeable future. Unless these funds are allowed to be managed in ways that will increase the likelihood of targeted investment returns exceeding wage growth, the replacement rates generated by these Individual Accounts will remain moderately low (see comparison in **Table 12**).

Table 12: Return on Investments and Replacement Rates from the Individual Accounts

Retirement age	Contributory years	Investment return (i) relative to wage (g) in real terms		
		$i = g - 1\%$	$i = g\%$	$i = g + 1\%$
65	40	21.2%	27.7%	36.4%
65	30	16.6%	20.8%	25.9%
60	40	17.4%	23.0%	30.7%
60	30	13.7%	17.3%	21.9%

Source: World Bank staff estimates

Assumptions: 1/ Annual contribution rate of 8% p.a.

2/ 100% price indexation after retirement

3/ Replacement rate is expressed as % of initial pension amount to final wage

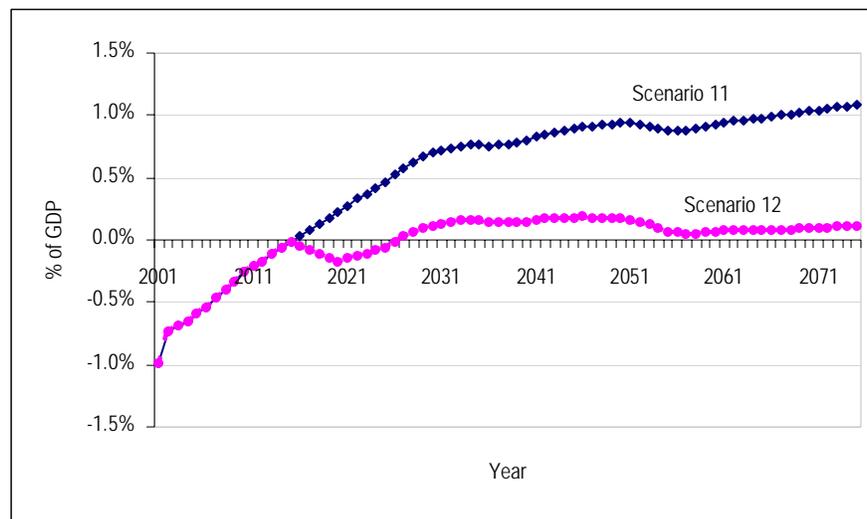
4/ Conversion from accumulation to annuity is at ½% less than i

⁵⁶ The combined annual contribution rate for the five social security insurance programs (old age, health, unemployment, work injury and maternity) averages 40.8% of wages nationally, with approximately 29.8% from the enterprises and 11% by individuals.

Second, the Basic Pension is a defined benefit arrangement with declining accrual rates – 133 basis points of average economy wage for the first 15 years, and 60 basis points for each year thereafter, which means workers will accrue at less than half the initial benefit rate for service after 15 years. This in fact creates a perverse incentive for workers to try and evade the system after completing 15 years of contributing service.

Since it has been determined that the long term required contribution rate is around 17% of contributory wage after adoption of the three parametric reform options, one possible strategy to improve the financial prospect of the system is to reduce the required contributions under the Basic Pension. This will make the system more attractive for workers, thus boost compliance, which in turn will create the combined desirable effects of higher coverage and more contribution revenues, without jeopardizing the other fiscal sustainability benchmarks. Alternatively, instead of reducing the overall contribution rate, reduction to the Basic Pension can be flowed through to the Individual Accounts to allow for higher accumulation and hence higher retirement income. However, this latter option is beneficial only after the investment pattern for the Individual Accounts has been modified to yield a much higher level of return viz. wage growth on a risk-adjusted basis. Yet another option is to explicitly acknowledge, fully or partially, the accrued liability of the pension system, especially liabilities on behalf of those individuals who have already retired, which will open up possibilities for reducing the contribution rate. With explicit acknowledgement, the costs of past policies may not have to be borne exclusively by current and future contributors, but can be more broadly shared by society instead, which would be a more equitable strategy for reducing evasions. (see **Figure 24**)

