

Pension reform in China - a case study

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Abstract:

China is a relatively young country now, but about to undergo a remarkable demographic transformation in the near future. Despite foreseeable dramatic demographic changes, the current retirement system in China is badly structured, and not able to cope with the rapid ageing population in this century. The purpose of this study is threefold. First, we seek to provide a comprehensive historical review and detailed analysis of the Chinese pension system with an ultimate ambition of finding solutions to China's pension crisis. Second, we place the analysis of pension reform in the broader economic context, in order to identify the interaction between pension reform, economic growth and financial development. One purpose is to assess the reform conditions in China. Third, with particular reference to a simulation model, policy alternatives are proposed that could help make the Chinese pension system sustainable in the long run. Based on our critical analysis and empirical work, we find that first, China meet the basic requirement to start pension reform, second, in order to improve the current Chinese pension system, a range of institutional and practical changes need to be undertaken. They include unifying the system across the country to reduce the transaction costs, redesigning the system so it is fair to the current working population, diversifying pension fund portfolios to achieve a high and stable return, preserving traditional family support to serve as an income provision cushion in the short and medium term, and maintaining a stable macro-economy to protect the real value of pension assets.

Keywords: Chinese pension reform, multi-pillar model, simulation

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1 Introduction

Since initiating the economic reform and *open-door* policy in the late 1970s, China has witnessed a tremendous transformation. A once centrally-planned and impoverished country was gradually transformed into a market-oriented economy, and has become one of world's strongest economic powers. The latest joint report by the World Bank, United Nations and Morgan Stanley (ICXO 2005) gave estimates showing that China is turning into the "world factory": one of every two digital cameras sold in the world was manufactured in China, five of every six skiing clothes sold in Europe were made in China, and the increased electricity capacity in the Chinese power market in 2004 approximated the whole UK electricity capacity in the same year, etc.

The impressive economic expansion is also shown by socio-economic statistics in Tables 1 and 2. Table 1 shows that as of 2003, the annual growth rate of GDP per capita was 9.29% in China compared to 2.83% at the world level, 6.92% in low income economies, 5.69% in lower middle income economies, and 1.72% in high come OECD countries. Using 5-year average time series data, the trend is also quite clear. As revealed in Table 2, in all periods (but 1961 to 1965) during the past 4 decades, China performed much better than most other countries. This is particularly a case since the late 1970s, when China started her economic reform and opening-up policy. The average growth ratio between 1981 and 2004 was 8.3%, much higher than that in most other economies, e.g. 2% average in OECD countries, as shown in Table 2. When turning to the level of GDP per capita, China performed relatively well compared to other low income economies. For example, as of 2003 GDP per capita at constant 2000 prices was US\$1067 in China, while it was US\$432 on average in low income economies, as given in Table 1. When using PPP (Purchasing Power Parity), Chinese GDP per capita rose to US\$4,726¹, higher than that in low income economies, comparable to that in lower middle income economies, and still lower than the world average level.

In terms of education indicators, compared to all other but OECD economies, China was also in a more favourable position, as indicated by higher literacy rates. Meanwhile, China witnessed improvements in health and demographic indicators as well: as of 2003 life expectancy at birth was 70.80 years in China, and 58.08 years in low income economies. As regards demographic structure, China was younger than OECD countries, highlighted by a lower old-age dependency ratio. The population growth rates for both regions, however, were at similar levels in 2003.

Against the background of impressive growth, however, the Chinese economy is still associated with a number of key problems which remain to be solved (Yueh 2003; Feldstein 2003; OECD 2005a). Among others are a fragile banking sector (Lardy 1999; Park 2001; Allen et al 2003, 2005; Hu 2005a), widening income inequality

¹ Different estimates of GDP per capita arise from different exchange rates used, given the fact that price for same or similar goods and services might vary significantly across countries (OECD 2005b). The former, i.e. US\$1,067, was calculated by using nominal US Dollar to Chinese RMB exchange rates, while the large value, i.e. US\$4,726, was calculated by using assumed real exchange rates, based on PPP. The nominal exchange rate was much larger than the real rate.

between regions and sections of the society (Yao et al 2004, MOLSS 2005²) and a weak pension system (Feldstein 1998; James 2001; Asher and Newman 2002; Jackson and Howe 2004). Failure to tackle any of these problems may well have a devastating impact on the Chinese economy. In this paper we focus on and investigate the issue of the Chinese pension system.

China was a young country in the quite recent past. Table 3 reveals that in 1960 the ratio of the population aged 65 and above to the total population was 4.84%, while it increased to only 7.30% in 2003. China, however, is about to undergo a dramatic demographic transformation in this century. Forecasting statistics (UN 2004) estimate that the 65+/total population ratio will be 16% in 2030 and 24% in 2050. Similar to other countries (Hu 2005b) the rise in old age dependency ratios in China is mainly due to two factors, i.e. an increasing life expectancy and a decreasing fertility rate (Munnell 2004). Over the past four decades, the Chinese life expectancy has risen from 36 years in 1960 to 71 years in 2003. In addition, on average each woman had 1.88 babies in 2003³, as compared to 3.39 in 1960. The large drop in the fertility rate can be largely explained by the “one child per couple” family planning policy which commenced in the late 1970s, although lower fertility also usually accompanies higher GDP per capita. In passing, as of 2003 China had a population of 1.29bn, around one fifth of the world population.

The introductory information above clearly shows that China is ageing. The major question, however, is how to respond to the rapidly ageing population in terms of old age income provision. The paper seeks to address this issue, and the purpose is threefold. First, we seek to provide a comprehensive historical review and updated investigation of the Chinese pension system, with an ultimate ambition of finding solutions to China’s pension crisis. In particular, by drawing on current literature and analysis we conceptualise and present our solutions while also highlighting some points which appeared in the past literature but have been dismissed by many current Chinese pension experts. Second, we believe that a successful pension reform largely depends on the economic and financial environment in which the reform is undergoing, and also an improved economic and financial environment can facilitate pension reform. To meet this end, we conduct a detailed and comprehensive analysis of the interaction between pension reform, financial development, economic growth and other necessary institutional factors in China. Third, with particular reference to a simulation model, policy alternatives are proposed for the purpose of making the Chinese pension system sustainable in the long run. Particularly, we present the quantitative impacts on the replacement rates of diversifying pension fund investment and reducing administration costs.

² The latest statistics from Ministry of Labour and Social Security of China (MOLSS 2005) estimate that as of 2004 the richest 4% of the population in China controlled 45% of the national wealth, and the poorest 10% population controls only 0.4% of the national wealth. In addition the average wage difference between that in urban and rural areas was at the ratio of 3.3. It notes that if such a trend continues, in 10 years time there will be a risk of social unrest.

³ Despite the adoption of the one-child policy in the late 1970s, many Chinese, mainly those in rural areas have managed to have more than one child. It is partly due to the relaxation of the policy in the countryside, and partly due to many Chinese family’s willingness to pay the penalty as long as they can have more children. In addition the one-child policy does not apply to the national minorities in China. All these explain why as of 2003 on average each woman had more than one baby.

The structure of the remaining part of this paper is as follows. In Section 2 we review the Chinese pension system from 1949 when old age provision was first introduced till 2005. In Section 3 we identify those problems associated with the current pension system. Based on the analyses in both Sections 2 and 3, we propose some solutions to the flawed Chinese pension system in Section 4. Section 5 provides a comprehensive discussion of the economic and financial environment in which pension reform is undergoing, and the benefits of undertaking pension reform as well as an assessment of the preconditions. In Section 6, we present a simulation model and its empirical results; the purpose is to find alternative reform policies which could shift China towards a more sustainable pension system. Section 7 proposes some policy recommendations by combining both previous analysis and empirical work in Section 6. Section 8 concludes the paper by summarising our main findings and policy suggestions.

2 Historical review of the Chinese pension system

Since establishment of the first pension system 50 years ago, the Chinese pension system has undergone a continuous process of evolution. In this section we review what has happened, and is happening to Chinese pension system, in order to facilitate our critical analysis in next two sections.

2.1 The period 1949-1979

2.1.1 1949 to 1966

After socialist new China's establishment in 1949, the authorities promulgated *Regulations on Labour Insurance* in 1951. The Regulations, as the first labour social security law, served as the framework for the provision of cradle-to-grave benefits to urban employees. The urban population covered under this law included SOEs (state owned enterprises) and large COEs (collectively owned enterprises) employees⁴, civil servants and those people working in other public institutions, e.g. universities, hospitals, etc (Song and Chu 1997). The system was run on a pay-as-you-go (PAYG) basis, and solely funded by enterprises at a rate of 3% of the wages payroll; a 3% contribution rate was very low but feasible given the young population. Pension funds were administered by local trade unions at the municipal level. In 1954, the All China Federation of Trade Union (ACFTU) was set up by the central government, and took the responsibility for pension fund administration at the national level. In other words, pension funds were pooled across the country and thus pension provisions could be optimised across regions with different demographic features by involving intra-national transfers. Ironically, the first established formal pension system in China was quite advanced in terms of pooling risk; the system, however, was abandoned when the Cultural Revolution broke out in 1966 (see next section).

The Regulation was under continuous amendment throughout this period as shown in Table 4. For example, the initial requirement in terms of minimum years of working at the current place of work for a basic pension was 10 years, and it was decreased to 5 years in 1953. Meanwhile, men/women needed 25/20 qualifying years to get a full pension in 1951, while in 1958 the requirement was reduced to 20/15 years. The

⁴ For both SOE and COE the required minimum number of employees under the Regulations was 100.

retirement age was constant over the period, i.e. 60 for men and 50 for women. But those women in managerial positions were allowed to retire at 55. In addition, those workers employed in hazardous industries, e.g. mining, were allowed to retire five years earlier than normal, e.g. at the age of 55 for men and 45 for women. As shown by low life expectancy in the 1950s, e.g. 45 years in 1958, the relatively high retirement ages at 60/55 were not appropriate.

2.1.2 1967 to 1976 (Cultural Revolution)

Given the youthful age structure of Chinese population at that time, the pay-as-you go system worked well. But it only lasted 15 years until 1966 when the *Cultural Revolution* started. This unforgettable disaster in Chinese contemporary history stopped economic growth, and threw the whole country into ceaseless political battle and social chaos. Under these circumstances, trades unions – which once were responsible for pension administration and provisions - were abandoned and dismantled. In consequence, pension fund surpluses accumulated at both local and national levels during the past years were eroded and embezzled for other purposes.

Given the disorder of government at all levels during the so-called *Ten Year Catastrophe* in China, enterprises instead of the state had to take full responsibility for employees' benefits. In this context, all risk, demographic and investment if any, was confined within individual enterprises. Therefore, there was no cross-subsidization and risk sharing across enterprises and regions, like the pre-1977 pension system. The SOEs-based social security system continued even after the *Cultural Revolution* ended in 1976. The system was very generous by international standards and also known as the “iron rice bowl” in China. The “iron rice bowl” is a Chinese term referring to an occupation with the guaranteed lifetime employment, as well as stable income, and other benefits. The generous benefits include pensions, health care, children's education, housing allowances, etc. All expenses were mainly financed from enterprise revenues/contributions, and there was not any requirement for employees' contributions.

2.1.2 1977 to 1979

During this period, the SOEs sponsored “iron rice bowl” policy continued to be adopted across the country, although the pension accessibility became easier. In 1978, pension regulations were subjected to several amendments again, and the new rules allowed people who worked continuously for 10 years to be eligible for a pension rather than waiting 25/20 years. Meanwhile the replacement rate was raised to 60 percent for 10-15 years employment and to 75 percent for 20 years employment. In addition to the above changes towards an easier eligibility for a pension, many other favourable policies were introduced; for example a worker was not only guaranteed a lifetime employment, but also one of his/her children was allowed to take the same job when that worker retires (see Table 4 for a comparison of policy changes over the period 1949-1979). The new regulations of the 1970s towards a higher benefit and easier accessibility were clearly designed to encourage early retirement in order to

accommodate the influx of millions of migrants from rural to urban areas⁵ in China at that time.

Last, it is worth noting that the old system we reviewed in this section was limited to people living in cities and towns only, and mainly relevant to workers in the state owned enterprises and collectively owned enterprises. For the rest of the Chinese population - principally the rural population, there was not any formal pension system. In the 1970s the rural population accounted for around 80% of the whole population in China. Regarding people living in rural areas, family support plays a pivotal role. In this context it is very likely that three or four generations live in a big house, pooling all resources and sharing risks. There is a moral responsibility for sharing between generations. Normally, older generations help raise their grandchildren and do housework, while the middle generation works outside and generates income to support the family members - including both older generations and children who are too young to work. Such family support, as a complement to the established formal pension system, is also very common in cities.

2.2 The period: 1981-1989

During the period up to the 1980s, eligibility for a pension was relaxed in China. As revealed in Table 4, in 1951 the qualifying period for men was 25 years, while it was reduced to 20 years in 1958 and further to 10 years in 1978. Combined with population ageing, this meant that both the number of pensioners and pension expenditures increased significantly during the 10-year period from 1978 to 1988. For example, Table 5 reveals that the number of pensioners increased from 2.14 million in 1978 to 21.20 in 1988. Pension expenditures rose around 20 times in nominal terms over the same period, although growth was slightly smaller if inflation was considered (the average inflation rate during this period was 5%). In addition, the dependency ratio – the ratio of the number of pensioners to the number of workers - increased from 3.3% in 1978 to 15.6% in 1988.

Aware of the increasing pressure from old age provisions and the ageing population, the Chinese government implemented major reforms. In 1986, the authorities published provisional regulations, which required SOEs employees to contribute up to 3 percent of their wages towards their pension schemes. Along with the employees' contributions, enterprises contributed 15 per cent of payroll. The regulation was promising as it recognised the need of individual employees to prepare their retirement by making contributions. Therefore it was the first step towards a multi-pillar pension system involving contributions from both employees and employers. In addition, it helped to reduce the pension burden for enterprises, which could be viewed as part of the government's wider efforts to make SOEs more commercially oriented.

Meanwhile, the authorities set up a new agency i.e. the Social Insurance Agency. It served as the supervisory body of pension system in China, and was mainly

⁵ Chinese economic reform started in rural areas in the late 1970s, marking the start of dis-collectionisation, i.e. de facto privatisation or capitalism in nature. One consequence was the creation of large labour surplus released from the farming work. A significant portion of those released from the rural labour force has moved to cities and towns, seeking job opportunities. We will discuss it in more detail in Section 3.1.

responsible for the general administration and supervision of pension provisions, as well as the drafting and implementation of relevant regulations. During this period, pension provisions were still run on the enterprise basis, and pension assets pooled and distributed in each individual enterprise. In my view, it was like the defined-benefit (DB) pension plans which have long implemented in many countries. It was employer-sponsored, benefits were pre-determined, and increased commensurate with years of service with current employers. If pension payment was larger than contribution received, the difference was met by using company profits. If sponsors went into bankruptcy, the state stepped in, via the Social Insurance Agency.

2.3 The period: 1990 - 1999

2.3.1 1991 reform

After several years' trial in the late 1980s, the Chinese government decided to deepen its reform with the aim of establishing a multi-pillar system which is more able to cope with the ageing population. It was marked by the passage of *No. 33 State Council Resolution on Pension Reform for Enterprise Employees* (MOLSS 1991), a legal formalisation of several provisional regulations mentioned in previous sections. The No. 33 Resolution called for contributions from individual workers. Previously the pension burden mainly relied on contributions from enterprises, with the pension deficits met up by the state. It was stipulated that employees should make contributions of not more than 3 per cent of their wages to the first pillar, and such contribution was expected to move along with wage growth given that the contribution rate is a percentage of the wages. The pillar was managed on a PAYG basis since the No. 33 Resolution noted that the amount of pension asset collection in a single year should be based on the estimated pension payout of the same year. The intended replacement rate was in the range of 60% and 75%, depending on different types of employment.

Besides the first pillar above, the Resolution encouraged the establishment of second and third pillars. The second pillar was enterprise based and required contributions from both employers and employees, and the third pillar served as a complementary saving account with contributions from employees only. Both pillars were fully funded and all contributions credited to individual accounts. Both pillars two and three, however, were not compulsory and the decision whether to participate depended on enterprise profitability and employees' willingness. In reality, however, no enterprise set up a pillar two and very few individuals had pillar three during the period.

As for the 1991 reform, like many other Chinese reforms, the central government only issued directives/guidance on how to reform the pension system. In consequence, it left much room to manoeuvre for municipal and provincial governments. On the one hand, the practice was appropriate, since it allowed local authorities to adapt the reform to specific local conditions. On the other hand, it led to great differences and fragmentation during the reform process, an important feature of the Chinese pension system (Wang 1995). In addition, a number of powerful industry-related ministries, e.g. the Ministry of Railways provided separate pension schemes, which further increased the system's fragmentation and confusion.

2.3.2 1995 reform

In 1995 the government released *Circular No. 6 State Council Resolution on Deepening Pension Reform for Enterprise Employees*. The Circular No 6 was viewed as the starting point for another round of reform towards the multi-pillar pension system, which combined both social pooling and individual accounts. As we mentioned earlier, the 1991 reform was problematic in that it only provided guidance in respect of reform, and regulation details were not specified. In order to ameliorate the problem and unify pension operations, the Circular No. 6 introduced two initiatives to municipal authorities, but the implementation of either initiative needed permission from provincial governments. Both initiatives were related to the first pillar of the pension system.

Initiative one specified that employees should contribute at least 3 per cent of wages to their accounts, and the contribution should increase by one per cent every two years until it reached 5 per cent. In addition, enterprises were expected to contribute 11 percent of payroll. Regarding *Initiative two*, specifications of the contribution sharing between individuals and enterprises were not made and left with the local authorities to decide. Another distinction between *Initiatives one and two* was about the relative size of the individual account. Based on *Initiative one*, the individual account consisted of all contributions, i.e. 5 per cent employee contribution and 11 per cent enterprise contribution. Under the proposed *Initiative two*, the individual account may only consist of part of the combined contributions, and the relative size of the individual account depended on the local/enterprise variation. The coexistence of two initiatives created many problems and further fragmentation. The original intention of allowing municipalities to choose these two or to mix them was justified, but in practice it led to the creation of hundreds of incompatible schemes across China (World Bank 1997). This was largely due to local government's attempt to differentiate its scheme from others in order to maximise their own benefits.

2.3.3 1997 reform

In 1997 a milestone pension regulation, i.e. *State Council Document No. 26 Establishment of a Unified Basic Pension System for Enterprise Employees*, was published. The regulation - largely influenced by recommendations from the World Bank (Friedman et al 1996 and World Bank 1997) required the establishment of a multi-pillar system. Based on the new model, China should establish a unified pension system by 2000 on a national basis. The system should cover all employees working in cities and towns, regardless of ownership of enterprises or organisations to which employees were affiliated. Previously, pension reform mainly covered the SOEs and COE workers in addition to those workers in other public sectors.

The detailed structure of the 1997 model is given in Table 6. Pillar one comprises two components, i.e. 1A and 1B. Pillar 1A is run on a PAYG basis. The contribution is 17% of wages and wholly from enterprises. The replacement rate is 20%. Pillar 1B, managed as individual accounts, is financed 8% contribution via enterprises and 3% from individuals. Individual contributions, however, were planned to increase by 1 per cent every 2 years until they reach 8 per cent. With a target replacement rate at 38%, the monthly payout from pillar 1B is calculated by dividing the account balance by 120. Both components are mandatory, and the collective target replacement rate is

58%, i.e. 20% from pillar 1A and 38% from pillar 1B. Reform of pillar one was the focus of the Document No. 26 and most of the government's efforts have been put into its implementation. Both components are operational, but pillar 1B is just in name, as the individual accounts are always empty (Hussain 2001). Funds accumulated in the pillar 1B's individual accounts are frequently used to pay current retirees' pensions (details will be discussed in next section).

Besides pillar one, the Document No. 26 encourages the establishment of two other pillars. Pillar two as shown in Table 6 is similar to occupation pensions in western countries, e.g. the UK and the US, but it is voluntary. The pillar is designed to receive contributions from both employees and employers. In reality only those enterprises which are very profitable are willing to provide occupation plans to employees (Hu 2005e), since most other firms view such contribution as a tax. Currently the number of participating enterprises is quite small in China, partly due to the lack of tax exemption benefits (see Clark and Hu 2005a for historical figures related to foregone tax revenues for contributions on occupational pensions in the UK and the US). Pillar 3 serves as the complementary individual saving account. It is designed for those people who want to save more money for their post-retirement lives. Partly due to the lack of income tax incentives for saving money via pillar three, there is virtually no take-up of this option.

The qualifying years for a full basic pension (pillar one) is 15 years. If a person has a contribution history of less than 15 years, he/she only is entitled to payment from individual accounts - pillar 1B. In other words, he/she can only have a replacement rate of up to 38%. In addition, regarding investments, the Document makes it very clear that all surpluses in pillar 1A and the balance in pillar 1B should be invested in bank deposits and government bonds only. Pension funds should be restrained from investing in any other financial instrument, e.g. stocks. Last, it is worth noting that all these pension reforms initiated in China, as we discussed above, superseded each other, i.e. the old reform is always replaced by the new ones once the authorities introduce the latter. Meanwhile, regarding the three pillars of the Chinese pension system as given in Table 6, workers have to participate in them in order from pillar 1. In principle, workers were allowed to move from one scheme to another. Due to the fragmentation of the Chinese pension system, such movement always results in a sizable loss of pension benefits (see Section 3 for details).

2.4 The period: 2000 onwards

2.4.1 Liaoning reform

One important part of the 1997 reform is the establishment of individual accounts, i.e. pillar 1B. The change is in the right direction towards a more appropriate multi-pillar model after recognising the un-sustainability of the previous unfunded system. In reality, however, pillar 1B is largely notional. The main reason is that, as noted, assets accumulated in the pillar are always used to pay current retiree' pensions. In consequence, pillar 1B, which is supposed to be a funded pillar, becomes a PAYG account again.

Aware of the issue, the Chinese government in 2001 started experimenting with a experimental pension reform in Liaoning province. Liaoning, located in north China

and once a heavy industry hub, has recently witnessed a sharp increase in retirees and pensioners (OECD 2005a). For example as of 1999 Liaoning housed 678,000 laid-off workers from the SOEs (NBS 2001), which accounted for 11% of national laid-off workers. Since many of them were approaching their retirement age, they were allowed to have a full pension in order to pacify them. In consequence, in 2000 Liaoning, a province with a 3% of the total population in China, hosted 7% of the total pensioners in China.

Given the grave picture of pension operations in Liaoning, the Chinese government believed that if Liaoning could be freed from pension difficulties, the experience should be very useful for other provinces, and the task should be easier since other provinces are likely to have a younger population and a lesser number of pensioners. In 2001 with generous support from the central government, not least to the significant budget transfer, a pension reform commenced in Liaoning. There are some key features relating to the Liaoning reform:

First, pillar 1A is financed by a 20% contribution from enterprises only, and pillar 1B by an 8% contribution from employees. The individual account is solely financed by pillar 1B and funds accumulated in pillar 1A are for social pooling purpose only.

Second, there is a separation between fund management of pillar 1A and that of pillar 1B. The main purpose is to avoid the fund transfer from pillar 1B to pillar 1A when the latter gets into deficit. In order to facilitate the separation, the central government uses budget transfer to meet any demand from the deficits in pillar 1A.

Third, with the purpose of encouraging the development of supplementary pensions, i.e. occupation pensions, contributions to pillar 2 are tax deductible, but the limit is 4 per cent of pre-tax wage bills. As of 2003 1,124 enterprises in Liaoning participated in the scheme, 60,000 people were covered, and the amount of accumulated assets was around RMB1.4bn (TPPension 2005).

Fourth, in order to achieve higher returns, pension assets accumulated in supplementary pension are encouraged to invest in high-risk-high-return financial products, e.g. equities. In this context, investment normally is outsourced to specialist fund managers. Pension assets in pillars 1A and 1B, however, should still be invested in bank deposits and government bonds.

The Liaoning reform is promising in that it recognises the need of separating PAYG and funded accounts, which therefore makes the fund transfer from the former to the latter impossible. In addition, other investment opportunities, e.g. equities, are allowed to be considered, which can potentially increase investment returns in the long run. There are, however, three concerns as follows.

Firstly, a 20% contribution rate to the system's social pooling component, as we will discuss in Sections 3 and 4, is too high, which thus motivates evasion. Secondly, 4% tax exemption for employer contributions is quite low, when compared to practices in other countries, e.g. no any restriction about the maximum amount of tax relief an employer can receive when making pension contributions, based on current UK pension policies (HMRC 2005). Thirdly, tax benefits only are relevant to employer contributions, which might hinder the would-be rapid growth of pension assets if

contributions from both employers and employees are tax exempted, as well as people's willingness to participate (Hu 2005e).

2.4.2 National Social Security Fund (NSSF)

In 2000 the National Social Security Fund (NSSF) was created in China. At the same time, the National Council of the Social Security Fund, as the supervisory and management body of the NSSF, was established. In nature, the Chinese NSSF is similar to the national pension reserve funds in some western countries, e.g. Norway's Government Petroleum Fund (GPF) and the Irish National Pensions Reserve Fund, but different from provident funds established in Singapore and Malaysia. The principal objective is to prepare for the ageing population in China and the subsequent large pension deficits by setting up a strategic reserve fund.

The NSSF assets mainly come from four sources. There are fiscal transfers from the central government budget, equity asset transfers from state share sales in SOEs, national lottery income and investment income. As shown in Table 7, the principal asset source is the central government transfer. For example, in 2000 there was a RMB 20bn transfer, and in 2004 it rose to 114.8bn. For all four years, the central government transfer accounted for well above 75% of total assets. The second largest source is the transfer of revenues from state share sales in SOEs. Based on the experience on Chilean and Polish pension reforms⁶, in order to build up the NSSF, China decided in 2001 to transfer a portion of the State shares⁷ in SOEs to the NSSF. Specifically during the IPOs in both domestic and overseas stock exchanges, 10 per cent of the State shares in SOEs should be sold in the markets, and resulting revenues transferred to the NSSF (See Section 5.1.2 for details).

Regarding fund management, it is stipulated that NSSF can be invested by in-house teams or outsourced to specialist fund managers. Investments by in-house managers is limited to bank deposits, government bonds and other financial instruments with high liquidity and security. For those funds invested by outsourced fund managers, a number of quantitative investment restrictions apply. The minimum investment limit on bank deposits and government bonds is 50%, among which at least 10% should be invested in bank deposits. Investments in non-government bonds, i.e. corporate bonds and other financial bonds should not exceed 10% of the total assets. In addition, the limit on shares and investment securities is the maximum of 40%. It is worth noting that all investment should be within Chinese borders, and all other investment options, e.g. hedge funds, real estate and overseas assets are either unavailable due to the thinness of the Chinese financial markets, nor allowed due to the foreign exchange controls.

2.4.3 Occupational (employer sponsored) pensions

Over the past two years, the Chinese pension system has witnessed new developments as the pension reform gathers pace. One of those developments is related to the growth of the supplementary pillar, i.e. occupational pensions. Table 6 shows that in 1997 details about the supplementary occupational pensions, i.e. pillar two, were not

⁶ There were a variety of ways of financing the pension deficits in Chile, one of which was the sale of assets through privatisation (Acuna and Iglesias 2001).

⁷ See Appendix A for the classification of the Chinese equity shares.

finalised, although there were experiments in many provinces. In 2004, however, the Ministry of Labour and Social Security of China (MOLSS 2004a) published and implemented the *Provisional Regulations on Occupational Pensions*. Learning from experiences of earlier pension reforms, including the Liaoning reform, the Regulation details operational coverage, fund resources etc. For example, based on the Regulation, enterprise contributions should not exceed 1/12 of the total wages bill, and collectively enterprises and individuals should not contribute over 1/6 of the total wages bill. All contributions are to be credited to individual accounts and these accounts are to be fully funded. In addition, sponsoring enterprises should set up a committee overseeing the operation of pension funds and the committees have representatives from employees and/or plan participants. In addition, employers are allowed to deduct up to 4% of the total wage bill from gross income for pension contributions. Regarding employee contributions, there is no relevant taxation incentive. We believe, however, that in order to stimulate pension asset growth, it is better to allow employees to deduct a pre-determined portion of their incomes before tax, like the 401(K) scheme in the US.

Given the importance of pension fund management and regulation (MOLSS 2004b), another regulation specifically focused on the occupational pension funds was released in 2004. It specifies the minimum requirements for qualified asset managers. For example, registered capital should not be less than RMB 10bn, and during the past three years there should not be any malpractice or illegal behaviour. Regarding investment regulations, quantitative restrictions apply, and are slightly different from those imposed on the NSSF as we discussed in the previous section. Specifically the upper limit on investment in bank deposits and fixed-income securities is 50% of total assets, but the lower limit on government bond investment is 20%. The investment limit on shares is 20% of the total assets. Like regulations on the NSSF funds, investment in foreign assets and alternative assets, e.g. hedge funds is not allowed. In general, China's occupational pensions adopt the quantitative restriction investment approach, rather than prudent person rules (Davis 2002a; Hu 2005c) (see Section 3.3 for a comparison of investment regulations between China and other countries).

In addition, the provisional regulations note that pension assets should be fully funded, and assets accumulated in the account belong to the beneficiaries. The choice of DC and DB schemes, however, is left with the individual employers to decide. Extensive research has been conducted on the differences between DC and DB plans (Baker 2005; Clark and Hu 2005b). In line with the global trend of declining DB occupational plans, e.g. the US (Munnell 2006), and the UK (Clark and Hu 2005a), employers in China mainly provide DC plans to their members (Tuo and Zhu 2005). This popularity of DC plans is largely due to the low risk of DC plans from the point of view of employers. In other words, any risk, principally investment risk, is borne by the DC plan members, and employers have no further obligations beyond their periodic contributions.

As we will discuss in Section 5.1.2, however, the stock market in China is very volatile, therefore there is a concern that if a large volume of pension and post-retirement annuities assets are invested in domestic equities, the plan members might end up with taking on excessive risk. Meanwhile, under the DC regime, sponsors have low incentives to optimise returns and may seek to be over-cautious (Davis 2004a). To solve this issue, one way is to encourage employers to provide DB plans. In this

case, most risk is transferred to sponsors, and the members are guaranteed a certain level of benefits. Another way is to allow pension assets to be invested abroad, so as to diversify investment risk and achieve a more stable return (see Sections 4 and 6 for details). Last, note that occupational pension assets in China are not protected by any formal or systemic arrangements except the state, in case of sponsors' bankruptcy. As a result, any shortfall might have to be met by the state if the occupational schemes cannot deliver sufficient supplementary income to avoid pensioner poverty and income inequality (Clark and Hu 2005a).

3 Problems of the Chinese pension system

In the previous section, we outlined the evolution and development of the Chinese retirement system, from 1949 when socialist new China was founded to the latest 2004 regulations on occupational pensions. With reference to the above description, we analyse current problems relating to the Chinese pension system in this section.

3.1 Poor coverage in rural areas

Pension coverage in China is largely limited to urban employees working in the public sector of the economy. In principal, people in rural areas are covered by another pension system, called the *Provisional rural pension system* (MOLSS 1992). The system was especially designed for rural areas and quite different from and much less generous than that operating in urban areas. Pension participation is voluntary, and the practical issues, e.g. how to make contributions to the pension system is left to the local government. In practice, only a very small portion of the rural population participates in such a pension system.

For example, statistics in Table 8 reveal that during the period 1999-2003, in addition to a small declining trend the rural pension coverage rate in China was in the range of 9-11 per cent⁸. Specifically in 2003 the number of participants in any formal retirement system in rural areas was 54.3 million, which only accounts for 9 per cent of the total rural population. In other words, as of 2003 for every 11 people above age 15 only one person was either lucky enough to receive benefits from the government or need not to worry about his/her future retirement life to the extent he/she participated the system. As a result, post-retirement lives for the remaining 10 people are deemed to be very hard if lacking traditional family support. Other statistics present an ever more grim picture. Pang et al (2003) give estimates that only 3% of the old in rural areas were covered by any pension system in China, and the average pension was only RMB100 (\$12) per month.

Current poor pension coverage in rural areas is just one side of the story. The other side, which is ever more worrying, is that looking forward, the authorities have not really realised and are not seriously taking steps in tackling the pension crisis in the countryside. For example, a rough comparison of the number of regulations relating to pension provisions in the past reveals that the Chinese government has spent and is spending much more efforts and energy on urban reform. During the period 1991-2004, there were at least five major regulations directly linked to urban pension

⁸ The pension coverage ratio was calculated by dividing the number of year-end participants by the rural population aged above 15.

reform and ten supplementary regulations; the latest one was in 2004. In comparison, only two regulations - whatever major or supplementary - were focused on rural pension reform, and the latest one was issued 10 years ago in 1995. More ironically, the latest work commissioned by the Development and Research Centre of the State Council⁹ (Li and Gao 2005) outlines 23 options for Chinese pension reform, but of these options, only 2 are aimed to address the rural pension crisis.

As we briefly mentioned in Section 2.1.3, the traditional culture of raising children and supporting the old is very strong in China, particularly in the countryside. Indeed for those 90 per cent of the rural population who are not covered by any formal pension system, the majority, if not all of them, must depend on informal family support to survive. The main reason why the Chinese authorities have given the priority to the urban pension reform is related to the means of production, although this argument is becoming less strong following China's mass industrialization (Leisering et al 2002). To clarify, in China, it is widely recognized that the last resort of living or the means of production for the peasants is the land for which they have the right of usage, although the land is state owned. For those people living in urban areas, simply speaking, they have to sell their labour to entrepreneurs in order to earn incomes; with such income they can buy food sold by the peasants. During this process, the urban workers are disadvantaged to the extent that it is likely that they end up with no resources to support themselves when they retire, if we abstract from family support. Under this reasoning, it is preferable for the government to consider the old-age provision for those citizens living in urban areas first. In addition, the Chinese authorities argue that if the Chinese industrialisation process continues its rapid pace in this century, it is very likely that the majority of the population will live in urban areas some point in the future (World Bank 1997). In that context, if current urban pension reform works well, most of the Chinese population will be eventually covered by the formal pension system.

Given the lack of any formal pension system in rural areas, the informal arrangement of family support plays a crucial role. The informal system worked well in the past when peasants were bound to the land, and the job mobility between regions, i.e. from rural to urban areas was very limited. The arrangement is facing increasing pressures now. The main reason is that the extended family is breaking down, as more and more young people move to cities and/or towns, looking for job opportunities. Statistics (NSB 2005) give estimates that as of 2004 the number of peasant migrants in China was around 150 million, among which, half moved between provinces. Meanwhile, 80% of rural households had family member(s) working in the non-farming occupation.

Despite the significant presence of migrant workers in urban areas¹⁰ and their large contributions to recent high economic growth in China¹¹, however, they benefit little

⁹ The Development and Research Centre of the State Council, as the most influential think tank of Chinese top policy makers, plays a central role in initiating any economic reform in China.

¹⁰ An earlier report (CRER 1996) shows that as of the mid-1990s rural migrants accounted for 18% of the total rural labour or 34% of the total urban labour force.

¹¹ It was estimated that a quarter of world's clothing production is produced from the Pearl River Delta, southeast China. Thousands of joint ventures and foreign firms settle down in that region and most workers are very young rural-urban migrants, i.e. the average age was 25.4 for females and 28.3 for males (Fan 2004). Those young and unskilled workers are always engaged in labour intensive work but

if any from the urban pension system. This is mainly due to “isolated economies” between rural and urban areas¹² (Meng and Zhang 2001). Thus, rural migrants are still closely attached to the place where they are from, i.e. countryside, although they are free to work and live in cities. As we mentioned earlier, however, there is not an adequate rural pension system in China. So, there will be problem of poverty in old age if migrant workers cannot earn enough money to support their post-retirement lives, when returning from cities to home countryside. As regards those migrant workers who participate in the urban pension system - thanks to the government’s efforts to extend pension coverage, most of them find the system inconvenient, in that it is not easy to transfer accumulated pension assets between jobs without suffering a significant loss. Therefore, they choose either to evade participation in the first place, or drop out the system when changing jobs or returning back to countryside (see the next section for details about latest developments of rural workers’ pensions in urban areas).

3.2 Insufficient pension provision in urban areas

We have noted a couple of times throughout the paper that the Chinese pension system vastly favours urban workers. For example, many more state resources have been used in urban areas with an attempt to reform the fragile system, which is to some extent reflected by the various regulations released over the course of the last 10 years (See Section 2.3 for details). There are a number of reasons why urban areas have been given more emphasis during the process of China’s pension reform. The first is related to the means of production, as discussed in Section 3.1. Another reason is the pressure arising from the large volume of laid-off workers following the SOEs reform in the late 1990s¹³, as discussed in Section 2.4.1. It is worth noting that, informal family support, serving as an important backup for old people, is widely recognised in urban areas as in rural areas. In this section, we discuss some key shortcomings associated with the Chinese urban pension system.

3.2.1 Low overall coverage rate

Firstly, overall coverage is quite low. As revealed in Table 9, the urban coverage ratio was 26% in 1989 and increased to 40% in 2003. The low ratio is not satisfactory since it means for every 10 working people in China’s urban areas, only 4 are covered by any formal pension system. For the remaining people who are not covered, the only

paid poorly in terms of both salary and pension provision. Nevertheless, the rapid growth of those export-oriented factories in China contributed to high economic growth in the past decades.

¹² China had separated rural and urban economies for decades until 1980s when the reform and “open up” policy was deepened. Until then, labour and resources flows between these two regions were very rare. The separation policy was made possible due to the implementation of strict household registration system (HRS) (Meng and Zhang 2001). The system requires individuals to register with local police stations. In addition to the HRS, China established food rationing system (FRS) which allowed people to buy food in regions where the registration was held with the allocated food coupons. If a person moved from one area to another he/she would find life in the new place very difficult, as without allocated food coupons, buying food was not possible except in the black-market. Now, the FRS no longer exists any more, while the HRS is not viewed as a hurdle in terms of restricting labour movements across regions. These changes, to a large extent, are conducive to current “migrant tide”, i.e. influx of rural workers to cities.

¹³ There have been recent reports of social unrest in China, directly linked to the issue of unpaid pensions (Asian Labour 2004; Asher and Newman 2002).

backstop against a destitute old age is the family (Jackson and Howe 2004). In addition, when compared to other emerging market economies, the coverage rate in China was very low. Table 10 shows that the average national coverage rate within eleven other countries was 46% as of 2002, while in China it was just 30%¹⁴. Among these countries, four countries, i.e. Bolivia, Peru, Philippines and Thailand had slightly lower rates than China.

There are a number of impediments to achieving full coverage. One of them is the high contribution rate¹⁵. Table 11 gives contribution rates for public unfunded pensions (social security pensions) across 26 countries, including both OECD countries and emerging market economies (EMEs); such contributions are collected to cover old age, disability and survivors pensions (OLDS) for the purpose of social pooling or redistribution rather than towards individual accounts of any kind. All data are from the US SSA (Social Security Administration 2004). As revealed in Table 11, for some countries, e.g. Australia and South Africa, all costs related to OLDS benefits are borne by the state¹⁶, and there is no contribution requirement for employers and employees. Of the 26 selected countries, Singapore and China registered the highest contribution rates at the order of over 30%. 0 to 20% of the Singaporean contributions, however, are used to finance the purpose of home and education (SSA 2004). Therefore, if this effect is considered, the actual contribution rate for Singapore is lower than that for China.

The average contribution rate across all countries was 16%, equal to about half of China's rate. The Chinese picture will be much more serious if we consider all other contributions employees and employers have to make in China. Table 12 shows that the overall contribution to social welfare programmes in China could be as high as 58% of wages, among which 39% is from employers and 19% from employees. Lower overall rates were reported in Jackson and Howe (2004) and OECD (2005a), which is mainly due to the exclusion of housing provident funds in their analysis. This 58% is very high by international standards (Chen 2004; World Bank 1997), thus leading to evasion. In fact, such a heavy burden on the previous SOEs-based system serves as an important contributing factor behind the several pension reforms initiated in the 1990s (see Section 2 for details).

The government appears to have deliberate intention of requiring employers to contribute to pensions at a rate which is unnecessarily high. According to the World Bank simulation results for China's pension reform (1997), in order to achieve a 59% replacement rate employers should contribute 9% of payroll (pillar 1A, see Table 5) and employees 8% (pillar 1B, see Table 6); the estimated replacement rates are 24% and 35% respectively. As of 2004, however, the actual average contribution rate from

¹⁴ Separate coverage rates between urban and rural regions are not available, so we use national coverage rates to compare China and other countries. 30% for China was aggregated national coverage rate, which was calculated by weighting coverage rates by regions, i.e. urban and rural areas (also Section 4.2).