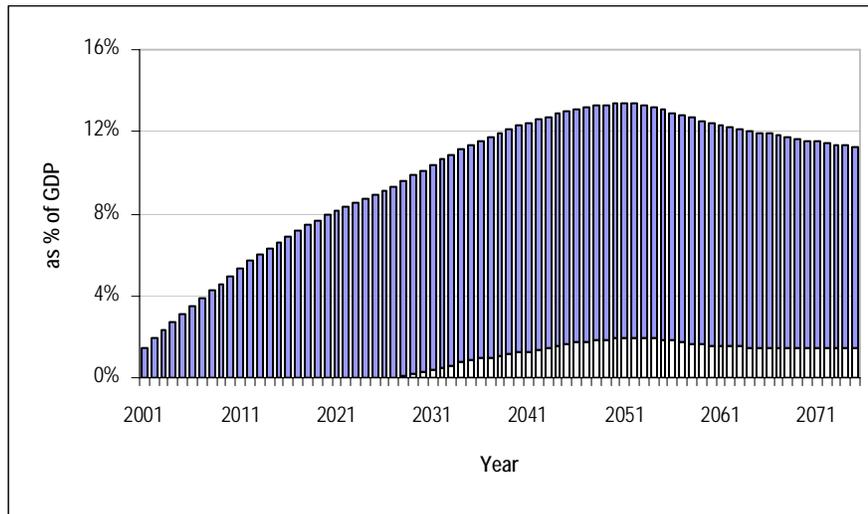
Figure 24: Comparison of Current Balances under Scenario 11 and 12



Source: World Bank staff estimates based on PROST

Figure 25 illustrates the current balances by taking Scenario 10 and modifying the contribution rate after 2015, reducing it from the current 23% by one percentage each year until it reaches 17% in 2021, and keeping it constant thereafter. At the same time, there will be a small build up of pension reserve as contingency fund. **Figure 26** presents the composition of the fund reserves being accumulated under Scenario 11. Both the Basic Pension/social pooling and the Individual Accounts will have reached peak accumulation by 2050, up to 2% of GDP for the Basic Pension and 11% for the Individual Accounts. Both funds will decline moderately and gradually thereafter.

Figure 25: Fund Reserves under Scenario 11
Social Pooling (clear), Individual Accounts (solid)



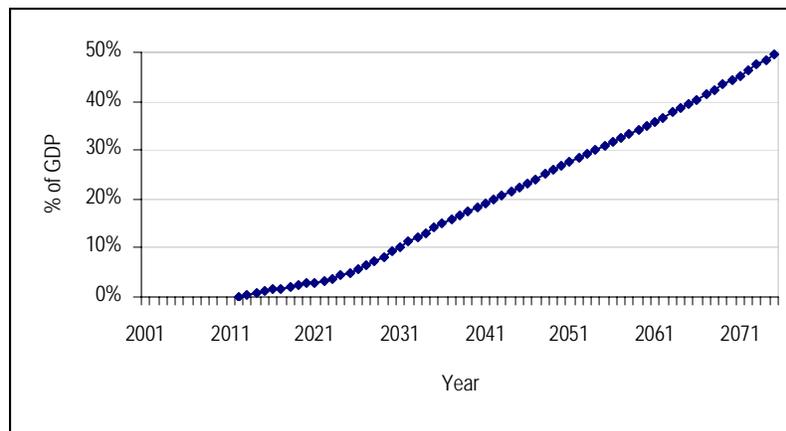
Source: World Bank staff estimates based on PROST