¹⁵ In the current Chinese labour market, high contribution rates means high labour costs, which is a burden from the employer's perspective. It is largely owing to the downward rigidity of wages (Fehr and Goette 2005), i.e. it is much harder to lower wages than increase them. Therefore, in response to higher contributions, employers can only transfer such costs to consumers by charging a higher price, rather than to employees by lowering wages.

¹⁶ It is worth to note in some countries, e.g. Australia and Malaysia, there are compulsory funded private pension schemes.

enterprises was 20%, and that from employees 8%; the target replacement rate still approximated 59%. Therefore, enterprises in China are contributing at a rate 11 percentage points higher than that recommended by the World Bank (1997). The main reason of requiring enterprises to contribute more is the government's intention of siphoning the fund surplus from pillar 1A to cover the deficits inherited from the previous PAYG system or transition costs (Wang 2001, Holzmann et al 2004). During the process of policy implementation, however, it has encountered strong resistance, and subsequent low coverage, largely due to the presence of de facto extra corporate tax.

One issue closely linked to low pension coverage in urban areas is the unfair pension arrangement for migrant workers. As we mentioned in the previous section, there are around 150 million rural workers working in cities and towns across the country. For historical reasons, i.e. the traditional separation between rural and urban economies, it was not possible for this group of workers to participate in the urban pension system. Having realised the problem and also intending to take advantage of the young age structure of those migrant workers¹⁷, the Chinese government in recent years has tried to extend to rural-urban workers the urban system which was previously a privilege to urban employees in SOEs and COEs. Such efforts, however, have not been successful. Statistics (CALSS 2005) show that as of 2004 only 15% of migrant workers participated in the urban pension system.

Besides the two points we mentioned above, e.g. high overall contribution rate and the government's intention to overcharge employers in terms of pension contribution, two other factors specific to migrant workers contribute to the low participation rate of rural-urban workers. First, the qualifying years required for a full basic pension is 15 years, and in some prefectures and municipalities, another eligibility criterion requires that the worker should stay in the locality at least five years before retirement. Such restrictions in fact exclude most rural workers from the urban system, in that those rural migrants change jobs very frequently. Based on a 1995 labour survey, it was reported that the average time staying in one job was 3 years for a typical rural migrant, and it was 15 years for a normal urban worker (Meng and Zhang 2001).

In addition, the main reason why rural workers move to urban areas is saving, and most of them have a long-term plan to go back to their villages, typically when they earn enough money to build a house at home and/or are able to support their dependants (old parents and young children), so they wish to avoid pension saving to some extent. A second reason why rural migrants show less interest in the urban pension system is that when changing jobs, job changers or migrant workers are likely to lose much of their contributed funds. According to current regulations, migrant workers are allowed to take the amount accumulated in their individual accounts with them. The amount, however, is often very small, and typically 5% of payroll; the rest, i.e. 15% is always kept and used by local governments to pay those deficits related to the PAYG part of the system. Hence, the incentives for evasion are high. Meanwhile, the decentralised administrative environment in China brings a very fragmented pension system (World Bank 1997, Sin 2005) (See Section 3.4). Given that migrant workers move frequently between regions or provinces, they find that it is very difficult for them to really obtain future benefits from such a system.

¹⁷ It was estimated that the average age of migrant workers was 25.4 for female and 28.3 for male (Fan 2004).

Before moving to the next section, it is worth noting that even when migrants work in cities and towns, most of them still share the responsibility for supporting their old parents in countryside. The most common way is to remit money back to their elderly parents regularly, typically on a quarterly basis. Given the low living costs in most of the countryside, even a small portion of wages earned in cities could meet the basic demand from migrants' parents.

3.2.2 A system favouring the state sector

In addition to the low overall coverage rate among urban and rural migrant workers, another point relevant here is that the current pension system largely favours the state sector of the economy, particularly employees in SOEs and COEs. Table 13 gives the numbers of retirees by enterprise ownership in China. In 1997 there were 33 million retirees, and the number rose to 45 million in 2003. In percentage, it is revealed in Table 14 that SOEs accounted for more than half of national retirees; it was 57% in 1997 and 53% in 2003. The second and third largest institutions where retirees came from were COEs and public institutions. Collectively both SOEs and COEs had 67% of all retirees in 2003. HK (Hong Kong), Macau (MA) and Taiwan firms had the smallest number of retirees in China. In 2003 the HK, MA and TW firms housed 166,000 retirees, which accounted for just 3% of the national retirees. The picture was the same for foreign firms, where there were only 175,000 retirees in 2003. Our statistics are consistent with the findings in Fan (2004) where it was found that the average age of migrant workers was 25 for female and 28 for male. Given a significant proportion of migrant workers in China were employed by the HK, MA and TW firms and foreign firms, it is not surprising to see the small number of retirees in those firms.

Besides the number of retirees in China, we collected data on pension payment by enterprise ownership. Table 15 shows that in 1997 total pension payments were RMB 161bn (US\$ 20bn), while it increased to RMB 390bn (US\$ 48bn) in 2003. In terms of payment allocation between different institutions, Table 16 indicates that most were consumed by retirees from the state sector of the economy, and the percentage was 55.8% in 1997 and 47.2% in 2003. COEs and public institutions were the second and third groups in this case. If SOEs, COEs and the public institutions were combined together, they accounted for over 90% of the total pension payment in China. Enterprises with other ownership, e.g. private small ownership, only accounted for less than 10% of the total amount.

In addition, as regards Chinese pension provision, there is a special group of people, who do not need to make pension contributions but have a relatively high replacement rate. They are the civil servants, who work for the government at all levels. As we will discuss in Section 3.4, pensions for these people are unfunded, and the payments are from the government' budgets. Table 14 shows that around 6-7% of national retirees fall in this category.

3.3 Poor pension fund investment and returns

Above, we talked about the pension coverage problem associated with the rural and urban systems respectively. In this section, we analyse another important issue, i.e.

pension fund investment, making reference to relevant historical data. In China, pension fund assets are accumulated through five different channels, which corresponds to the structure of the Chinese pension system. The first three channels correspond to the three pillars of the urban pension system, i.e. pillars 1A, 1B and pillar 2 as shown in Table 6. The remaining two are the rural pension system and the reserve pension system, i.e. the National Social Security Fund (NSSF). We talk about them in three separate sections as follows.

3.3.1 Investment of urban pension funds

As we discussed in Section 2.3.3, the Chinese pension system is characterised by the multi-pillar arrangement. For pillar 1A as shown in Table 6, there is very little, if any, pension asset accumulation. It is because this pillar is administered on a PAYG basis, and by definition all assets accumulated are used for current pension payment. If there is any surplus¹⁸, pension assets are allowed only to invest in bank deposits and government bonds so as to meet the high liquidity requirement. Returns on bank deposits and government bonds in China, however, are not satisfactory. Table 17 shows that the average nominal return on bank deposits during the period 1993-2004 was 5.2%, while the return was 6.8% for government bonds and 10.3% for equities. When it was calculated in real terms by taking off inflation rates, the average return on bank deposits became negative at the level of -0.6, and the real return on government bonds was 1%, much lower than the returns on equities (4.5%). When using the observation period 1997-2004 (low inflation period), the real returns on both bonds and equities were 3.2%, but the latter was much more risky. The low returns on equities could be explained by the bear market in 2001-2004. Among these three assets, bank deposits were safe (1.9% standard deviation), but returned little (2.1% real return).

As noted in Table 6, the next pillar along the line is pillar 1B. Given the funded nature of this pillar, how to invest accumulated assets properly and hence earn high returns is an important issue. Table 18 gives the volume of asset accumulation by five different social insurance systems, i.e. pensions, unemployment insurance, medical insurance, work injury insurance and maternity insurance. Some are contributed by employers only, e.g. work injury insurance, while others are contributed by both employers and employees (see Table 12 for details). Aggregated pension fund assets within both pillars 1A and 1B are given in the third column of Table 18, and separate statistics for the pillars 1A and 1B are not available.

Despite the large amount of pension assets accumulated, investment regulations regarding pillar 1B account are far from satisfactory. Based on current regulations (Sin 2005; Li and Gao 2005), the majority of these accumulated assets should be invested in bank deposits and government bonds. For such pension schemes¹⁹ which consistently have surplus funds, actual investment allocations are not available. The

¹⁸ It is most likely to happen in such areas where the population is young, i.e. areas where there are relatively more contributors and less pensioners. In China some coastal municipalities and/or prefectures, e.g. Guangdong often have pension surplus in the pillar 1A account. These areas are also featured by high economic growth and influx of millions of young migrant workers.

¹⁹ As we mentioned before, Chinese pension funds regarding pillars 1A and 1B are pooled and administered at the levels of municipalities or prefectures. Therefore, there are thousands of pension schemes operating in China, due to such high fragmentation.

investment practice, however, could be to a large extent reflected by the investment strategy of National Social Security Fund (NSSF) in 2001/2. Table 19 shows that in 2001, 98.4% of the NSSF were invested in bank deposits, government bonds and other similar low risk assets. The asset allocation of pension assets accumulated in pillar 1B should not differ significantly from that of the NSSF in 2001, since the NSSF was established in 2001 and investment procedures should be very similar between these two institutions. It was indeed the case in that many investment staff at the SSF – the administrator of the NSSF, were from the MOF (Ministry of Finance) and/or the MOLSS (Ministry of Labour and Social Security).

In addition, pillar 1B is designed to be fully funded. In practice, however, as we noted, accumulated assets are always diverted to meet cash shortfalls in the PAYG component of the pension system as we discussed earlier. Therefore the pillar 1B account is actually managed on a notional basis, i.e. the account is funded in name but empty in reality. Aware of this issue, in most cases, local authorities credit the individual accounts annually with a return equal to that on government bonds. Unfortunately, however, real returns on government bonds in China were traditionally low. As shown in Table 17, the average real return on government bonds was only 1%.

Moving further along the pension system in China, the next pillar is pillar 2, i.e. the voluntary occupational pension scheme (See Section 2.4.3). The establishment of pillar 2 - as a supplementary component to the pillars 1A and 1B – took place in the 1997 Pension Reform as revealed in Section 2.3.3. Public attention, however, had not been focused on the importance of the pillar until very recently, e.g. 2004. It was estimated (CALSS 2005) that the occupational pension industry was very small at the moment; the total amount of assets as of 2004 was around RMB30bn-40bn (US\$3.7bn-4.9bn). The growth, however, is forecast to be very fast. It has been anticipated that the assets will reach RMB100bn (US\$12.3bn) in a few years. Regarding the investment issue of occupational pensions, the asset allocation and returns data are very limited given its short history. Nevertheless, the first investment regulation on occupational pensions (MOLSS 2004b) mandates that the upper limit on bank deposits and fixed-income securities investment is 50% of the total assets, while the lower limit on government bond investment is 20% (See Section 2.4.3).

3.3.2 Investment of rural pension funds

In addition to urban pension funds, another channel by which a large volume of pension funds are accumulated is through the rural pension system. Table 20 gives historical statistics related to aggregated rural pension funds. Over the past few years from 1999 to 2003 the total amount of pension fund assets accumulated in rural areas registered a steady upwards trend. For example the amount was RMB18.4bn (US\$2.3bn) in 1999, RMB21.6bn (US\$10.3bn) in 2001, and RMB26.0bn (US\$3.2bn) in 2003. Bank deposits was the most important investment instrument in this case, as they accounted for around half of total assets over the period, i.e. 49.9% in 1999 and 42.5% in 2003. The investment in government bonds was also considerable. In 1999 RMB3.5bn was directed to government bonds, which was equal to 17.8% of the total assets. The combined investment in bank deposits and government bonds was in the range of 50-70%. The heavy investment in them was consistent with investment regulations on rural pension funds. According to the *Provisional regulations on rural*

pension insurance (1995), fund investment of rural pension funds should mainly focus on government bonds and bank deposits, and local authorities are not allowed to conduct in-house pension investment.

Besides bank deposits and government bonds, another main means of investment was “management by government”. It refers to the case where funds are not invested on a commercial basis, but borrowed by local finance bureaus to meet any short term finance deficit. In this case, local authorities view such funds as the same as tax revenues under their discretion. The only difference is that borrowed pension funds will be repaid with a pre-determined return in the future. Based on the nature of their borrowing, the rate of return is determined by local governments and may show heterogeneity between regions. It is worth noting that this practice in principle is not permitted in the *Provisional regulations on the rural pension insurance* (1995). In reality, however, due to the highly fragmented and decentralised pension management and administration in China, such malpractice is quite common. Statistics in the lower panel of Table 20 show that the proportion of total pension fund assets under the management by government in rural areas was in the range between 15% in 2000 and 25% in 2003. Besides bank deposits, government bonds and the management by government, the rest of rural pension funds were invested in other assets, but the exact breakdown of these investment is not available.

Despite the heavy asset allocation to bank deposits and government bonds, returns of rural pension funds were relatively high. Table 21 shows that the average nominal return between 1999 and 2003 was 3.31%, and real return 3.37%. Particularly in 1999 the real return was 6.23%. It might be partly due to the negative inflation rate, i.e. minus 1.41%. In addition, as we mentioned earlier, up to a quarter of the rural pension funds in China was managed and/or borrowed by local governments, and a pre-determined return was credited to the borrowings. As a result, it was very likely that local officials in rural areas purposely promised a high return in order to make them look good²⁰. This is possible in China given the high level of discretion enjoyed by the local officials in their regions.

3.3.3 Investment of National Social Security Fund (NSSF)

As noted at the outset of Section 3.3, there are five channels through which large amounts of pension funds are accumulated in China. The last one is concerned with the National Social Security Fund (NSSF). The NSSF, established in 2001 and similar to Norway’s Government Petroleum Fund (GPF), serves as the future reserve fund in China. Such fund assets were RMB80.5bn (US\$9.9bn) in 2001, and increased to RMB170.8bn (US\$21.1bn) in 2004. According to investment mandates of NSSF (SSF 2001), asset security and liquidity is the top priority; therefore the asset allocation is quite conservative. In the first year of the NSSF’s establishment, all but 1.6% of total assets were invested in low risk assets, i.e. bank deposits and government bonds.

Over the past four years, investment in deposits has dropped gradually, and that in government bonds and other bonds has picked up steadily. Nevertheless, the majority of the NSSF is invested in very low and low risk assets. It is consistent with relevant

²⁰ In China an official’s performance evaluation from senior officials is closely linked to a range of economic indicators. Therefore, if one wants to be promoted, he/she might have the intention to make up or create important economic figures.

regulations (see Section 2.4.2). For example, the investment limit on bank deposits and government bonds is minimum 50% of total assets, and at least 10% should be directed to deposits and other very low-risk assets. In order to benefit from investment diversification and professional management, starting from 2003, around 10% of the NSSF assets have been outsourced to specialist fund managers (NSSF 2003). They are allowed to invest up to 40% of the total assets in stocks. Partly due to government efforts to achieve such diversification, in 2004 10.8% of the total NSSF assets were invested in high-risk assets, e.g. stocks and equity funds.

Regarding asset returns, the results were not satisfactory. Table 22 shows that the average real return between 2002 and 2004 was 1.65% and the return in 2004 was -0.80%. Such low returns were in line with the asset allocation as shown in Table 18; over 82% of the NSSF assets were invested in bank deposits and bonds. Therefore, given return statistics in Table 16 – the average returns of bank deposits (-0.6%) and government bonds (1.0%) -, it is not surprising to see poor returns attained by the NSSF over the past three years. One main purpose for the outsourcing noted above is to realise the better return earned from investing in stocks through professional fund managers (see Section 5.1.3 for details).

A relevant comparison here is the Central Provident Fund (CPF) in Singapore. The superficial fact is that the assets accumulated in the CPF are only allowed to be invested in non-tradable government bonds and liquid bank deposits. In fact, they are converted to investment in risky assets, e.g. foreign assets, through the Government of Singapore Investment Corporation (GSIC) and the Monetary Authority of Singapore (MAS) (Davis 2002b). Therefore, there is political risk that the Singaporean government deliberately claims and pays a low return on pension members' accounts, but in fact obtains a higher return on their actual investment, e.g. profitable foreign investment (Asher 1999; Asher and Newman 2003), although we do not rule out the practice where fund managers' good performance is still recognised and rewarded. In my opinion, such a risk is less likely to materialise in the current Chinese context, since most Chinese officials have a natural and strong intention to demonstrate their competence and capability by achieving high performance, as noted in Section 3.3.2. In consequence, it is not surprising to see an official make up a good performance, but should be very surprising to see any Chinese official intentionally deny their accomplishment.

By collecting Chinese pension fund data together, Table 23 shows volumes of pension assets by type as of 2003. Pension assets accumulated in Pillars 1A and 1B accounted for half of total assets, i.e. RMB220.7bn. The second largest component was those assets within the NSSF (National Social Security Fund), accounting for 30% of total assets. The remaining two were related to occupational and rural pensions funds, respectively. By weighting returns by capitalisation of assets, we calculated the estimated real return for Chinese pension funds in 2003, which was 1.6/1.7%, depending on estimates of returns on occupational pension funds. In comparison, the real returns for pension funds in other countries were much higher, as revealed in Table 24. For example, for Australian pension funds, the return in 2003 was 26%, which was mainly due to high performance achieved by equity investment (Hu 2005c). Other advanced countries, i.e. Canada and the UK, also witnessed high returns on their pension funds. Comparatively, pension funds in emerging markets performed much worse, e.g. 8.8% in Philippines, 3.9% in Mexico, and 3.6% in

Malaysia. One reason is that pension funds in those countries could not take advantage of the pick-up of international equity markets in 2003, owing to foreign investment restrictions (Davis 2002b; Hu 2005c). The worse return obtained by China's pension funds in 2003, was related to narrow investment opportunities, as well as significant reliance on bank deposits and government bonds (see Sections 4 and 6 for benefits of investment diversification).

3.3.4 Investment practice in other countries

Above we discussed the issue of pension fund investment and regulations related to the urban pension funds, the rural pension funds and the NSSF. In consequence, one might be interested in the investment practice in other countries. Table 25 gives the statistics summarising the investment regulations across both major OECD countries and emerging market economies (EMEs). Not surprisingly, regulations vary across countries, but the general trend is that there are few concrete restrictions on the pension fund investment in most OECD countries, and many more restrictions in EMEs (emerging market economies). Among the seven classified assets in Table 25, foreign assets are the most restricted asset. For example, in all countries with available data, except Australia, Japan, the Netherlands, UK and USA, there are some forms of restrictions on foreign asset investment. The magnitude varies from forbidding foreign investment completely in Mexico to the maximum 30% of the total assets in Canada. One major rationale behind the foreign investment restriction is that the accumulated pension fund assets are an engine for the economic growth (World Bank 1994; Davis 2004b; Davis and Hu 2005), for example through the channel of compulsory and voluntary savings (Hu 2005c; Davis and Hu 2006).

In comparison, the investment restrictions on other assets are more lenient. In general, low risk assets, e.g. bonds and bank deposits, are subject to less constraints, while high risk assets are subject to more constraints, except those countries adopting the PPR (prudent person rules) (Davis 2002b). For example, for equities, in the UK and the US, there are no quantitative restrictions, while in Denmark, the upper limit is 70% of the total assets. As regards bank deposits, in most countries there is not any limit, except in a few countries, e.g. Czech Republic and Turkey (10% limit).

3.4 Large variation in pension provision across the country

The Chinese pension system is characterised by vast variation and fragmentation between regions and sectors. First, pension administration at the national level is fragmented (Li and Gao 2005). In China, a number of different governmental ministries are in charge of pension administration. The principal government agency involved in retirement policy formation and pension supervision is the Ministry of Labour and Social Security (MOLSS). Pension issues related to the majority of the national labour force are under its jurisdiction. Besides the MOLSS, the Ministry of Personnel (MOP) is in charge of pension regulations and provisions for civil servants and any other individuals working for government organisations and public institutions. Pensions for this group of people are unfunded and payments are entirely from the budget. In addition, the Ministry of Civil Affairs (MOCA) is responsible for pension provisions for those old people who are neither covered by any formal pension coverage, nor have informal family support.

Second, China's pension pooling shows heterogeneity across the country. One main benefit of pension pooling is to spread risk among the population. In principle, in order to achieve a full realisation of risk sharing, the size of the basic pooling unit should be as large as possible. Indeed in many countries the whole national population serves as the pooling base. In China, however, the pooling unit is quite small, at best at the provincial level. It is typical and still common now that pension pooling is arranged within a county or city. With the purpose of increasing risk sharing within the population, the 1997 reform required that all pooling at the county or lower levels should be gradually elevated to the provincial level. As of 2002, however, provincial pooling was achieved only in four provincial municipalities, i.e. Beijing, Chongqing, Shanghai, Tianjing and one province, i.e. Hainan (Chen 2004). All the remaining 26 provinces are still operating the pension pooling at the county or city level. The latest census statistics in 2000 (NBS 2003) show that the combined population of these four provincial municipalities and one province accounted for just 6.2% of the national population. Therefore, current provincial pooling in five prefectures, although a small success, is far from satisfactory.

Third, the detailed design of pension provisions varies between regions (Wang 1995). The variation is partly due to the central government's willingness to allow for regional differences, which in turn is expected to be able to increase participation incentives. In China, there is no national legislation, e.g. social security law, which provides a consistent and coherent legal framework of pension provisions on a national basis. In contrast, the central government, through its relevant ministries - principally the MOLSS - issues directives or operational guidelines, and makes changes in policy from time to time. Pension reforms in the 1990s, as discussed in Section 2.3, share this feature.

The nature of the directives is such that only rough guidance is provided. In this context, policy implementation is left to lower levels of the government, and local governments are allowed to adapt the general guidance to their specific local conditions. The underlying logic is justifiable in that it meets local demands for flexibility. In practice, however, it creates a large variation. For example, as of October 2001 employers in different regions contributed to the basic pension at different rates (Hewitt 2002), i.e. 19% of payroll in Beijing, 22.5% in Shanghai and 13% in Shenzhen²¹. The main reason why different contribution rates apply between regions is the difference in dependency ratios. During the industrialisation process in China, a large number of migrant workers move frequently between provinces, looking for jobs. In consequence, it leads to a sizable difference in demographic structures across regions.

4 Solutions to the Chinese pension crisis

Above, we discussed the main shortcomings relating to the Chinese pension system. Combining the above discussion and the facts presented in Section 2, the message is

²¹ Shenzhen, on the border of Hong Kong, is a very young city. 90% of the population are young migrants from other parts of China. Therefore the local government can adopt a lower contribution rate. By doing this, the benefit from the employer's point of view is low production cost, besides many other preferential pro-investment policies and regulations, e.g. low business taxes. Hence, more investment is attracted to this city.

very clear, i.e. China is very poorly prepared to cope with its rapidly ageing population. Any further delay in solving the Chinese pension crisis will jeopardize its ambition to become one of the richest countries around the middle of this century, by hindering the achievements of many positive economic and financial benefits, e.g. a larger and more efficient equity market and less distorted labour market (see Section 5 for details). It can also cause a major negative impact on the budget, leading to high interest rates and a large tax burden, as well as political unrest. Therefore, how to tackle this difficult task turns into an imperative issue. In this section, based on previous analyses and discussions, we seek to highlight a number of solutions. It is worth noting at the outset, that in this part we seek to conceptualise and present those solutions in a systemic manner; in addition, we elaborate and also re-emphasize the importance of points which appeared in the past literature (McCarthy and Zhang 1996) but have been dismissed by many present Chinese pension experts.

4.1 Unification

A highly fragmented pension system is economically inefficient since it leads to undesirable results, e.g. unnecessary administration expenses and labour immobility. As a result, a unified system is needed in China. We discuss the unification issue by two dimensions; one horizontal between different geographical regions, the other vertical between central and local governments.

4.1.1 Horizontal unification

The first and major horizontal separation in China is that between rural and urban areas. As we mentioned earlier, the pension system in rural areas is quite different from that in urban areas. Inter alia, the system in the former is voluntary and receives very little financial support from governments at all levels. In addition, the 150 million migrant rural workers who work in urban areas, in many cases, are covered by a system different from and also less generous than the urban pension systems; in other cases, they do not take part in the urban pension system at all. One way to get around the issue is to unify pension regulations between rural and urban areas. The underlying justification is that any pension system should not discriminate against any particular group of the population for such reasons as origin, background etc. If the subsequent unification leads to a simpler system and also treats different sections of the population in a fair manner, it might reduce administration costs and increase participation incentives (See following sections).

The second horizontal reform needed is related to the pension system between regions, i.e. provinces. In China, based on the current pension model, local authorities, particularly at the provincial level, are very powerful, in that they are the executive agencies, i.e. how to implement pension policies in their localities totally depends on their political will. Local authorities always have natural incentives to differentiate their systems from others so as to maximise their own benefits but at the expense of national interest (World Bank 1997). Therefore, a reform towards a unified system across provinces is imperative. For example, the contribution rates should be standardized into one rate, which is the same across the whole country. In this case, the cash surplus generated in those young provinces by using the single contribution rate could be transferred to the national reserve fund to meet any future pension deficits.

4.1.2 Vertical unification

Pension administration in China is unique in that the central government, via the ministries, is in charge of the drafting of pension regulations, but policies are in fact made in effect by the local authorities. When central ministries, e.g. the MOLSS in Beijing, issue a guideline, labour and social security bureaus at the provincial and lower levels are responsible of executing the policies. When implementing this task, however, they need cooperation from other local bureaus, e.g. the taxation authority. Given that all local bureaus are under the leadership of the head of local government, local branches of the MOLSS in fact are ultimately subject to control by provincial and municipal governments rather than their highest administrative officials in Beijing. In this context, given the conflicts between central and local governments, the local authorities have incentives to modify the original plans to meet local-specific conditions. Consequences of this vertical fragmentation between different levels of governments include high administration costs and disputes regarding pension provisions between regions. In order to solve this issue, a more unified system in the vertical direction is desirable. In other words, all levels of the MOLSS should have more consistent and coherent power. In addition, local branches of the MOLSS should be granted more authority so as to be able to overcome political influences from local government.

4.2 Improve incentives

As of 2003 only 9% of the rural population aged 15+ were covered by any formal pension system, and in urban areas the corresponding coverage rate was 30%. Given the urbanisation rate of 38%, the approximate coverage rate for the national population above 15+ was just 21%. The coverage rate is very low by any standard, since it implies that for every 10 people aged 15+ on average just less than 2 persons are covered by the pension system. Therefore, increasing the coverage rate and pension participation is the prime issue for the success of the Chinese pension reform. When designing new systems and encouraging participation, however, the crucial issue is how to improve people's incentives. It is particularly relevant in China where the pension system is associated with high evasion and a low compliance rate.

One main reason why many employers and employees evade the pension system is that they find the contribution rate very high - as high as 58% of payroll (See Section 3.2). Therefore, more people would voluntarily join the pension system if the contribution rate is lowered. A lower contribution rate is financially justified. First, as we mentioned in Section 3.2.1, the Chinese government deliberately charges employers at a contribution rate 20% in excess of the normal need of replacement rate, just in order to siphon the surplus to pay off the cash shortfalls elsewhere in the PYAG, which inherited from the old systems. Another similar case is the low participation rate of migrant workers in cities and towns, despite government's recent massive efforts to extend the pension system to cover them. Again given that migrant workers are very young (the average age between 20-30), one main purpose of the authorities is to collect the cash surplus from these young workers. Therefore, a lower contribution rate, which applies to all workers regardless origin and background, is desirable and feasible, if all young non-participants are covered. In addition, reducing the current contribution rate to a lower level is justified, if general taxation is

employed to cover deficits, and higher pension fund returns are achieved by following a more professional management (see Sections 4.3 and 5).

Another interesting policy alternative is the NDC (notional defined contribution) scheme. As reviewed in Hu (2005b), some countries, e.g. Sweden and Poland, have implemented the NDC system, which is designed to combine the defined contribution scheme and the PAYG system. In this case, plan members have private accounts, linking benefits closely with contributions, and the accounts are credited with a notional interest rate. Although Li and Gao (2005) support the establishment of the NDC in China, we argue that it is not the best choice, since the NDC, by definition, is unfunded. In consequence, many beneficial effects of the funded systems cannot be realised (see Section 5 for details).

4.3 Pension fund investment diversification

Pension fund investment has received a great deal of attention from academics, policy makers etc. In comparison to international standards or norms (OECD 2005b; Davis 2002), Chinese pension funds are heavily invested in bank deposits and government bonds. This is for two reasons. One is the investment mandate of pension funds where low risk assets are always recommended to be the main investment vehicles, the other is underdeveloped financial markets. In China, the stock market has a 14 year history (see Section 5.1.2 for details), bond market 20 years (see Section 5.1.4), and the mutual fund industry emerged in the mid 1990s (see Section 5.1.3). A range of financial instruments which are common in western markets are currently not available in China, e.g. options and futures. In order to increase pension fund returns, the investment portfolio has to be diversified.

This could be achieved in two phrases. In the short term, pension funds should be allowed to invest in international markets as soon as possible, since the longer the funds stay in domestic markets, the riskier and lower the returns achieved (see Section 6 for empirical results). By conducting international diversification, the risk would be lowered and returns increased. At the same time, the quantitative restrictions on low risk assets, i.e. bank deposits and government bonds, should be gradually eased. But an investment limit on domestic stocks and other high risk assets is still justified in that the current stock market in China is very risky and once described as “a big casino” by a renowned economist (Wu 2001). The process of developing an efficient equity might take a long time given the structural weaknesses associated with Chinese stock markets (Liu 2005; Green 2003a), e.g. lack of corporate governance and non-floating of state shares (see Section 5 for details). In addition, as noted in Vittas (2000) and Hu (2005c), in the early stage of pension reform in emerging markets, macro conditions might not be ready to implement the prudent person rules (PPR); reasons include inexperienced financial regulators, thin capital markets and poor accounting practices. In the long term, however, when Chinese financial markets become more developed, the final objective is to apply the prudent person rules in the Chinese pension fund investment industry, i.e. no quantitative investment restriction, and fund managers invest those funds as they would their own personal assets (Davis 2002a). The benefits of adopting the prudent person rules have been found in a number of empirical studies (Davis 2002b; Hu 2005c).

4.4 Social security law

In many countries, there are national laws which set out details of how to manage PAYG pension provisions, for example, the Welfare Reform and Pensions Act 1999 in the UK and the Social Security Act 1935 in the US. In China, however, such legislation is absent. All previous and current pension reforms in China were initiated by the government with the help of some provisional regulations, which were designed and released by relevant agencies and changed from time to time. On one hand, it reflects the government's experimentalism during the economic reform process; on the other hand, it creates many problems, e.g. the difficulty in enforcing participation. Under current conditions in China, the most efficient way to achieve a satisfactory compliance rate and subsequent high participation and coverage rates, in our opinion, is to pass a social security law, with efficient enforcement.

One benefit of having such a law is that it would provide a legal framework upon which pension provisions are based, thus making political intervention in the system less feasible. With such a law it would also be easier to enforce pension participation, since any evasion from the pension system is against the law. Another beneficial effect is that it enhances the government's credibility and public confidence in the system. The issue is crucial in that the public's confidence about the government's capability to provide pension benefits has been weakened in the past, partly due to frequent changes in pension regulations since the 1990s. For example, people are not sure when the authorities will increase the number of qualifying years or simply change the benefit formula again. Such problems of political risk have been identified in many emerging market economies (Hu 2005b), and also some advanced countries as well, for example, the UK (Whitehouse 2000a). Therefore, if a national social security law covering all citizens were available, there would be relatively less uncertainty and ambiguity from the point of view of employers and employees. In consequence, more people would be willing to participate in the pension system. It could also benefit labour mobility, since under a unified social security law, people's pension benefits would not lose too much by moving between different regions. Last, it is worth noting that beneficial impacts from a unified national social security law in China will be significantly greater if changes mentioned in previous three sections are realised, i.e. unification of the administration, incentive improvement and pension fund investment diversification.

4.5 Preserve traditional values: family support

A large proportion of people in developing countries are not covered by any formal system, and mainly rely on family support to care for the old, e.g. India (Pal 2005). China, as the largest developing country, is no exception. Indeed most of those people who are not covered by any social security system in China are supported by younger generations in the family. With rapid social changes and economic growth in China, however, the extended family network is breaking down. Then is the traditional family support outdated and not appropriate any more in a more modernized society (Leisering et al 2002)?

My answer is no, at least in the short and medium terms. The reason is that in some respects family "insurance" is less costly and more efficient than a formal pension system. For example to ensure smooth running of a formal pension system incurs

nontrivial transaction costs. At the very beginning, the government need to design a set of rules or regulations after rounds of consultation with public and professionals etc; local governments are then required to implement these regulations; if they find some particular rules or regulations inappropriate, a feedback mechanism between central and local governments is needed; last a supervisory team or committee need to be set up to oversee implementation of those regulations. In addition, record keeping and treatment of receipts and payments are also an essential component of the social pension system (Mitchell 2000). These are not free and costs associated could be very significant (Gent 2001; also see Section 6 for empirical evidence). Comparatively, a family support mechanism is largely freed from the above transaction costs, since the operating unit is a family which is much smaller than a country. Therefore, the implicit inter-generational contracts are more sustainable.

In addition, raising children for the retirement and caring for the aged parents are a norm and deeply rooted in the Chinese culture, i.e. Confucianism. By learning from a wide range of sources, e.g. TV programme, personal experience etc, young generations feel that it is a moral duty to take care of their parents when they are too old to work. Any behaviour by the young of leaving their parents alone or destitute is badly regarded in China. Meanwhile, this informal mechanism is strengthened by the passage of Family Support Law (1981), which gives younger generations the legal obligation to support their parents if their parents are not able to live by themselves alone.

An offsetting argument maintains that family support is a feature of developing countries, so when China continues its high economic growth and becomes a wealthy country in the future, family support will be outdated. It sounds reasonable, but traditional values in my view are so strong in China that it is not easy to dispense with them in a short time period. For example in some rich Asian regions where Chinese dominate, e.g. Hong Kong, Taiwan and Singapore, family support still plays a very important role. Li (1999) shows that as of 1995 for those elderly aged above 65 in Taiwan, 52.3% depended on their children and only 14.8% depended on social insurance, i.e. pensions. These statistics provide a simple illustration of the role family support will play when mainland China reaches the same level of development as that in Taiwan of 1995.

Therefore, the informal family support system should still continue its important role in providing old age support in China. It is understandable that in the long term pension provisions through the social network will become the norm given experience elsewhere (Hu 2005b; Davis 2004b). In the short or medium term, however, it is particularly vital to preserve traditional values, since during the transition process some particular groups of the population are likely to be disadvantaged, e.g. rural population in China, who have no formal pension coverage.

5 Preconditions and benefits of pension reform

In this section, we first introduce the pension reform's external environment in China, with particular focus on current development of the financial structure in China, and then present the pension reform benefits, arising from the shift from the previous PAYG system to the current multi-funded system. These issues are closely

interlinked, since a more developed financial market will facilitate pension reform (Davis 1998; Hu 2005b), while a shift from the pension reform toward a funded system can have a positive effect on financial development (Walker and Lefort 2002; Davis 2004b, 2005; Hu 2005b, 2005d). In addition, the macro-economic structure, or the general external environment, is also important during the reform process (Davis 1998, 2005a; Vittas 2000; Mitchell 2000; Blake 2003). An analysis of this kind, i.e. “preconditions”, is useful and justified, in that it deepens our understanding of the Chinese pension reform, to the extent that the pension analysis herein is not conducted in isolation from the external economic and financial environment which is expected to be of crucial importance.

5.1 Pension reform’s preconditions and benefits on the financial structure side

The maturity of the financial structure plays an important role when the PAYG system moves towards the funded pension system, and to a large extent serves as a contributing factor to the success of the pension reform. Figure 1 depicts the structure of China’s financial system, which mainly comprises the banking industry and intermediation sector, and the financial markets. Traditionally, China’s financial system consisted solely of the state-owned banks (Allen et al 2003, 2005; Hu 2005a), but has witnessed a great change since the late 1970s.

In what follows, we first review section by section these financial preconditions required for pension reform and the benefits arising from pension reform towards funded systems. Then, we discuss current development of China’s financial system, making reference to historical data. Last, we comment on whether these preconditions exist in China, and what benefits and/or costs pension reform might bring to China. The analysis is conducted for a variety of different financial sectors.

5.1.1 Banking industry

5.1.1.1 Preconditions

A sound banking system is an essential precondition²² required to initiate pension reform toward funded systems (Vittas 2000). The banking industry is important in that on the one hand, pension funds hold a large amount of their assets in bonds issued by banks (Mitchell 2000), on the other hand, bank deposits are an indispensable component in pension funds’ portfolios, particularly in developing countries (Hu 2005b). In this context, insolvency of the banking system would put at risk pension asset investment. Banks are also of crucial importance in maintaining the smooth running of the financial markets, by serving as providers of key financial services, e.g. collateral, clearing and settlement (Davis 1998; 2005a), efficiency of which directly links to equity markets and others. In consequence, pension funds are affected indirectly through these channels (see Figure 5). Meanwhile, commercial banks in many countries, including China, serve as custodians of pension funds (ADB 2003), the main purpose of which is to safeguard pension assets from misconduct and irregularity by separating asset management from fund accounts’ management. In this

²² Pension researchers have identified other preconditions, i.e. stock market (see the following sections for details).

context, to adopt a funded pension system, there is a basic requirement for having reliable and safe fund guardians, i.e. banks.

5.1.1.2 Benefits of pension reform

The literature linking pension reform to the banking industry is well discussed (Hu 2005b). So we will not describe that in this section, except presenting some key points. First, pension fund growth might increase the efficiency of the banking industry through market competition. This argument is proved by a panel study by Impavido et al (2002), who used a dataset covering 30 countries. In addition, competition from institutions, e.g. mutual funds and pension funds, puts downward pressures on bank spreads and profits (Davis and Steil 2001). In this context, however, there may be the problem of taking excessive risk by banks, e.g. lending to risky borrowers, seeking to open new line of business and generating fee-based incomes (Allen and Santomero 2001; Schuermann 2004). Development of institutional investors, as highlighted by rapid pension fund growth, might also help to facilitate the shift from bank based financial systems to market based financial systems (Davis 2005), although the question of which system is better is still under debate and might depend on country specific factors. In addition, Hu (2005b) tests the relationship between pension fund asset growth and the banking industry from both the short run and long run. For example, the CREDIT indicator (credit provided by banks) shows the negative impacts of pension assets on the banking sector for both OECD countries and EMEs, as shown in Table 26. It might owe to strong competition from pension funds. In addition, regarding the DMBTFA indicator (domestic monetary bank assets to total financial assets), the long run impacts frequently become positive, and are particularly strong for EMEs, indicating a more favourable effect.

5.1.1.3 Current situation in China

China's financial system is characterised by a dominant and inefficient banking sector (Xie 1999; Allen et al 2003; Hu 2005a). Allen et al (2005) compare China's system with other countries which have English, French, German and Scandinavian legal origins²³, respectively. As shown in Table 27, relative to other countries, China's ratio of bank credit/GDP was 111% as of 1999, which was partly owing to the large volume of loans accumulated via lending by state owned banks (Lardy 1999), while the average ratio for other countries was 73%, and the figure was 62% for English origin countries. In contrast, China's stock market was small in terms of both size (market capitalisation/GDP) and efficiency (total value traded/GDP). This issue is also observable if we look at the data in Table 28, where it is shown that China's banking industry was much larger than that in less developed countries; for example, the bank credit to GDP ratio was 167% for China, while it was 47% for low income countries, and 76% for middle income countries. It is admitted, however, that China still had a small banking industry relative to high-income OECD countries and the world average level. In all, the relatively large size of China's banking industry, compared to other countries and its own stock market, indicates the early state of

²³ As we noted in Hu (2005b), in the law and finance literature (La Porta et al 1998; Beck et al 2003a), it is believed that the legal origins have an important impact on the banking development. Generally, the legal systems of the company law and legal code are traced back to four origins, i.e. English origin, French origin, German origin and Scandinavian origin.

China's financial development, i.e. the financial system is dominated by the banking sector (OECD 2005).

Besides the large size of the banking industry in China's financial system, Chinese banks also suffer from poor performance. Allen et al (2005) show that, in Table 27, the overhead cost relative to bank total assets was 12% for China, while it was 4% for those countries with English and German origins, 3% for Scandinavian origin and French origin. In addition, Hu (2005a) compares the banking industry of China with the US, the UK and Germany. By following the categorized banking indicators recommended by the BIS (Bank for International Settlement) (1998), the author finds that the Chinese state-owned banks performed worse than the western banks. For example, the average ratio of the ROAA (return on average assets) was 0.17 for the largest four state-owned banks in China as of 2001, while the average ratio for the HSBC, Citicorp and Deutsche Bank was 3.15. Similar results are found by Herrero and Santabarbara (2005) and Allen et al (2005).