Coverage Expansion

Now that a sustainable and affordable system has been identified, the next step will be to explore scenarios that are associated with wider coverage following expansion. Up to now, the projected long run finances of the old age insurance system assumed that coverage, defined as the percentage of the working age population (ages 15-59) participating in the system, would remain constant throughout the projection period. Projections under Scenario 13 will now take the parameters under Scenario 12 and allow for coverage expansion that will reach 80% of the urban working age population by the year 2075. The assumed growth path is based on cross-country patterns as well as China's time series evidence of the relationship between coverage and income growth. Since it has been established that the provisions under this scenario are financially sustainable (under Scenario 11), there should not be any cash flow deficits or financing gap. It is debatable as to what constitutes a preferred funded ratio⁵⁷ for a public system of this type in order to ascertain that there are reasonable reserves to cover the implicit pension debt and that a growing burden will not be transferred to future generations. Under Scenario 13, it is projected that the funded ratio may grow gradually to nearly 50%, i.e., for every RMB of liability there will be one-half of a RMB of assets to pay for it. This is a particularly important issue given that China is only beginning to develop its fund management industry, and all facets of public and private fund management issues are at an infancy stage. The accumulation of a significant pool of assets, conceivably as much as 75% of GDP in 75 years' time, should not be taken lightly.

⁵⁷ Defined as the ratio of assets to the present value of accrued liabilities.

Figure 26: Funded Ratio under Coverage Expansion (Scenario 13)



Source: World Bank staff estimates based on PROST

Gao's Think-piece (Scenario 14)

Description of Gao's Think-piece. The last reform scenario is a “Think-piece” that has been put forward by a staff member of the former State Council Office for Restructuring Economic System (SCORES) – a proposal that advocates the use of a radical approach to change the system⁵⁸. This proposal is part of a broader government initiative to ensure a minimum living standard and to reduce poverty without compromising the country's international competitiveness. Key provisions of the proposal include:

- Coverage will be expanded to the extent possible to the urban working population, including civil servants as well as state organizations and institutions.
- Eligibility for pension is set at 20 years of contribution. Any one who retires prior to the statutory retirement age will have to wait till age 65 before receiving a pension even if (s)he has been contributing for 20 years.
- Contribution rate should be set on an actuarially fair basis and will be shared equally between workers and employers.
- Target replacement rate for a full-career worker will be around 40% of the worker's last five years of contributory wage and will be financed on a pay-as-you-go basis with some contingency reserve.
- Retirement age should be unified at 65 for both men and women.
- For the transition, all existing pensioners will continue to be paid their current pension entitlements. Contributors who have attained age 50 (age 45 for women), will be paid a pension at age 60 based on the provisions of the status quo but the pensionable wage has to be the average contributory wage for the last five years prior to retirement.

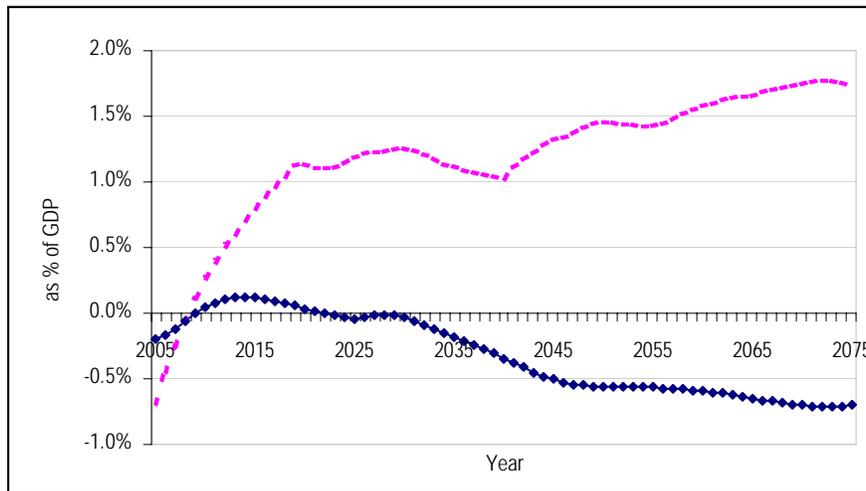
⁵⁸ Gao, S. (2002).