Table 29 shows the latest statistics of the central bank's balance sheet in China. As of July 2005, the total assets were RMB 9,506bn (equivalent to US\$ 1,174bn, and 70% of GDP). Among them, the foreign exchange accounted for 60% of the total assets, which were at the level of RMB 5,635bn (US\$ 700bn, and 41% of GDP). As regards the total liabilities, reserve money accounted for 61% of the total amount, and the next largest component was the bond issue at the order of RMB 1,619bn (US\$ 200bn, and 12% of GDP). Given that around 30-40% of foreign reserves in China was used to purchase US treasury bonds (Yu 2004), and the subsequent criticism from American politicians about Chinese government's manipulation of its exchange rate (see Section 5.2.5 for more detail), pension funds might help in this case, i.e. an outflow of portions of foreign reserves, particularly US dollar reserves, to foreign markets through pension fund investment (Davis 2005; SFRC 2005). On the one hand, it mitigates the inflationary pressures in domestic markets; on the other hand, it diversifies pension funds' portfolio risk.

Table 30 gives the statistical summary of assets held by the Chinese monetary financial institutions. The dominant position of the SOBs (state-owned banks) is clear, since more than 60% of the total assets were held by them. Relative to other institutions, the importance of the SOBs, however, has been steadily declining over the past 10 years. The RCCs (rural credit cooperatives) has held around 10% of the total assets. Other commercial banks, including those with solely and partially private ownerships, have grown rapidly during the past. Their share in terms of assets increased from 7% in 1995 to 14% in 2002, which largely resulted from the authorities' efforts of the financial liberalisation and deregulation in the 1990s (Liu 1999; Liu 2002). Foreign banks are still insignificant in China, but they are expected to grow rapidly after 2006 when the foreign banks are treated as the same as the domestic banks without any geographical and business restriction (Herrero and Santabarbara 2005); these new regulations were introduced in late 2001, when China joined the World Trade Organisation (WTO). Therefore, China's WTO commitments of gradually opening domestic markets to foreign banks will have large impacts on Chinese development (Green and Wall 2000; Yueh 2003), including the industrial structure of China' banking sector, which is characterised by monopolistic competition.

5.1.1.4 Comparison between China and Chile

In order to consolidate our analysis, we compare China and Chile in terms of the banking industry. Chile is selected to be the comparison country, in that it is the most common reference in pension studies. Since Chile started its pension system's privatisation in 1981, it has received a great deal of attention from international pension experts, and served as a real-world test-bed for the benefits of introducing funded elements into the traditional public systems (Holzmann 1997; Acuna and Iglesias 2005).

Table 31 gives the comparison data between China and Chile in terms of both financial intermediary²⁴ and banking industry indicators. The first indicator is liquid liability/GDP, which measures financial depth on the liability side, and thus the overall size of the financial sector (Beck et al 1999). Looking at the data from 1980 to 2003, it is shown that China had a much larger financial sector than Chile. For example, in 2003, the ratio of liquid liability to GDP was 37% for Chile, and 176% for China. The higher ratio for China might be due to the massive amount of credits lent to SOEs in the past decades, as mentioned in Section 5.1.1. It is consistent with our another statistic, i.e. private credit by deposit money banks and other financial institutions/GDP. In 2000, the ratios were 59% and 119% for Chile and China, respectively. In addition, the ratio of deposit money bank assets to GDP for China was much higher than that for Chile in most years, although it is the opposite case when the ratio of central bank assets to GDP is concerned. The last indicator within the financial intermediary group is financial system deposits/GDP. Consistent with high saving rates in China (OECD 2005a), the ratios were more than 3 times higher for China than Chile in most years.

In addition to the above same-year comparison, we also compare Chilean 1980 data with Chinese 2003 data. It is worth to note that Chile started its pension reform in 1981. The underlying reasoning is to test the question "whether the current banking system in China is strong enough to support pension reform". As shown in Table 31, for all but central bank/GDP indicators, China had much larger values. On the one hand, it implies a larger financial sector in China, on the other hand, it indicates the dominant position of the banking sector in China's financial system.

5.1.1.5 Conclusions on preconditions

Above, we reviewed and analysed China's banking industry by drawing on macro data. It is revealed that although the Chinese banking system is weak by international standards, e.g. in terms of overhead cost, basic conditions have been established, and this current banking sector is sufficient to start a pension reform towards funded systems. This conclusion is consolidated by the comparison between China and Chile. Despite this encouraging sign, however, further improvement needs to be done to banks if the government wants to maximise the benefits of pension reform (see next section). For example, capital base needs to be strengthened, so as to reduce financial risk (Mitchell 2000). Recent efforts to reform the largest state-owned banks in China by the authorities are in the right direction (Hu 2005a). In addition, the banking

²⁴ Financial intermediary indicators are included, given its close link to the banking sector, particularly in the developing countries.

industry is unproportionally large relative to other market components. Therefore, the government needs to enhance the development of other sectors, e.g. securities markets. Compared to a more balanced financial system, excessive reliance on the banking sector is risky and inefficient, which in turn would jeopardise the benefits of pension reform.

5.1.1.6 Conclusions on benefits

Pension reform towards a funded system is an inevitable choice for the Chinese government, and this reform would have far reaching implications for China's banking industry. Similar to those identified in other countries, e.g. Chile, pension fund asset growth would provoke competition, thus increasing banks' efficiency. This benefit is much needed in China, in that Chinese commercial banks, e.g. the state owned banks, are notorious for bad performance. This improvement in the performance of China's banks is beneficial to pension reform through the two-way transmission process, in that in many cases banks serve as custodians of pension funds in China (ADB 2003). In addition, recent regulations (CBRC 2005) allow commercial banks to set up their own asset management companies, which brings further competition to the fund manager industry (see Section 5.1.3) and has wider impacts on the whole financial markets. In this context, however, caution needs to be taken to look at the potential negative impacts of increasingly intensified market competition, e.g. whether banks lend to risky projects, after facing strong competition from institutional investors, e.g. pension funds, and whether banks open new line of business with lack of good financial justification etc (see Section 5.1.1).

5.1.2 Stock Market

5.1.2.1 Preconditions

To introduce a funded-component based pension system, one prerequisite is a rudimentarily developed stock market (Davis 1998 and Mitchell 2000). This point is of crucial importance, given the close linkage between the stock market and pension reform. For example, experiences elsewhere show that a large amount of pension assets are invested in equities (OECD 2005b; Clark and Hu 2005a), for their potential to earn returns higher than inflation in the long term. The traditional investment strategy of only bank deposits and/or bonds, commonly in many developing countries, is not enough to generate sufficient incomes to meet long-term liabilities. It is worth noting, however, that pension reform could be still initiated, as long as there are a certain amount of securities traded in the market, and the market can to some extent help fund managers to diversify their portfolios. It points out another main benefit of having a stock market, i.e. risk diversification, given the less correlation between different assets. In this context, however, the stock market is not required to be as efficient and deep as that in developed countries, although it is admitted that a more developed stock market facilitates pension reform. In addition, given the fact that the stock markets in many developing countries are very volatile, a way to get around this problem is to invest a portion of pension assets abroad, if regulations are permitted.

5.1.2.2 Benefits of pension reform

The relationship between pension reform and the stock market has been studied extensively over the past decades (Davis 1995 2000 and 2005a; Holzmann 1997; Walker and Leford 2002). It is widely believed that pension reform can stimulate the development of the stock market. For example, the functions played by the financial systems (Merton and Bodie 1995), e.g. pooling and transferring sources, can be improved following the growth of pension funds due to their professional risk management and longer investment horizon (Hu 2005b). In addition, pension asset growth contributes to a larger and more efficient stock market. It is the experience demonstrated in some reforming countries, e.g. Chile (Holzmann 1997; Acuna and Iglesias 2001). In addition, by using a dataset of panel countries, Hu (2005b) finds that pension fund asset growth leads to an increase in STKCAP (stock capitalisation to GDP) in both the long run and short run, as shown in Table 26. When turning to the stock traded indicator, the coefficients frequently show a positive sign in the long run, albeit the aggregate equation gives insignificant results. Concerning the stock turnover indicator, results are mixed but there is still evidence of positive influence of pension fund assets. Another important issue linking pension funds to the stock market relates to market volatility. It is argued that pension funds are long-term investors, and concerned about fundamentals, therefore their growth can dampen stock market volatility. By using data covering 33 emerging markets, Walker and Leford (2002) find that the security price is less volatile, following pension asset growth.

5.1.2.3 Current situation in China

Traditionally, the stock market was viewed as one characteristic of the capitalist society in China, therefore was initially ignored by the policy makers. The authorities, however, began to realise the importance of the equity market in the late 1980s, i.e. after 10 years economic reform. The milestone was the establishment of the Shanghai Stock Exchange (SHSE) and the Shenzhen Stock Exchange (SZSE) in December 1990. Over the past 15 years, the Chinese stock market has grown rapidly. Table 32 shows that as of 2003, China was the 13th largest stock market in the world. Its market capitalisation, combining both the SHSE and the SZSE, was US\$ 513bn. In terms of capitalisation of those tradable shares (around 1/3 of the total shares), however, it stood as the 20th largest market. The historical data regarding China's stock market is provided in Table 33. The number of listed firms grew from 8 in 1990 to 1,377 in 2004, a 172 time-fold increase within 15 years. The total number of investors rose from 0.4 millions in 1990s to 72.1 millions in 2004. Along with these developments, the market capitalisation of the total shares increased from RMB 1.2bn to RMB 3,706bn, while the market capitalisation of the tradable shares grew to RMB 1,169bn in 2004 accordingly. In addition, the ratio of market capitalisation to GDP increased from 0.1% in 1990 to the peak level at 54% in 2000, then decreased to 30% in 2004.

Despite the rapid growth of the Chinese stock market over the past 15 years, there are many problems (Cheng 2005). Whether these issues could be solved have implications for the development of the Chinese financial markets in general, and the pension reform in particular. We briefly introduce these issues as follows:

Firstly, the Chinese stock market is still small relative to the economy. As shown in Table 28, as of 2004, the market capitalisation to GDP ratio for China was 39%, which was smaller than that in other four groups, and three times smaller than that for

OECD countries. In addition, statistics in Table 33 show that the actual size of China's stock market is not as large as what common people think. If we use market capitalisation of tradable shares only, the combined size of Shanghai and Shenzhen Stock Exchanges become the 20th largest market in the world. In terms of liquidity, the ratio of total value traded to GDP was 45% for China, while it was also 45% for low income countries, and 113% for OECD countries. This low ratio to some extent reflects illiquidity of China's stock market, which was partly due to the lack of investors' confidence (Chen et al 2003), as well as large volume of non-tradable shares in China (see below). When turning to efficiency, as highlighted by the stock turnover ratio, all groups, except middle income countries, had the same level of performance.

Secondly, the share holding structure is extremely biased toward the state (Shirai 2004). This is mainly for historical reasons. When the Chinese authorities first introduced the stock market in 1990, the principal motivation behind this was to find another financing method for the ailing state-owned enterprises (SOEs) (Green 2005b), besides the loans from the state-owned banks. But it was very difficult for the authorities, under a socialist regime, to allow most shares of the SOEs to be controlled by the individuals or private investors. To circumvent this problem, around 2/3 of the shares of each listed company are not allowed to trade in the market (Green and Wall 2000). These shares comprise all State shares and most legal person shares, which belongs to the Chinese government (see Appendix A for a classification of the Chinese equity shares). Largely due to the state's share holding advantage, the majority of the listed firms in China are controlled by the state. Based on the ultimate ownership principle proposed in La Porta et al (1999), Liu (2005) found that, as of 2001, around 85% of Chinese companies were ultimately controlled by the Chinese government, despite the 67% direct share holding.

As a result, most of listed firms in China view the stock market as a "cash machine", to finance the deficits of their mother companies, which in most cases are ailing or cash-constrained SOEs (Tenev et al 2002). At the same time, few listed SOEs firms care about the issue of corporate governance and profitability. Chen et al (2005) find that after the IPOs, listed firms under the control of the state experienced a decline in profitability, while those without state control performed better. Given the important role pension funds play in stock markets, particularly in Anglo-Saxon countries (Davis and Steil 2001; Clark and Hebb 2004a), a strong pension industry in China can benefit Chinese firms' corporate governance, which is really needed in China. For example, pension funds can raise their concerns in the Annual General Meeting (AGM), or engage directly in corporate management. Zhou (2004), governor of the PBC (China's central bank), mentioned that the development to China's capital market is, to a large extent, determined by the quality of listed companies, which then is closely linked to corporate governance.

Thirdly, shares in China are traded at a large premium. It is because of the fact that 2/3 of the shares are not tradable, as we mentioned above. Hence, shares are priced less based on the fundamental values, but much on the investors' enthusiasm and the excessive demand (Fan et al 2003). In consequence, the Chinese stock market has one of the highest P/E (price/earnings) ratios in the world (Green 2005a). Table 32 shows that the P/E ratio for SHSE/SZSE was 36.5/36.2 times, which was the second largest among the world top 15 stock markets. The figure was 18.3 times for the LSE

(London Stock Exchange) and 19 times for HKSE (Hong Kong Stock Exchange). In this context, most Chinese investors, including both individuals and institutions, are speculators; they do not care about the fundamentals, since fundamentally, the underlying share price should have been much less than current market prices, given the 2/3 non-tradable shares (Chan et al 2004). Therefore, most investors head into the stock markets, intending to achieve short-term capital gains rather than dividend payments (Cheng 2005). For example, a survey shows that 78.6% of Chinese individual investors were motivated to buy stocks by potential capital gains, while only 11.7% were motivated by the regular dividend payments (Chen et al 2003). The authorities have realised this issue, and tried to solve it by selling the state-controlled non-tradable shares, thus aiming to trade all shares in the market (ADB 2005).

On 12th June 2001, the State Council of China published the “*provisional regulations on raising the national social security fund (NSSF) by selling the state-owned shares*” (CSRC 2001). It stipulates that when the state-owned enterprises go to the IPOs in both the domestic and the international stock exchanges, 10% of the State shares should be sold simultaneously, and the revenues raised should be credited to the accounts of the NSSF (see Section 2.4.2 for details). But the investors viewed this regulation as a negative message, since they feared that more State shares would be sold in the market, in light of the large pension deficit in China. Far from the expectation of the regulators, within the few days of the regulation’s announcement, the stock market price fell by more than 30% (Asher and Newman 2002). In consequence, the authorities admitted this policy’s failure, and decided to temporarily terminate the implementation of the regulation on 22nd October 2001²⁵, four months after the first announcement (NCSSF 2004). Such a drop in share prices could be viewed as a correction of the over-valuation to some extent. The negative impacts of allowing prices back to their fundamentals, i.e. around 1/3 of market prevailing prices, however, were so significant, that it was decided to put the new regulation above on hold, unless the authorities find an appropriate way to trade those 2/3 non-tradable shares in the market.

The fourth major problem associated with the Chinese stock market is high volatility. Table 34 gives comparative data between China and other regions regarding volatility, which is calculated as a standard deviation of monthly total stock returns (capital gains plus dividends). Over the period 1994-2005²⁶, China’s stock market registered a high level of volatility, i.e. 0.104. In comparison, the average value was 0.064 for emerging markets, 0.042 for EAFE²⁷, and only 0.039 for all developed countries. Among these years, China’s stock volatility was frequently higher than 0.1, e.g. from 1996 until 2000. Since then, volatility has dropped gradually, albeit showing a slight pick-up in 2004. In addition, Du and Wei (2004) show that China has one of the highest stock market volatilities in the world. Based on their statistics, China’s stock market volatility²⁸ (0.146) is 2.5 times higher than the UK’s market volatility (0.056). The authors argue that insider trading plays a role in contributing to the cross-country differences in the stock market volatility. Generally, the more prevalent is insider trading, the higher stock market volatility. This finding is particularly relevant for the

²⁵ Such policy still applies to the firms going to the IPO on the international stock markets.

²⁶ 2005 is related to the period from January 2005 to October 2005.

²⁷ EAFE refers to Europe, Australia, and Far East.

²⁸ Stock market volatility is defined as the standard deviation of the monthly returns in US dollars over 1984.12-1998.12.

China case, since insider trading is very common. For example, Wu (2001), a renowned economist in China, once criticized the Chinese stock market as a “big casino”, which mainly arises from the prevalence of the market control by the large institutions as well as insider trading. During the years around 2001, the stock market in China was very volatile, where the large institutions – mainly securities companies and mutual funds, frequently manipulated the prices at their will, but at the peril of the individual investors.

In consequence, following the deteriorating confidence in the market from the individual investors (Chen et al 2003), China’s stock market has witnessed a significant downturn since 2001. Table 33 clearly reveals the trend. For example, the market capitalisation dropped from RMB 4,809bn in 2000 to RMB 3,706 in 2004, while the market capitalisation to GDP ratio declined from the peak level of 54% in 2000 to 30% in 2004. In terms of the level of the stock market index, since 2001, both Shanghai and Shenzhen stock indices have fallen continuously, and there was no sign of a recovery even until now. China’s current shrinking stock market is against background of a recent boom in many other countries (ADB 2005; OECD 2005c). Table 35 shows that despite the global bear market around 2000, the stock markets in all our selected countries have started picking up quickly since 2003. For example, the growth rate for Japan in terms of stock market index was 31.4% in 2003, and 12.7% in 2004, while these two figures were 48.9% and 39.6% for South Africa. In fact, against the sustained rapid economic growth in China, and strong recovery of overseas equity markets, China’s sluggish stock market since 2000 has raised a great deal of concerns among policy markers and economists in China (OECD 2005a).

5.1.2.4 Comparison between China and Chile

Similar to the previous section, we move to a short comparison between China and Chile, seeking to find out whether China is ready to reform its pension systems in terms of the stock market conditions. To meet this end, we use three ratios, i.e. stock market capitalisation to GDP, stock traded to GDP and stock turnover to GDP, which measure size, liquidity and efficiency respectively. In terms of size, i.e. stock market capitalisation to GDP, as of 2003, China’s stock market was smaller than Chilean market, as shown in Table 31. Concerning liquidity, however, the Chinese stock market performed much more better. For example, in 2000, the ratio of stock market traded to GDP was 8% for Chile, and 43% for China. Due to illiquidity of the Chilean stock market, Chile’s efficiency indicator, i.e. stock market turnover ratio, showed worse results in all years. Despite superior performance of China’s stock market in comparison to Chile, it is worth to note that the Chinese stock market is not even as efficient as the average world level, as shown in Table 28. However, is current Chinese stock market sufficient to initiate pension reform? By comparing the data between Chile in 1980 and China 2003, it is revealed that the answer is “Yes”. For example, the ratio of market capitalisation to GDP for China 2003 was 41%, while it was 30% for Chile 1980. In addition, both market turnover and traded indicators also strongly support our conclusion.

5.1.2.5 Conclusions on preconditions

Above we reviewed and analysed the current situation of China’s stock market. It is shown that the market still faces many problems, and some of these problems are

structural and important. During the reform process, one issue is very important, and the sooner the issue is solved, the quicker and larger the beneficial impacts of pension reform are realised. This relates to the non-traded 2/3 percent State shares in the stock market, as discussed in Section 5.1.2. As far as the preconditions are concerned, however, the current stock market meets the basic requirements for a funding oriented pension reform. For example, there were more than one thousand listed companies and 70 million investors as of 2004. In addition, when compared to the Chilean situation in 1980, China outperformed Chile in all three indicators, strengthening our conclusion about the feasibility of the Chinese pension reform (Vittas 2000). As noted at the outset of Section 5.1.2, only a rudimentary level of the stock market is required to start pension reform, and with pension reform, the stock market would benefit significantly, which is the subject of the next section.

5.1.2.6 Conclusions on benefits

In view of the underdevelopment of China's stock market in terms of size, liquidity and efficiency, pension reform can play an important role in improving it (Kim et al 2003). Such a beneficial impact arises from the fact that pension funds, as long-term investors, invest a significant amount of assets in equities (OECD 2005b), e.g., for the UK top 100 pension funds, as of 2004, around 60% of the total assets were allocated to equities (domestic and foreign) (Clark and Hu 2005a). In consequence, pension funds growth leads to a larger market, which has been empirically proved by Walker and Lefort (2002) and Hu (2005b). In addition, pension funds might increase market liquidity and efficiency, given their superior information about fundamentals compared to individual investors (Davis 1998; Walker and Lefort 2002). In addition, stock market volatility might be reduced following growth of pension assets, given pension funds' relatively long investment horizon and their professional investment management (Davis and Steil 2001). This is much needed in China, as indicated by high market volatility in Section 5.1.2. Indeed, financial regulators in China expect that growth of institutional investors will stabilise the current volatile equity market.

It is noted, however, that the scale of the positive influence on China's stock market hinges on some structural issues, particularly the non-traded state shares (see Section 5.1.2.3 for details). Therefore, to maximise the beneficial impacts of pension reform, the authorities need to reform other aspects of the market correspondingly.

5.1.3 Institutional investors

Compared to institutional investors in advanced countries (Davis and Steil 2001), China has a very small sector of institutional investors, which is just at a nascent stage of development (Kim et al 2003; also see Section 5.1.3.3). Broadly speaking, institutional investors comprise mutual funds, insurance companies and pension funds. In China, there is another kind of institutions, i.e. securities companies, which are an important player in the market, as noted in the previous section.

5.1.3.1 Preconditions

Concerning the preconditions required for institutional investors, we would like to discuss the importance of insurance companies and mutual funds. For funded pension systems, it is a prerequisite to have a working insurance sector (Davis 1998; Mitchell

2000). This is because of the crucial role played by the annuities markets during the de-cumulation process of accrued pension assets (James and Vittas 1999). In this context, insurance companies should be able to provide annuity products to scheme members, and protect them from longevity risk. If such insurance companies do not exist, any funding oriented reforms would not succeed, since it is very likely that scheme members use up their accumulated pension funds in personal accounts before they die. This is a particularly important issue for those reforming countries which adopt the pension systems dominated by the personal component or defined contribution accounts, e.g. Chile.

As far as mutual funds are concerned, the corresponding minimum requirement is much less strict, but we believe that a strong mutual fund industry will help pension reform and the growth of pension fund assets to a large extent. This is because mutual fund managers are investment experts, and have expertise and strong knowledge on portfolio investments. Therefore, if a large amount of pension assets are given to mutual fund managers to invest, it is more likely to achieve higher and more stable returns.

5.1.3.2 Benefits of pension reform

A pension reform toward funding components will stimulate the development of institutional investors (Davis and Steil 2001). The direct link to pension funds is straightforward, in that individuals accumulate savings over their working lives; these assets are deposited in their personal accounts, rather than used to pay off current pensions, like the PAYG system. It is observed that pension assets have grown dramatically over the past decades (Acuna and Iglesias 2001; OECD 2005b; Hu 2005b). Regarding insurance companies, the positive effects are also obvious given the close link between DC schemes and annuities markets as noted in the previous section. This point is strengthened given the fact that the majority of reforming countries stipulates sponsors to offer annuities to DC scheme members, and in some cases, buying annuities is compulsory, e.g. in Brazil and Sweden (Blake 2000; Yermo 2001; Davis 2002).

The mutual fund industry will benefit from pension reform as well, although the scale of such positive effects differs, depending on whether there are regulatory restrictions on investment of pension assets in mutual funds (Yermo 2003). In general, the prudent person regime has the potential to maximise the benefits (Davis 2002a; Hu 2005c). In addition, it is argued that rapid growth of the US mutual fund industry in the past decades has owed a great deal to development of 401(K) plans. A survey by ICI (2005a) shows that as of June 2005, 35.6 million households in the US owned mutual funds through employer-sponsored retirement plans, which accounted for 31.5% of the total households.

5.1.3.3 Current situation

5.1.3.3.1 Insurance industry

The insurance industry plays a very important role during the process of the pension reform. For example, insurance companies are important asset managers for pension funds, and life insurance can provide a means of saving for retirement (Vittas 2000;

Liu 2005). Meanwhile, their provision of annuities industry is closely linked to the pension assets' de-cumulation within any funded pension system. In China, the insurance industry, particularly the life insurance industry, is quite small, when compared to other countries (Ji and Thomas 2001). Table 36 gives comparative statistics between the top 50 countries by the life insurance density (life premium per capital in US\$). As of 2000, Japan had the largest life insurance industry; the life insurance density was US\$ 2,877 in Japan, while it was US\$ 2,633 in the UK, and US\$ 855 in Korea. In comparison, it was only US\$ 8 per capita in China. Another statistic, i.e. life insurance penetration (total life premia/GDP), again, indicates the underdevelopment of the Chinese life insurance industry. It was 8.7% in Japan, 12.6% in the UK, and 1.1% in China. The latest statistics (Wu 2005a) show that as of 2004, the life density ratio in China was US\$ 40, and the penetration ratio was 3.4%.

Despite the underdevelopment, China's life insurance companies have witnessed significant growth over the past years. For example, as given in Table 49, the ratio of total assets within insurance companies to GDP was 3.8% in 2000, and while it was increased to 9.4% in 2004. In addition, Table 37 shows that total life premia grew rapidly during the period of 1992 – 2004 (Wu 2004; CIRC 2005). In 1992, total life premia were RMB 2.1bn, which then increased to RMB 100bn in 2000, and further to RMB 323bn in 2004. The average growth rate, as shown in Table 37 was 83% over the past 13 years. Against the rapid growth of the life insurance industry in China, the property insurance industry declined relatively over time, as shown in Table 38. For example, in 1999, the premium on property insurance was RMB 52bn, while it was RMB 87bn on life insurance. In 2004, however, the premium on the former became RMB 109bn, while the latter registered at the level of RMB 323bn, three times larger than the former. Among the life-related insurance premia, life insurance was the biggest contributor. The potential growth of China's insurance industry over the coming decades, particularly the life insurance industry, was exemplified by the investors' keen enthusiasm, when China Life went to IPO (Initial public offering) at the NYSE (New York Stock Exchange) and the HKSE (Hong King Stock Exchange) in 2003. In addition, the continuing pension reform will stimulate development of the insurance industry in China over the coming decades (Wu 2005b; Hu 2005e).

As regards the issue of fund investment and regulation, China's insurance industry experienced three stages (Wu 2004). The first stage is from 1980 to 1987, when all funds were deposited with the banks, therefore earning low deposit returns. The second stage is related to China's over-heating economic boom in 1987-1995. During this period, the previous tough investment restrictions were excessively relaxed, therefore leading to a large volume of funds invested in the real estate industry, stock market, and other high-return-high-risk sectors. In 1993, when the economy started cooling down, a large proportion of the insurance companies' investments fell in value. Largely for the lessons learned from the second stage, China has conducted a very conservative investment approach in the insurance industry, since 1995 until recently.

Table 39 lists the changes of investment regulations over the past decades. In June 1995, the "Insurance Law" was passed, and it stipulates that the insurance assets can

be invested in bank deposits, government bonds, and financial bonds²⁹ only. In May 1997, the investment restrictions were relaxed, and the investment in those bonds issued by the central government controlled SOEs and rated as AA+ is allowed. In 1999, the “*Provisional regulations on the investment of insurance assets in mutual funds*” was released. According to this regulation, insurance funds are allowed to enter the stock market, but indirectly via the investment fund companies. In 2000, the CIRC (China Insurance Regulatory Commission) allowed China Life and other four insurers to invest assets in any mutual funds up to 10% of the total assets. Recent years have witnessed significant investment changes. For example, as shown in Table 39, in September 2005, a regulation was released, specially focusing on the investment issue of those foreign assets within the Chinese major insurers³⁰. In comparison to those insurance assets, generated and kept within the Chinese territory, the foreign insurance assets are allowed to invest in a slightly more diversified manner. For example, they are allowed to invest directly on the equities, but those equities must be issued by the Chinese firms in the overseas stock exchanges.

Against the background of the evolution of the investment regulations in China, the investment largely tilts toward the low risk assets, particularly the bank deposits and government bonds (Lai 2002). For example, Table 38 reveals that over the period 1999-2004, in all years except 2004, more than half assets were invested in bank deposits. Among these non-deposit investments, government bonds frequently accounted for more than half, with the mutual funds at an insignificant level. In 2004, there were RMB 265bn invested in government bonds, while RMB 67bn were in mutual funds. By following this investment approach, the returns are expected to be very low. Immediate historical return data are not available, but Wu (2005a), chairman of the CIRC, noted that as of 2002, the nominal return was 0.05%. Given the inflation rate of -0.77 (see Table 17), the real return was only 0.82%. In this context, the positive return is totally from the negative inflation rate, and the investment performance only accounts for 6% of the total return.

To summarise China’s insurance industry, the size is still small relative to other countries, particularly compared to developed countries. Against this, however, insurance industry in China has grown rapidly since 1990s. For example, statistics in Table 37 show that during 1992-2004, the average growth rate of life premium was 82%. When investment issues are concerned, real returns were quite low, which might be due to strict regulations.

Comparison between China and Chile

Last, a short comparison between Chile and China. Comparative statistics of life insurance market are given in Table 31. Both countries had an insurance industry at the similar size if using same-year comparison. The ratio of life insurance penetration

²⁹ Financial bonds are issued by the state-owned banks, and can be viewed as a kind of government bonds.

³⁰ For some Chinese insurers, they have a certain amount of foreign assets outside the Chinese territory. These assets mainly come from the IPO revenues, injection capital from the foreign partners for those joint-ventures, and those business involving foreign markets. It is estimated that foreign assets within the Chinese insurers were equivalent to US\$ 10bn as of 2004 (www.cei.gov.cn). In addition, for each major insurer, the SAFE (State Administration of Foreign Exchange) issues a limit within which the foreign assets could be free invested abroad. For example, the PINGAN Company has a US\$1.75bn quota, allowed for a free investment abroad.

(life premia to GDP) was 2.3% for China, and 2.6% for Chile, as of 2003. When using comparison of Chile 1980 versus China 2003, however, China showed an encouraging sign. Specifically, in 1980 the ratio of life insurance penetration was 0.2% for Chile, while it was 2.3% for China in 2003.

5.1.3.3.2 Mutual fund industry

Before 1997, there existed a range of different small mutual funds in China. During this period, there was not any national regulation regarding this industry, therefore their development was largely self-initiating, and separated between regions. Also irregularities often occurred in the industry (Chen 2001). In response to this problem, the *Provisional regulations on the securities investment funds* was released in 1997. It is the first of this kind of regulation, providing a framework for the development of the mutual fund industry in China. Moreover, by establishing and developing a strong mutual fund industry, the reformers want to solve another structural problem associated with China's stock market, the speculative investment culture and the consequent high volatility. Financial regulators expect that mutual funds, as long-term investors, are able to conduct professional investment, i.e. buying or selling shares based on the fundamentals (Xu 2001). This kind of long-term investment culture or practice is very needed, in that China's stock market tends to be dominated by individual investors and speculators (Green 2003a).

At the beginning, all funds were closed end, and in 2001, open-end funds were introduced. As of August 2005, there are 195 funds, among which, 54 were closed-end funds, and 141 were open-end funds. For these 141 open-end funds, 65 were equity funds, 13 were bond funds, 35 were balanced funds, 23 were money funds, and 5 were income funds (Hu 2005). Table 40 reveals the rapid growth of China's mutual fund industry, particularly the open-end fund industry. In 2001, there were only 50 funds, including 2 open-end funds and 48 closed-end funds. The total amount of assets approximated RMB 66bn. Within one year, i.e. in 2002, the number of the open-end funds became 14, increased from 2, and that of the closed-end funds rose to 53. As of June 2005, China mutual fund industry had 127 open-end funds and 53 closed-end funds, with total assets of RMB 430bn, an 8 time-fold increase within 4 years, despite sluggish stock market as reviewed in the previous section. Meanwhile, as shown in Table 49, the ratio of mutual funds assets/GDP was 0.9% in 2000, which then increased to 2.7% in 2004. In terms of the asset allocation of China's mutual funds, the summary statistics are given in Table 41³¹. It is revealed that China's mutual fund managers favour the equity much more than the bond and other assets. For example, as of 2004, 53% of the assets were invested in equities, and 36% in bonds, 6% in bank deposits, and 5% in others, e.g. money market.

Stock is expected to have a higher return than other assets, e.g. bonds, at least from the long run perspective (see Table 17). Did mutual fund managers in China achieve a satisfactory performance? Table 42 shows the return on the net assets over the past 5 years. All years witnessed positive nominal returns. After considering the inflation rate, however, the returns became negative in both 2004 and the first half year of 2005. The growth rate of the net assets over the previous period was negative in 3

³¹ It is worth noting that the total assets in Table 41, in some cases, are not same as those in Table 40. Such difference might be due to the different calculation methods as well as the rounding errors.

years, and positive in 2 years. For example, in 2002, the growth rate was -5.03% . On one hand, the unsatisfactory returns and growth rates over the previous period were in line with the sluggish stock market in China during the same period (see Section 5.1.2 for details), since more than half of the mutual funds' assets were invested in equities, as noted above. On the other hand, given the downward trend of China's stock market over the period 2000-04, as indicated by the declining stock indices in Tables 33 and 33, China's mutual fund managers outperformed the stock market during the period. For example, in 2004, the real return of mutual funds was -1% (Table 42), while in the same year, the return by following the market was even more negative, i.e. -5% (Table 33). In addition, it is shown in Table 42 that all years experienced positive over-performance ratios, e.g. 10% in 2001, and 8% in 2004.

In comparison, US mutual fund managers performed much better in terms of real return, as indicated in Table 43. During the period 1971-1975, the real return was 1.67% , partly owing to the bear market in the early 1970s. In 1990s until 2005, all average returns were above 10% , e.g. around 20% in 1996-2000. Regarding the over-performance ratio, i.e. mutual fund return minus market return, it was negative in 4 periods, while positive in 3 periods, notably 15% over 2001-2005. When it comes to the growth rate of net assets, it is shown that the US mutual fund industry grew more quickly than the Chinese fund industry. For example, except the two bear market periods, i.e. 1971-1975 and 2001-2004 (Davis 2003b), in most other periods, particularly in the early years, the US mutual fund industry registered high growth rates, i.e. 32% in 1981-1985, and 164% in 1951-1960. In addition, as given in Table 43, the asset to GDP ratio was much larger for the US than that for China, i.e. $1-3\%$ for China's mutual fund industry, while it is 67% for the US mutual fund industry in 2001-2005. All these comparison ratios indicate the large scope of development of China's mutual funds in the future (Kim et al 2003). In this case, pension reform can play an important role, since mutual funds are an important investment vehicle for pension fund managers, as noted earlier.

Table 44 shows the distribution statistics relating to the 100 shares which are most invested in by mutual funds in China. In 2001, the average/mean number of funds invested in the 100 shares was 1.1. The average percentage of the stock market capitalisation related to the tradable shares was very small, and close to zero. The insignificance is consistent with our discussion above; in 2001, the mutual fund industry was very small, therefore it was without voice in the stock market. By June 2005, however, the picture had changed a lot. In terms of the number of funds, the minimum number of funds invested in each of those 100 shares was 3, and maximum 81. On average, there were 28 mutual funds invested in each share. On the value part, the average market capitalisation of the tradable shares for the 100 shares invested in by mutual funds was 32% . In other words, for those 100 shares most favoured by mutual funds, on average, 32% of the tradable shares are controlled by mutual funds in China. If we consider the remaining non-traded shares, i.e. $2/3$ of the total, mutual funds control around 11% of the total shares of those 100 stocks.

Given the relatively large number of the share controlling, particularly in terms of the tradable shares, one interesting question is whether those mutual fund managers in China are engaged in herding, thus generating volatility. As reviewed in Hu (2005b), herding refers to mimetic investment behaviour, where asset managers try to buy and sell shares at the same time, underpinned by the regular performance assessment from

the fund sponsors (Davis 2000; Dennis and Strickland 2002). Table 45 presents the statistical summary of the 10 most invested shares by each mutual fund. In 2001, on average, the 10 most invested shares accounted for 50% of the total assets of each mutual fund. Moreover, in maximum, 70% of the assets were allocated in the 10 largest shares. In 2003, the share holding became more concentrated among the 10 largest shares. For example, for some mutual funds, they allocated 100% of their assets to the 10 shares, while the average allocation ratio was 59%. Another interesting observation is that the assets were most concentrated to the most favoured shares. In 2003, the largest share, on average, received 11% of the total assets, the 2nd largest share, 7.6%, and the 10th largest share received only 3.4%.

Table 45 reveals that a large volume of mutual funds' assets are invested in the 10 largest shares. Although it provides some evidence of herding, it is not necessarily the case, if the 10 largest shares for each mutual fund are not the same. In extreme cases, if Fund A holds Share 1, Share 2 until Share 10, and Fund B holds Share 11, Share 12 until Share 20, they both in fact are engaged in different investment strategies, therefore there is no herding behaviour. In order to get around this issue, a deeper analysis is needed. We selected 2 shares, which are believed to be among the most favoured by the fund managers in 2002 and 2003. As shown in Table 46, in 2002, 9 out of 10 mutual funds were invested in the same stock, i.e. China Telecom (China Telecommunications), and China Telecom was among the 5 largest shares for all funds. In 2003, the concentration declined, but was still significant. 19 out of 43 funds put Sinopec in their portfolios as the 10 largest shares. Therefore, statistics in Table 46 suggest that in China, the mutual fund managers have herding behaviour, at least to some extent. The finding is consistent with other research results in China (Yang and Chen, 2004; Xu 2003), and in other EMEs such as Poland (Voronkova and Bohl 2003).

Comparison between China and Chile

The precise start date of Chilean mutual fund industry is unknown. However, it was estimated that in 1990, the assets under management by mutual funds in Chile were equivalent to US\$ 670million (2.2% of GDP) (Harris 2005), while this figure rose to US\$ 12.6billion (13.3% of GDP) as of 2004 (ICI 2005b). In comparison, China's mutual fund industry was smaller. As shown in Table 49, as of 2004, the total assets managed by China's mutual funds were RMB 336bn (US\$ 41bn), which was only 2.7% of GDP. If we use Chile-1980-China-2003 comparison as in the previous sections, however, the result is likely to be favourable to China's pension reform. Although we do not have data concerning Chilean mutual fund industry as of 1980, it is expected to be quite small, and very likely to be smaller than China's 2003 figure, i.e. 1.2%, as in Table 49.

5.1.3.3.3 Pension funds

In Sections 2 and 3, we reviewed the general development of China's pension fund sector, e.g. the fund regulation and investment. In this section, we discuss another two different issues which are closely linked to the stock market in China. The first one relates to those pension assets handed over to the mutual fund managers for professional management from the NSSF (National Social Security Fund). It is noted that as of 2004, the ration of NSSF assets/GDP was 1.3%. Until recently, the NSSF

was managed by the in-house investment team. Due to the lack of expertise and knowledge of fund investment, the returns were very low (Ma and Wang 2001), also as noted in Section 3.3.3. Aware of this issue, the authorities decided to allow a portion of the NSSF to be invested in stocks, but through the mutual fund companies in 2003. After a rigorous and careful selection by National Council for the Social Security Fund NCSSF (NCSSF), six domestic fund managers were chosen to manage around RMB 12bn assets, equivalent to 10% of the total assets in 2003 (ADB 2003). The initial investment mandate lasts 2 years, and the internal requirements for these six fund managers are to achieve at least a 3% real return per year, and/or a return higher than the one-year fixed interest by 20%. Based on the forecast inflation and interest rates in 2003, the target return was 4% per year during the first two-year mandate period. The actual returns earned by the fund managers are not available. The mandate-end assessment in June 2005 by the NCSSF, however, indicates that most managers achieved a satisfactory result. The NCSSF renewed the contacts for all six managers for another two years, and the asset allocations to each manager slightly changed, i.e. the out-performers were allocated more funds, and the under-performers allocated less funds (NCSSF 2005).

Table 47 shows the statistical summary of the NSSF assets managed by mutual funds in China. The statistics are only related to those stocks for which the NSSF, through mutual funds, was among the top 10 largest shareholders of tradable shares. Overall, 162 stocks meet this criterion, and those stocks are under the management of 11 stock portfolios. As shown in Panel A, on average, the NSSF served as the fifth largest shareholders in 2004. Moreover, in 24 of 162 cases, the NSSF, via mutual funds, held the largest number of tradable shares. The average market capitalisation per portfolio was RMB 327mn, and the average number of held shares was 35 millions. Panel B compares the total NSSF assets held by mutual funds with the market capitalisation. It is shown that relative to the market, the NSSF, through the fund managers, only controlled 3.1% of the total tradable shares, which approximated 1% of the total shares. Therefore, for the time being, the NSSF has not played an important role as in advanced countries (Davis and Steil 2001; Clark 2000).

As we discussed in Section 3, the Chinese pension system is highly fragmented. Regarding pension funds accumulated in different regions, fund management is separated, and shows a large variation in terms of returns and investment procedures. In Table 48, we present the data concerning occupational pension assets accumulated and managed in two cities in China, i.e. Shanghai and Shenzhen. In these two cities, the Occupational Pension Management Centres were established, when the authorities encouraged the development of the supplementary or occupational pension funds in 1997 (see Section 2). As of 2004, the total amount of assets allocated to the stock market was around RMB 463 millions, and the total number of shares held by these two centres was 69 millions.