Additionally, contributory wage has to be aligned so that it is consistent with pensionable wage.

- The proposal did not spell out the treatment of the existing contributors who are below age 50 (age 45 for women). For the purpose of this simulation, it was assumed that they would be given the choice of being covered by the existing system or the proposed system.

Financial Projections. Based on the above provisions, the accrued liabilities of the proposed arrangement are estimated to be about RMB6.9 trillion (US\$833 billion), roughly 72% of the GDP in 2001. Furthermore, the actuarially balanced contribution rate for financing a pension provision to yield a replacement rate of 40% of the final five-year average salary is estimated to be around 12% each year. **Figure 27** presents the cash balance of the combined arrangement – closing off the existing system to current participants older than ages 45-50, honoring all pensions in payment, and providing a brand new defined benefit system of 40% replacement rate to the urban working population at large.

Figure 27: Comparison of Current Balance under the Baseline and Scenario 14
Baseline (solid), Scenario 14 (dashed)

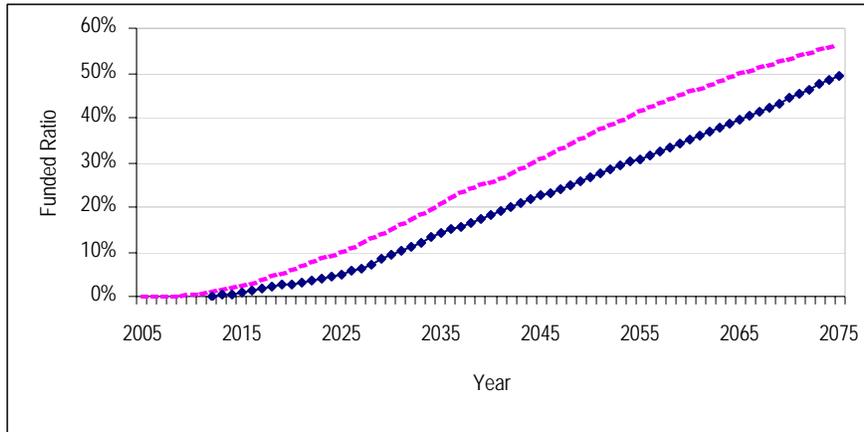


Source: World Bank staff estimates based on PROST

Given the gradual expansion of coverage, the system will not reach maturation until some 20 years beyond the end of the simulation period, during which time the system dependency ratio will have risen even more rapidly. **Figure 28** shows that under Scenario 14, the funded ratio may grow gradually to nearly 52%, i.e., for every RMB of liability there will be RMB0.52 of assets to pay for it. As pointed out in the earlier scenario, the accumulation of large reserve funds of this magnitude requires a strong governance structure to protect the assets during the expansion period, to ensure that there will be sufficient assets to cover the liabilities when they fall due.

Figure 28: Funded Ratio under Scenario 14

Scenario 13 (solid), Scenario 14 (dashed)



Source: World Bank staff estimates based on PROST

Observations. The general parameters and the underlying rationale put forward under this proposal attempt to make the paradigm shift from a primarily pay-as-you-go defined benefit/defined contribution combination to a partially funded defined benefit system. Most of the suggestions are sound and address many of the pitfalls of the existing system. However, a number of issues require further consideration:

- *Using lifetime average earnings instead of last five years of earnings.* There are problems associated with using short periods to measure earnings in pension formulas. These include high costs, strategic manipulation of earnings profiles, and disproportionately higher benefits going to higher-income workers who tend to have more steeply rising age-earnings profiles. The use of lifetime average earnings, revalued for price inflation or wage growth, can provide adequate inflation protection without the adverse side effects.
- *Indexing pensions automatically to price inflation or to a combination of wage growth and inflation.* This provides assurance to pensioners that the real value of pensions can be maintained instead of the uncertainty that is currently associated with annual declarations of the level of increase on an ad hoc basis.
- *Providing the necessary safeguard against political interference.* Given the potential size of the reserve fund that may arise from pre-funding the pension promise, the task of how to overcome the risk of governments trying to interfere in the investment process will be quite challenging⁵⁹. Adverse political influence can cause pension funds to be invested in government securities or socially oriented investments that usually yield below market rates of return, resulting in loss of capital from the reserve⁶⁰. According to research, the likelihood of this type of detrimental interference can be diminished by setting up a proper governance structure, maintaining a high degree of independence from government, adopting transparent decision making processes and supporting participation by non-state players.

⁵⁹ Palacios (2002).

⁶⁰ Iglesias and Palacios (2002).

VII. Conclusions

Based on the projections and analyses presented in this report, several major challenges can be identified for the reform of China's old age insurance system. These are connected with the need to: (i) achieve fiscal sustainability in the face of rapid population aging; (ii) provide adequate old-age income security for workers and retirees; (iii) ensure efficient collection, prudent fund management and effective information management; (iv) achieve sufficient uniformity in contributions, benefits and portability; and (v) elevate the pooling of fund reserves and current balances beyond the municipal level. As a first step towards meeting these challenges, a number of critical issues will have to be addressed.

The political will to address inherent system shortfalls is crucial. While the current system has some major flaws, nothing can be considered so overwhelming as to be beyond repair, provided the political will to solve the problems exists. It is important to emphasize that, regardless of what other reform initiatives the government may wish to undertake, two policy arenas require urgent attention – the amortization of Individual Accounts in line with life expectancy at retirement, and the elimination of special early retirement privileges with the gradual unification of retirement age at 65.

If policy makers are seriously considering implementing the first parametric reform measure, they must act now. When the accumulated balances in the Individual Accounts are still relatively small, with few workers actually receiving benefits through these accounts, dissatisfaction with measures to change the amortization method will be less likely. This is a narrow window of opportunity, and inaction to make the change as early as possible will increase the likelihood of greater opposition later on. As regards to the second parametric reform measure, there is no empirical evidence to support the belief among policy makers that it may have an adverse effect on unemployment. Since the change is meant to be implemented very gradually, over a period of 20 years for men and 30 years for women, this makes it even less likely for it to have any significant impact on unemployment overall.

The combined effect of these two measures should significantly improve the financial prospects of the pension system and put it on a solid financial footing. Savings generated as a result can help to lower the contribution level for the social pooling, which in turn will restore workers' confidence in the system and result in better participation, in addition to lowering the cost of labor and maintaining China's overall competitiveness.

Reducing perverse incentives and enhancing accountability are priority issues. Assumptions on collecting higher revenues depend a great deal on whether better compliance and repayment of contributions in arrears by enterprises can be effectively enforced or not. Not surprisingly, there is a general unwillingness to collect contributions as long as accumulated revenues ultimately translate to surpluses which are then transferred out of the county or municipality. This type of practice not only sets up a perverse incentive to limit collections, it also encourages municipal and provincial labor and finance bureaus to try and maximize central government transfers. This in turn will further weaken the pressure for local collections and act as a disincentive to the transmission of accurate data to higher levels of government.

Historically, mechanisms for integration or coordination between labor and finance bureaus have generally been limited. Data analysis has for the most part been carried out by municipal social insurance agencies, and to some extent at the provincial level. There appears to have been little

effort on the part of local finance bureaus to audit and validate reported information such as contributory wage bill, compliance rate or actual levels of disbursement. While elevating social pooling to at least the provincial level can optimize risk pooling and resource sharing, adopting some mechanism for vertical management and accountability will be essential to offset some of these perverse incentives.