In terms of the shareholding structure, on average, the occupational pension funds within these two centres were the sixth largest shareholders concerning the tradable shares. Although it is only related to the investment practices in two cities, it to some extent reflects the start of the corporate engagement by pension funds in China (Clark 2000; Clark and Hebb 2004). On the academic side in China, there is little debate on the role played by pension funds in corporate governance. On the one hand, it is due to the small size of pension fund sector in China, i.e. 1.4% of GDP in Table 49. On

the other hand, it is associated with the 2/3 non-tradable State shares. In other words, if only 1/3 of total shares are traded in China's stock market, with the remaining controlled by the state, there is little room for institutional investors, and pension funds in particular, to actively engage in corporate governance (Tenev et al 2002).

5.1.3.3.4 Securities companies

Securities companies in China are defined as those financial intermediaries which mainly provide securities services such as dealing, brokerage and underwriting (Green and Wall 2000). As of October 2002, there were 124 securities companies in China (Kim et al 2003), and those companies are grouped into two types; one is termed as *Brokerage firm*, and the other is termed as *Comprehensive firm* (CSRC 1999). Generally, the requirements for establishing the former are stricter than for the latter. For example, the initial capital required for establishing a brokerage firm is RMB 50 million, while it is RMB 500 million for the comprehensive firm (CSRC 1999). Largely for the high entry barriers and the difficulty in obtaining the licenses from the CSRC, securities companies used to enjoy profitable returns until 2001. As noted earlier, starting in 2001, China's stock market has experienced a downward trend, with the transactions dwindling in 4 consecutive years. Because the majority of the revenues in securities companies generated from the dealing and brokerage (Green and Wall 2000), the recent sluggish stock market has significantly affected the profitability of many securities companies.

In order to avoid the excessive dependence on brokerage activities, and develop new lines of business, many securities companies, in the 1990s, started to engage in direct asset investment business, mainly for large corporations. With the original purpose of diversifying income-generating sources, thus reducing profit volatility. Securities companies, in practice, directed most funds to the stock market and the property market, given their high returns. Everything went well, when the stock market was strong in the 1990s. The picture has, however, become less favourable since 2001. As of 2004, China's securities companies registered losses at the level of RMB 6bn, including RMB 3.4bn in misused client funds (www.hexun.com, 2005). In addition, China Southern Securities, once the 5th largest securities firm, went into bankruptcy in 2002. Many factors underpin the bankruptcy, and one of them is the risky investment of the client's funds, which was exacerbated by the recent continuous market downturn.

In order to regulate China's securities companies, the CSRC, in December 2003, issued the "Provisional regulations on the management of clients' assets by securities companies", which aims to regulate securities companies' investment banking business (CSRC 2003). For example, it is stipulated that government bonds and other liquid fixed-income bonds should be the main investment instruments. Equity investment is allowed, but the priority should be given to those blue-chip stocks and stock mutual funds. In addition, the upper limit on the investment in stocks is 20% of the total assets. In addition, it is regulated that any securities company should not buy more than 10% of the total shares issued by one company, and should not promise minimum guarantee returns to clients. Given the strict quantitative investment restrictions, and the potential growth of pension fund assets with China's ageing population, many securities companies have started eyeing the accumulated assets within pension systems, particularly the occupational pension funds (Chen 2001). The

beneficial impacts on securities companies could be direct, owing to the increase in the fee-based income, and indirect, related to the rise in business by their subsidiary asset management companies.

In comparison to other institutional investors in China, the aggregate assets data of securities companies are difficult to be accessed. Kim et al (2003), however, report that, as of October 2002, the total assets under the management of securities companies in China were around RMB 51 billion (0.53% of GDP).

5.1.3.3.5 Summary

In this section we provide an overview of the size of China's institutional investors, so as to compare China's institutions with those in other countries. By summarising the results presented in previous sections, it is expected to give some indication of the potential growth of the industry in the coming decades, if China continues its rapid economic growth, and reforms its pension system smoothly.

Table 49 presents the aggregate statistics of China's major institutions investors, as we discussed above. The only institutional investor, we did not mention earlier, is *underground funds*; they are defined as those large investors which engage in the investment business in the financial markets, but are not legally recognised in China. They grew dramatically from the early 1990s, to the current huge industry managing assets around RMB 500-800bn (www.hexun.com; Xia 2001). Their rapid growth is mainly linked to the promised high returns and flexibility in terms of fund investment and regulations. For these characteristics, they could be viewed as hedge funds, similar to that in advanced countries (Brooks and Kat 2001); the only major difference is that their operation and business in China is illegal. Due to the lack of the exact data, we estimate the assets under management of underground funds were same over the 4 years, i.e. at the level of RMB 650bn. In addition, the occupational pension assets in 2004 were RMB 0.45bn, and the assets under securities companies in 2002 were RMB 0.5bn. In order to facilitate our analysis and for the simplicity, we assume that the assets under management did not change over the past 4 four years.

Table 49 shows that the aggregate assets of institutional investors in China grew from RMB 1,316bn in 2001, to RMB 2,394bn in 2004, 80% growth over the four years. Relative to the level of GDP, it is found that the size of institutions increased steadily. For example, the ratio of All institutions/GDP (including underground funds) was 13.5% in 2001, and increased to 18.9% in 2004. If excluding underground funds, the formal/legal institution investors in China accounted for 6.8% of GDP in 2001, and 13.8% in 2004. If we consider pension funds only, the ratio of Pension funds/GDP was 0.8% in 2001, and 1.4% in 2004. It is worth noting that pension data herein only include the assets of the NSSF and the occupational pension assets in Shanghai and Shenzhen, which obviously is smaller than the actual size of the total pension assets in China. As we discussed in Section 3, however, pension management in China is highly fragmented, and it is always conducted at the city or country level. In consequence, the accumulated assets in that way are very small, and not genuine institutional investors. It is also a relevant point that most assets in that context are invested in government bonds and bank deposits. Therefore, they are not expected to have any impact on the financial markets, which then justifies the exclusion of them from our analysis in this section.

By presenting the data for China's institutional investors above, one interesting question naturally emerges, i.e. how large are China's institutions relative to other countries? In order to make the comparison meaningful, we choose 2001 as the comparison year, since 2001 is the year for which we have consistent data regarding institutional investors in both China and other countries. As indicated in Table 50, we group OECD countries into three headings, i.e. OECD-all, including all OECD countries, OECD-advanced, including those advanced OECD countries only, and OECD-developing, including those less advanced OECD countries. In addition, we use another heading, i.e. All EMEs, when discussing pension data. All EMEs refers to 33 emerging market economies, including Asian, Latin American, African and Eastern European countries, and the data are as of 2002. When the ratio of All institutions/GDP is concerned, China was at the level of 14%, while the OECD-all was 163%, more than 10-fold higher. When the advanced OECD countries are dropped, however, the ratio (OECD-developing) decreases to 11.1%, comparable to the Chinese case. As regards the importance of pension funds as institutional investors, China had an insignificant pension industry as of 2001. The average ratio of Pension funds/GDP was 18.9% for all OECD countries, 34.4 for all advanced OECD countries, and 3.3% for those less advanced OECD countries. In addition, Hu (2005b) and Davis (2005) report that the ratio was 12% for the selected 33 EMEs. In comparison, China's pension fund industry was only 0.8% of GDP in 2001, which was also significantly smaller than 12.7% for the Chilean case, as given in the last row in Table 50.

5.1.3.4 Conclusions on preconditions

By reviewing the current situation of China's institutional investors above, it is indicated that they are sufficient to initiate pension reform with funding components. For example, the life insurance industry has developed from non-existence to a relatively large market, and it is also able to offer some annuities products, although admittedly there are still many problems, e.g. small market penetration and strict investment regulations. Concerning mutual funds, their current development is capable of supporting pension reform towards funded systems as well, given the size and range of products in the market. For example, as noted, mutual funds in China are classified into different funds, e.g. bond funds, equity funds etc, which can meet basic heterogeneous needs from pension funds. Blake (1997a) argues that pension schemes with different maturities should shift between bond and equity investment accordingly.

5.1.3.5 Conclusions on benefits

Pension reform can improve the development of institutional investors in China. As noted in Hu (2005b), Chile had virtually no pension assets before 1980 when it started its pension reform. In 2002, however, the pension fund industry grew to around 60% of GDP. If China continues its rapid economic growth and current pension reform towards a funded system, China is expected to witness a significant expansion of the pension fund industry, like Chile, over the coming decades. This trend is underpinned by China's rapid ageing population. This point, however, is closely linked to the case of "empty" personal accounts in China, as noted in Sections 2.3 and 2.4. If these savings in personal accounts are used to pay off current pensioners, rather than accumulated, the acclaimed positive impacts are expected to be small at best.

Another benefit relates to the mutual fund and insurance industries (Davis 2005a). In many countries a large volume of pension fund assets are outsourced to mutual fund managers for investment. For example, as noted in Section 5.1.3, 6 domestic mutual fund managers have been selected to manage the NSSF in China. Even in the case where pension funds are to invest by themselves, mutual funds are still a good investment vehicle in terms of risk diversification and professional management (Davis and Steil 2001; Ma and Wang 2001). Insurance companies also can benefit from pension reform (Devesa-Carpio and Vidal-Melia 2002), since the annuities market plays a very important role in any funded system. The annuities market in China is in its infant stage, but expected to increase in size significantly in the coming decades (Hu 2005e).

Securities companies of course would be able to obtain a share of the positive impacts as well, arising from pension reform and pension fund growth. For example, more activities and transactions required from other market participants, e.g. mutual funds and insurance companies, would bring more business to brokers, i.e. securities companies, thus implying more revenues and higher growth.

5.1.4 Bond market

5.1.4.1 Preconditions

A sound bond market is the precondition for any pension reform, given the important role played by bonds in pension funds' portfolios, especially for EMEs (OECD 2005b; Clark and Hu 2005a). In this context, one point which is particularly important, relates to annuities markets. Specifically, for insurance companies offering annuities, their investment strategy mainly focuses on bond investment; therefore the availability of bonds in the market is a minimum precondition. The importance of the bond market becomes increasingly noticeable, given the current trend of liability driven investment (LDI). The Bank of England noted that UK pension funds were buying index-linked gilts at virtually any price (IPE 2005), which is partly explained by the LDI strategy. In addition, reforming countries frequently use debt financing, i.e. bond issuance, to meet up the implicit pension debts after implementing pension reform, e.g. Chile (Acuna and Iglesias 2001). Therefore, for those countries which have to consider issuing bonds to finance pension debts, a bond market must be ready before adopting pension reform with funded components.

5.1.4.2 Benefits of pension reform

Hu (2005b) investigates the impacts of pension fund asset growth on both private and public bonds. As shown in Table 26, the results are mixed, but there is some evidence indicating the positive influence of pension assets on private bonds in the long run. In addition, Impavido et al (2003) find a positive impact of contractual savings on aggregate bond markets, although they do not separate the data by public bonds and private bonds. The reason why the bond market can benefit from pension reform is the heavy investment of pension funds in both government and corporate bonds, as noted in the preceding section. In this case, the development of annuities markets and the popularity of liability driven investment (LDI) are particularly important and play as two powerful growth engines. In addition, pension reform can also contribute to the

growth of the bond market by facilitating bond-related financial innovation, e.g. inflation-linked bonds (Bodies 1989).

5.1.4.3 Current situation

China used to avoid the issue of bonds and any other debt securities, since under the past centrally planned regime, one objective of fiscal policy was to maintain equality between government spending and revenue. Moreover, the policy of “No domestic debt and international debt” was widely regarded as one advantage of the socialist society (MOF, Japan 2003). The picture changed, however, in 1981 when China first issued government bonds (Su 2005). Although the amount was very small, only around RMB 5bn (see Table 51), it opened another new era of China’s financial liberalisation. With China’s rapid growth, the authorities have gradually realised the importance of the bond market. In consequence, bond market has grown significantly over the past two decades. Table 51 shows that in most years, the size of government bond issuance grew at a two-digit rate, except in a few years when bond issuance dropped, e.g. 1990. Commensurate with the growth of bond issuance, bond repayments, including both principal and interests increased steadily. For example, in 1990, the repayment was just around RMB 11bn (0.61% of GDP), while in 2003, it soared to RMB 288bn (2.45% of GDP).

Figure 2 reveals the expanding trend of China’s bond market relative to the level of GDP. In the early 1990s, the combined size of both public and private bond markets was around 10% of GDP. Over the following years, China’s bond market continued its expansion, and in 2003, bond market capitalisation accounted for around 30% of GDP. Over the period until 1999, the public bond market was of the same size as the private bond market. Since 2000, however, the former has expanded more quickly, being size the double of the latter in 2003. In comparison to other countries, China’s bond market (both private and public) is small (Green and Wall 2000), as indicated in Figure 3. The ratio of bond market capitalisation to GDP for China was less than that for OECD and EMEs over the period 1990-2003. For example, in 2003, the ratio was above 90% for OECD countries, and 40% for EME, while it was only 30% for China.

In China, bonds are classified into different types by issuers. They are long-term government bonds, issued by the government (Finance Ministry), treasury bills, issued by the central bank, policy financial bonds issued by the development banks, commercial bank bonds by the commercial banks, securities companies bonds by securities companies, and corporate bonds, mainly issued by the large SOEs. Among these bonds, the first three bonds account for most of the market share. Table 52 gives the issuance data of different bonds by issuers in China. The overall size of China’s bond markets was RMB 2,730bn in 2004, while the government issued RMB 481bn bonds (3.8% of GDP), the central bank issued 1,704bn (11% of GDP), and the development banks issued 435bn (3.4% of GDP). In terms of issuance frequency, the central bank issued 11 times in 2004, and corporate bond issuance only occurred twice. The data for 2005, as revealed in Table 52, have a similar picture, with the central bank being the largest issuer. It is admitted that large volume of treasury bills were issued to finance government deficits.

In terms of the term structure, most bonds are issued with the maturity periods longer than 5 years, and the most common maturity periods are 5, 7 and 10 years. There are

bonds longer than 20 years, but they are very rare. The first 30-year bonds were issued for the purpose of financing China's Three Gorges Dam project along Yangtze River, which is expected to cost billions of dollars. Statistics (www.hexun.com, 2005) show that as of August 2005, there were 74 government and corporate bonds traded in the markets³². Among them, 67 were bonds with maturity period longer than 5 years, and 7 bonds less than 5 years. For those government/corporate bonds (36/38), 30/37 were issued with the maturity periods longer than 5 years, and 6/1 shorter than 5 years.

In addition, Figure 4 depicts debt maturities and short-term debt ratios for China and EMEs in general over 1981 and 2003. Debts herein refer to publicly guaranteed loans borrowed by domestic governments from international organisations, e.g. the World Bank, as well as domestic agents, e.g. central banks. In terms of short-term debt ratio (debts under 1 year/total debts), China witnessed higher values consistently over the period. For example in 2003, the ratio was 37% for China, and just 16% for EMEs. Concerning maturity, both China and EMEs registered values around 15 years, although China's values were larger over the whole period. Given the statistics above it to some extent reflects borrowing pattern in China, i.e. in favour of short financing, although loans are different from bonds. Therefore, it is suggested that if the Chinese authorities plan to use debt financing to cover the pension deficits in the future, more weight might be given to long-term debts, typically longer than 10 years, e.g. 20 and 30 years. On the one hand, it adjusts the debt structure in China. On the other hand, it meets pension fund managers' need for long-term investment instruments (Campbell and Viceria 2001; G10 2005). In addition, issuance of inflation-linked bonds might be considered, given its importance in pension fund management (Bodie 2001, 2004; Hu 2005c).

As to the returns, Table 53 shows that the average return, i.e. YTM (yield to maturity), was 2.52% for government bonds in 2005, and 1.04% in 2003. For corporate bonds, the returns were higher. The mean YTM was 3.21% in 2003, and 2.87 in 2005. In addition, the maximum returns for corporate bonds were larger than those for government bonds. For example, in 2003, it was 4.16% for the former, and 3.73% for the latter; the higher premium is consistent with the financial theory, i.e. as the compensation for the higher risk. In comparison to other countries, China's 10-year government bonds yield low returns than other countries, as shown in Table 54. For example, in 2004, China's long-term bonds had a real return of -0.91%, much lower than 5.56% for selected OECD countries, and 4.42% for EMEs. The negative bond yield is consistent with the low level of interest rates in 2004, i.e. 2.25% in nominal, and -0.71% in real term (IMF statistics 2005), which in turn indicates the loose monetary policy since the late 1990s, in order to sustain high economic growth (Lin 2004).

5.1.4.4 Comparison between China and Chile

Last, we have a brief comparison between Chinese and Chilean bond markets. Data are given in Table 31. In terms of the same-year comparison, Chile was in a better position over the whole period. For example, the ratio of private bond market assets to GDP was 10.3% for China, while it was 19.4% Chile as of 2003. Concerning the

³² In China, the bonds used to be sold to targeted institutions and individuals, and they were not traded in the market. In order to facilitate the liquidity, in 1999, selected bonds could be traded in the market.

public bonds/GDP ratio, it was 18.9% for China, and 27.4% for Chile in the same year. If we compare Chile 1980 with China 2003 as in the previous sections, the results might differ. We do not have specific 1980 data for Chilean bond markets, however, presumably the figures should be less than 9.3% for private bonds/GDP, and 19.8% for public bonds/GDP (both figures are 1995 observations). If this is the case, the current bond market in China is larger than that in the years when Chile started its pension privatisation.

5.1.4.5 Conclusions on preconditions

In terms of the basic requirements for a pension reform toward funded systems, we believe that the current bond market in China can sustain such a transition. However, a number of issues still need to be addressed, if it is intended to maximise the positive impacts of pension reform on the bond markets. The first one is concerned with the term structure. Currently, the majority of bonds in China are issued with the maturity periods less than 10 years. This is not sufficient to meet the demand from pension funds for a longer liability. Therefore, the Chinese authorities might consider issuing more bonds longer than 10 years, e.g. 20 years, and even 50 years, like the UK and France. Secondly, inflation linked bonds are very attractive to pension funds, in that this kind of bonds can protect scheme members from inflation risk to a large extent, if not completely³³ (Hu 2005b). Therefore, inflation-protected bonds should be introduced to the market as soon as possible.

5.1.4.6 Conclusions on benefits

Pension reform can play a positive role in stimulating the growth of China's bond markets. The public bond market will expand, since many reforming countries, e.g. Chile, use bond issuance to finance the pension liabilities. In China, the government has not yet issued bonds for the purpose of pension reform so far. It is, however, a reasonable policy alternative to consider in the future (Wang et al 1999). Particularly, at the moment, when the government's favoured method of transferring IPO assets to the NSSF (see Section 5.1.2.3) was withdrawn, issuing bonds is an appropriate choice. In terms of the private bond market, pension reform also plays a beneficial role, in that fund managers always buy corporate bonds to diversify their portfolios, seeking a return, lower and less risky than equities, but higher than government bonds. In addition, pension fund growth can contribute to financial innovation, e.g. longer bonds and inflation-linked bonds, as noted above. It is notable that the balance of bonds rose from US\$ 44million in 1981 to US\$ 1,873million in 1997 in Chile's bond markets; it is argued that pension reform played an important role (Acuna and Iglesias 2001).

5.1.5 Money market

5.1.5.1 Preconditions

³³ Specifically, the life insurers in many countries typically offer inflation indexation up to a pre-specified level, e.g. 5 per cent in practice, and the risk above that level is still borne by the annuitants. In this context, the inflation risk is not removed completely.

Money market can be defined as the market for short-term securities issued by corporations, banks and the government (Luenberger 1998). The main activities involve inter-bank lending, repo (repurchase agreement), and circulation of commercial paper and discount notes. It is believed that the money market is not a minimum condition for pension reform. On the one hand, pension funds normally do not invest a large amount of assets in the money market directly, on the other hand, even in the case where pension funds buy money market products via mutual funds, the high liquidity and security provided by the money market could be met by investment in cash and bank deposits to some extent, although it is admitted that these two investment types are not the same. The money market, however, may still be a positive factor during the pension reform process in that it can help fund managers to find a better return-risk portfolio, not least due to that reason that an efficient money market plays a beneficial role in facilitating derivatives trading.