The creation of a dynamic market-based environment with sound pension fund governance is the key to fiscal sustainability. Consistent with international trends, this projection exercise shows that some level of pre-funding is important. These funds can be used to first help finance past liabilities and then to build an adequate contingency reserve for absorbing economic, demographic and political shocks in the short and medium term⁶¹. The important proviso however is that, the system must by design be financially sound and free of systemic leakages. The potential for accumulating any sizable reserve can give rise to another type of challenge for policy makers – the need to devise ways and means to efficiently manage such funds, with proper checks and balances against political and other influences.

Even though higher returns on investments can potentially provide higher pensions under the Individual Accounts, this alone will not necessarily lead to greater income security. In order to realize these potential returns, concurrent changes to financial institutions, capital markets and the pension market will also have to take place. Relevant issues that will come up and will have to be addressed include pension fund governance, integration of public and private retirement income provisions, establishment of financial and pension regulatory regimes, as well as expansion of capital markets for private and institutional investors. It is only within the framework of a dynamic market that efficient portfolio management can take place, thus allowing these potential returns to materialize commensurate with acceptable risk.

Implementing a bottom-up approach and periodic reviews will be necessary for accurate measurements of fiscal status. The projections presented in this report follow a logical, systematic approach in estimating China's pension liabilities and resource requirements. In an environment of highly decentralized administration, with wide dispersion of contribution rates and benefit provisions, as well as extensive variability in stages of economic and demographic developments, a bottom-up approach will provide a more accurate picture of the overall national financial status. Modernization of information technology with installation of an integrated centralized information system will facilitate the timely retrieval of vital data for individual benefit calculations and periodic actuarial projection needs. This will also provide the MOF with accurate and up-to-date statistics on the actual financial status to permit effective planning and efficient resource allocation.

Given that the reformed pension system will remain primarily a defined benefit arrangement, regular estimates of liabilities and assessments on the adequacy of contribution requirements must form part of the review process. In order to identify problems at an early stage, periodic projections should be conducted for each municipality, perhaps every two years, using realistic assumptions and guidelines on asset and liability valuation. However, this will only be possible if

⁶¹ Over the next seven to ten years, China will experience a phenomenon known as the demographic dividend, i.e., the ratio of working age population to total population will continue to rise. It is therefore important to be able to take advantage of this situation to accumulate sufficient capital so that when the demographic dividend disappears and the dependency ratio starts to climb, there will be an asset base to draw against. It is also advisable that such an asset base be invested outside of China so that when the reverse trend happens, assets can be liquidated abroad and capital brought back to China to meet the obligations which in turn can be reinvested in the economy.

there are ways to enforce mechanisms that facilitate the move towards unifying provisions in terms of contribution rates and benefit levels, and towards the goal of attaining a higher order of social pooling to at least the provincial level.

Investing in upgrading and training will increase knowledge transfer and the likelihood of success of the reformed system – After a three year effort to equip staff from finance bureaus with the necessary tools for estimating budget requirements and projecting pension liabilities, the intricate linkages between pension policies and costs are now well understood. The usefulness of the services offered is well recognized and the value of the products generated is widely accepted. Government officials have expressed a keen interest in analyzing pension policies on a long term basis using actuarial projections. It is therefore imperative to capitalize on the momentum and ascertain that this acquired know-how will be transferred to other provinces/municipalities through a training-of-trainers approach.

In fact, the learning experience of the last three years need not be a one-time exercise. A number of participants from the PROST training workshops have “graduated” with sufficient knowledge and skills to become qualified trainers themselves. To improve their capacity for troubleshooting when errors occur and strengthen their confidence in analyzing results for overall reasonableness, training workshops should ideally be repeated at least once every two years. Through this mechanism, earlier trainees who demonstrate both interest and ability can benefit from more advanced training. Then, with practice and over time, the first group of “PROST graduates” can form a core group of “super-users” who will be capable of carrying out the function of disseminating the requisite know-how to the rest of the provinces/municipalities.

A network of PROST trainers can also be established to institutionalize PROST nationally, to help generate the kind of analysis that will be required to inform policymaking on old age income security.

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