5.1.5.2 Benefits of pension reform

Pension reform again can benefit the development of the money market. The reason is quite straightforward. First, many mutual fund managers purchase money market products to diversify risk and achieve high liquidity. Then given the fact that mutual funds manage a large amount of pension assets in their portfolios, it is obvious to see a rapid growth of the money market, following pension reform. Second, Allen and Santomero (2001) mention that in the US, individuals are allowed to deposit their salaries automatically in money market accounts, and routinely withdraw money from cash machines. This convenience would increase the popularity of this account, and thus leading to the growth of money market assets.

5.1.5.3 Current situation in China

The money market first emerged in the 1980s in China, and has undergone rapid growth since 1990s (CCER 2004). As of May 2005, the total market volume reached the level of RMB 5,566bn, up from RMB 72bn in 1997 (Shen 2005). A variety of institutions have participated in the money market, including commercial banks, policy banks, securities companies, insurance companies and mutual funds, as well as the central bank (Su 2005). The largest market participant is the central bank/government. As shown in Table 52, the central bank had issued RMB 1,704bn (13.5% of GDP) treasury bills in 2003, accounting for more than 60% of the total bond market capitalisation. The amount of short-term debts issued by corporations in the money market is insignificant, although there is a consensus that the dominant position of the government and the state-owned banks should be changed by allowing more participants/institutions to finance short-term debts in the money market.

Given the high liquidity and security, the money market has received a great attention from mutual fund managers. In order to encourage mutual funds to participate and also regulate their investment behaviour, PoBC (People's Bank of China) and CSRC (China Securities Regulatory Commission) issued a joint circulate, i.e. "*Provisional regulations on the management of the money mutual funds*" in 2004. It stipulates money funds can only invest in one year saving certificates, one year treasury bills, and other high monetary assets recognised by the PoBC etc. In addition, investment in short-term corporate bonds issued by any single firm should not exceed 10% of the net assets of mutual funds.

Last, it is worth noting that the money market is the only place in China where the market decides the interest rates (Zhou 2003). The authorities hope that, by allowing the marketisation of interest rates in the money market, it can help develop the financial regulators' experience in the issue, therefore facilitating the achievement of full interest rate liberalisation eventually some time in the future (CCER 2004). It is consistent with China's style of economic reform, i.e. gradualism (Woo 1999; Yueh 2003), whereby any major economic reform is always initiated in a small region or context; when the reformers obtained sufficient experiences, and became confident about its consequences, the reform then is extended to the other part of the country and the economy.

5.1.5.4 Conclusions on preconditions

As we noted at the outset of Section 5.1.5, it is not a prerequisite requirement to establish a money market first, before pension reform is initiated. However, if we want to reform pension system as smoothly as possible, and maximise the positive benefits of pension reform, it is necessary to have a healthy money market in China. The underlying reason is that the money market provides investment vehicles which are complementary to other traditional ones, e.g. bonds and shares, in terms of liquidity. In other words, it is beneficial from the perspective of fund management in terms of risk diversification (Davis 2002b; Hu 2005c).

5.1.5.5 Conclusions on benefits

The benefits of pension reform on the money market observed in other countries should also be available in China. Specifically, with deepening of pension reform, more pension assets would be invested in money market products, directly or indirectly via mutual funds. In consequence, the market grows in terms of both size and efficiency, and it might also lead to more efficient pricing of financial products as well as asset allocation within the economy. However, as noted in Section 5.1.5.3, currently there are some quantitative restrictions regarding investment by mutual funds on money market products. Therefore, in due course when the market becomes more developed, such restrictions should be lifted and ideally follow the prudent person rules. Another benefit, which is specific to China, relates to interest rate liberalisation, as noted in the preceding section. This is important in that such liberalisation can have wider impacts on the whole financial system, which in turn would benefit pension reform and pension fund growth.

5.1.6 Other issues

Although the financial markets, e.g. the banking sector, institutional investors, are crucially important in the process of the Chinese pension reform, there are a number of other preconditions for successful pension reform, which are equally important. They are monetary stability, financial stability, the legal and regulatory environment, good accounting standards, relatively experienced regulators, financial education and administrative capability. In what follows, we discuss them briefly.

5.1.6.1 Monetary stability

Firstly, maintaining monetary stability is a precondition for successful pension reform shifting from pay-as-you-go (PAYG) to funding (Davis 1998, 2005a; Vitas 2000; Mitchell 2000; Holzmann and Hinz 2005). Monetary instability, particularly high inflation, is very destructive of the funded pension accounts, since the real value of accumulated assets could be eroded away significantly within a high inflation regime. In fact, the PAYG's ability to protect pensioners from inflation (Barr 1998) is a major strength, while lack of inflation protection is one main disadvantage of the funding systems (Hu 2005b). In China, inflation was out of control in two periods, i.e. in the late 1980s and in the early 1990s. For example, Table 17 shows that in 1994, the inflation rate was 24%. The first period was associated with the government's intention to let the market decide the prices of almost all commodities in China, while the second high inflation period arose from lax fiscal policies. The high inflation in the early 1990s partly contributed to the passage of "Central bank law" in 1995, which legally stipulates the independence of the central bank (Hu 2005a). Since the second half of the 1990s, inflation has gone down, and remained at a quite low level, even negative in 2002 (Table 17). One point, relevant here, is that of inflation-linked government bonds. This type of bonds is very useful in a funded pension system, in that it can provide some degree of inflation protection. As noted in Section 5.1.4, inflation protected bonds are not available in China.

Since China has changed into a market-oriented economy, it should be less common to have prices controlled and manipulated purposely by the authorities than before. The risk of high inflation, however, still exists. As argued in Davis (2005b), inflationary pressures might arise in an aging society, which partly links to the excess demand of goods and services over supply (Fitoussi 2003). It is noted, however, this effect would not materialise in China until 2030 and afterwards, when the demographic pattern changes and China converts to a truly ageing society. On the contrary, at the moment, there is counter-inflation effect, which is consistent with currently observed low inflation in China; one underlying reason might be "surplus labour" which results in downward pressure on wages and high productivity growth at a national level. Inflationary pressures could also occur if bond issuance is used to finance the transition costs from PAYG to funding (Wang et al 2001), and the government does not reduce other public expenditures and spending correspondingly. For the time being, China has not decided to use bond issuance to finance its pension deficits (Liu and Gao 2005). If the method is adopted some point in the future, however, it is recommended that prudent monetary policy is undertaken. When inflationary pressures do arise, the monetary authorities should monitor the economy carefully, and take restrictive monetary policy if appropriate, e.g. by increasing interest rates. "Giving in" to pressure to accommodate high demand with lax monetary policy and without reducing spending accordingly needs to be avoided.

5.1.6.2 Financial stability

Secondly, it is crucial to maintain financial stability. Despite the vast heterogeneity of financial instability in appearance, it could be summarised into bank, market-price, and market-liquidity linked crises by nature (Davis 2003a). A successful pension reform relies on the health of financial stability, in that financial markets serve as a pivotal intermediary in terms of financing and investment, which in turns has impacts on pension reform (Davis 2000; G10 2005). As noted in earlier sections, a large volume of pension assets in China has been invested in bank deposits. Therefore, a

widespread bank default will seriously harm pension fund assets, although the effect is expected to be smaller in the future, when bank deposits might comprise only a small portion of China's pension assets, as in advanced countries (Clare 2005; OECD 2005b).

It is admitted that a degree of stock market volatility is inevitable, and might be necessary and beneficial in terms of helping adjust prices to fundamentals, and increase output potentially (Smets and Wouters 2004); in this case, it is argued that central banks should not respond to asset changes per se unless those changes signal expected future inflation pressures (Bernanke and Gertler 2000). Protracted collapse of market liquidity, however, is damaging during the process of pension reform, since it can temporarily erode the market value of pension assets, create difficulty in pension debt financing, as well as reduce people's confidence in funded systems. On the other hand, pension reform per se might lead to market volatility, in that institutional investors, e.g. pension funds, intend to engage in herding behaviour, i.e. copy others' investment strategies regardless of fundamentals (Davis and Steil 2001; Dennis and Strickland 2002; Lipson and Puckett 2005). In this context, a robust market surveillance mechanism is needed; whenever the market experiences turbulence, regulators should be able to quickly identify them to be transitory or long term. If it is the latter with a non-fundamental character, i.e. bubbles, actions should be taken to mitigate its negative impacts at least.

5.1.6.3 Legal environment

The third issue relates to the legal and regulatory environment (Li and Gao 2005). There are two relevant points. As noted in Section 4.4, a national social security law is needed in China, since it would provide the legal framework upon which pension provisions are based. In this context, whether to participate in the public pension system in China becomes an issue of compulsion, thus any ignorance and deliberate evasion is against the law. In addition, such a law can enhance people's confidence about the government's reform commitment (Mitchell 2000), and therefore increase the participation rate. Passage of laws, including both the social security law and other relevant financial laws, however, is just the first step. Another issue is law enforcement. The problem of weak law enforcement, currently quite common in China, mainly arises from the bureaucratically political structure, as well as the principal-agent problem between central and local governments (James 2002), i.e. maximising own interests at the expenses of the other. Therefore, in addition to passing the laws, it is necessary to strengthen law enforcement, which could be achieved by streamlining the regulatory framework (Davis 1998), and establishing coordination between agencies (OECD 2005a), to the extent the unnecessary bureaucratism and conflicts of interest are minimised. Recent progress in terms of facilitating and strengthening investors' rights to sue listed companies, e.g. due to false financial disclosures, is an encouraging sign in China (Li 2004).

5.1.6.4 Accounting environment

Fourthly, good accounting standards and practices are necessary in order to conduct pension reforms smoothly. The indirect link between accounting standards and pension reform is through the stock market, i.e. by improving the quality of listed companies, whose shares are an important component of pension fund portfolios.

Many listed firms in China are engaged in document falsification and accounting information manipulation, just in an attempt to make their stocks attractive and meet regulatory requirements (CSRC 2003; Li 2004). This mis-behaviour is destructive in that it induces company's management to "create numbers", rather than enhance productivity and profitability (Cheng 2005). It partly explains why investors in China care little about fundamentals (Green 2003a), as well as the public's lack of confidence in China's stock market (Chen et al 2003). The direct need of good accounting practices for pension reform is to help establish internationally recognized pension accounting standards³⁴. In this case, it is argued that pension funds per se, as large institutional investors, will push for reform of accounting, e.g. the Calpers (Global Aging 2003). Pension accounting has undergone major changes, and there is a trend to move to the fair value or mark to market approach (Skerratt 2002; Fore 2004), for example the IAS (International Accounting Standards) 19. The new approach constrains management's opportunities to "creative accounting", and their ability to mislead investors (Shirai 2002). The relevance to the Chinese pension reform is not immediate, since the occupational pension industry in China is very small at the moment (Hu 2005e). However, the positive benefits of good accounting standards will become large when more and more Chinese enterprises establish pillar 2, i.e. occupational pensions in the near future.

5.1.6.5 Regulator's competence

Fifth, regulators' competence is an essential precondition for pension reform. It is closely linked to the points mentioned above. For example, when a new pension reform is designed and agreed, the relevant parties should have a basic capability to implement it. The more capable the governmental agencies, the more likely the positive benefits will be achieved, other things equal. As noted, law enforcement is also important in developing markets, including China. Weak law enforcement arises from the conflicts of interest between regions (see Section 3.4), and from wide political corruption (Wei 2003). This issue is important in that new policies themselves have little impact, and what really matters is successful implementation of relevant policies at a regional level. On the pension fund investment side, the capability of financial regulators is also of critical importance, in that pension funds are becoming a major player in the financial markets in China (Kim et al 2003; Green 2005b), and at the same time, the capital markets are expected to be more complex, as in advanced countries (Greenspan 2003; Large 2004). Given these new developments, in order to preserve pension assets' real value by maintaining monetary and financial stability as noted above, financial regulators should have skills and expertise to monitor market movements, e.g. financial disorder and fluctuation carefully (G10 2005). In this case, ideally financial regulators are independent, desirability of which is highlighted by the worsened financial situation following political interference and intervention during major financial crisis over the past decades (Quintyn and Taylor 2004).

³⁴ During the period until 1980s, accounting in China was essentially a bookkeeping system, and there were no any formal accounting standards (Xiao and Pan 1997). With economic development, international accounting practices have been gradually introduced to China, partly arising from pressures from foreign investors for a more transparent system (Zhang 1992). The magnitude of accounting reform, however, is limited, highlighted by the co-existence of old accounting systems and the international standards in most SOEs and many private enterprises (Xiao et al 2004).

5.1.6.6 Financial education/awareness

Sixth, in order to foster and facilitate the development of occupational pensions, it is critical to pay attention to financial education in general and pension education in particular (Lusardi and Mitchell 2005; Johnston 2005). The issue is especially important in a pension regime where individual accounts are a large component, and individual consumers are allowed to make their own decisions at least to some extent. Experiences in other countries suggest that if uninformed consumers are left with choosing pension provisions, they are very likely to end up with an inappropriate scheme, e.g. the mis-selling scandal in the UK (Whitehouse 2000a; Blake 1997b). In addition, empirical work in Nyce (2005) gives evidence that improved communication between employers and employees leads to higher 401(k) participation and contribution rates. Meanwhile, the latest report on the reassessment of Chile's retirement programme shows that 80% of those surveyed did not know how the benefits are computed (Mitchell 2005). In the Chinese case, in the short term it is still reasonable to aggregate individual accounts and manage them in a centralised manner and/or provide individuals with relatively limited choices, which is consistent with argument of reducing administration costs (James et al 2001). In the long term, when Chinese consumers become more sophisticated and familiar with a range of financial products following financial education, more individual responsibilities could be granted so as to better meet individual needs.

5.1.6.7 Administrative competence

The last issue is related to administrative capability of all relevant parties (Holzmann and Hinz 2005). On the one hand, it involves some specific "hard" constraints, e.g. computerization and record-keeping (Mitchell 2000). Given the size of China's population and potential massive number of pension participants, any pension reform will not succeed, if various administrative tasks are undertaken manually. Among others, such tasks include individual account management, contribution collection, benefit distribution and data collection. In this context, advanced technology, e.g. purpose-designed computer programmes and softwares, is recommended and indeed a prerequisite. Without computing help, it is very likely that pension reforms will run into chaos at the very start. Beside such "hard" constraints as above, on the other hand, there are "soft" human-related constraints. In other words, it is not difficult to purchase large amount of computers and other relevant equipments, one immediate issue, however, is how operate them properly and efficiently. In this case, staff training is necessary, so that all relevant parties, including administrative staff and professionals, e.g. accountant and auditors, have sufficient expertise and knowledge on their respective fields. For example, account administrators need to be able to manage a large dataset by using appropriate software programmes, while accountants are familiar with international accounting standards and able to apply them to their daily work.

5.2 Wider benefits of pension reform

Since 1990s, China has been determined to move towards a multi-pillar pension model, as recommended by the World Bank (1997). It is a necessary step in the right direction. Indeed, it is widely believed that by shifting from PAYG to funding, many

beneficial impacts arise (James 2002; Holzmann and Hinz 2005; Hu 2005b). In this section, mainly linked to the pension and growth literature, we shall briefly discuss those positive implications, from both the short run and long run perspectives.

5.2.1 SOEs restructuring

The first benefit, which is a short-term one issue, is related to the restructuring of China's SOEs (State-owned enterprise) (Zhao and Xu 2002; James 2002). Since the late 1990s, China's ailing SOEs have laid off millions of workers (see Section 2.4.1). Many of them, although far away from the official retirement age, are allowed to be treated as pensioners. For example, it is not uncommon to hear that workers retire in the 40s. When those workers are laid off, their links with the previous enterprises normally are terminated, although they often receive a certain amount of one-off compensation. As regards old-age provision and medical care, the municipal government starts taking the charge. Behind such a massive SOE restructuring is the government's intention to free SOEs from this heavy non-commercial responsibility, therefore increasing their competitiveness in the market economy (World Bank 1997). The expected positive results for the SOEs' performance remains to be seen, since empirical research needs to be conducted. In addition, pension reform can also have positive impacts on the financial side of restructured SOEs. It links to the growth of the bond market as noted in Section 5.1.4. By issuing bonds in the market and optimising their debt-equity ratio, the SOEs can benefit from less financial risk, given the diversity of financing sources away from bank lending (Davis and Stone 2004).

One caveat, however, is that during this restructuring process, some undesirable consequences arise, which we believe will affect the effectiveness of the pension reform on SOE's performance. Specifically, when the restructuring starts, it is always announced that any worker who is willing to quit the job is allowed to do so, and will receive some level of compensation. The younger the worker is, the more compensation she receives. In this context, many young skilled workers choose to leave, since they believe they can find better jobs without much difficulty. Moreover, they are compensated with a large amount of cash which is really attractive to them. In addition, corruption is reported to occur to the extent that those who have close connections with the managers are not sacked, while those who are not lucky enough to have such connections are laid off, although the latter might be more competent than the former. For example, by using urban household survey data, Knight and Yueh (2004) find that people with Communist Party membership was less likely to be laid off during the period 1995-1999, when there was a massive wave of lay offs among the SOEs, as shown by the large increase of pensioners between 1995 and 2000 in Table 9. Potential consequences, following the above restructuring, include increases in future pension payment, and loss of would-be higher productivity. Future pension payment is increased, in that many laid-off workers are still young, and could have made contributions to the system longer than remaining older workers. Similarly, given many of them are skilled workers, their leaving can have negative implications for those firms' productivity and further profitability.

5.2.2 Labour market

Another benefit arising from pension reform, is concerned with the labour market (Disney 2004). As reviewed in Hu (2005b), the close link between contributions and

pension benefits is one main advantage of the World Bank pension model over the PAYG system (World Bank 1994), mainly for the former's actuarial fairness (Lindbeck and Persson 2003). Pillar 1B (see Table 6) in China's pension system is a DC pillar, therefore it is expected to see the improvement of the labour market conditions to the extent that the workers are willing to work longer. It might not be an immediate beneficial impact, since labour in China is currently abundant. It will become more relevant, however, in 2030 and afterwards, when China's abundant labour resources reach the peak, and starts declining (Wang et al 2001). In addition, as discussed in Sections 3 and 4, the Chinese pension system is characterised by the high degree of fragmentation and large variation across regions. If a national unified pension system is implemented across the country some time in the future, it will make job change and migration easier, thus leading to increased job mobility, since the DC element of the new multi-pillar system, by definition, entails pension assets' portability. The portability to a large extent links to the establishment of individual accounts (Clark and Hu 2005b).

5.2.3 Saving rate

Following the shift from PAYG to funding, there may be an increase in the saving rate. As reviewed in Davis and Hu (2006), private saving might increase, if pension participation is compulsory, and pension assets accumulated can not be fully offset by reducing discretionary saving correspondingly. In addition, tax incentives of pension assets (McCarthy and Neuberger 2004; Clark and Hu 2005a), and the recognition effect arising from pension reform (Hu 2005b), are also drivers for a potential higher personal saving. As regards China's case, however, we believe that in the short run, the private saving rate will not increase in a significant manner. There are two underlying reasons. The first one is that current private saving rate in China is already very high, i.e. 40%, in comparison to around 20-30% and even lower in many OECD countries (Loayza et al 1998; Serres and Pelgrin 2003). Therefore, there is little room for a large further increase in private saving rate. Secondly, the disposable income earned by many workers and the majority of rural people in China is very small, which in many cases is just sufficient to meet their basic needs. In consequence, it is very likely that those workers, if forced to participate, reduce their discretionary saving, thus leaving the level of private saving rate unchanged. Another scenario is that for those people who do not save at all now, their total saving will increase following a compulsory pension reform. They, however, would suffer from "social burden", in that they sacrifice current assumption too much for future retirement provision, compared to wealthier people. In the long run, the beneficial effects on the saving rate might emerge and become larger, since at that time, people become richer, i.e. have more disposable income, and they are more willing to, and are capable of saving more money.

Besides private saving, national saving is another relevant issue. Given that national saving equals private saving plus government saving, the level of national saving after pension reform, is largely influenced by government behaviour. It is widely recognised that governments can finance the existing pension liabilities by issuing public bonds and increasing taxes. Their effects, however, differ, with implications for national saving. If the government finances the debts by borrowing via bond issuance, and there is not corresponding decrease in other public spending, the overall national saving rate might remain unchanged or even reduced (Cesaratto 2003). Empirical

results are mixed generally, despite the fact that a number of authors find the positive impact of funding on national saving rate (Hu 2005b; Schmidt-Hebbel 1999). Nevertheless, it is important to watch government's behaviour during reform, since an unjustifiably lax fiscal policy is neither supportive of increasing national saving rate, as discussed in this section, nor constructive in maintaining a stable macro-economy (see Section 5.1.6).

5.2.4 Economic growth

Pension reform towards a funded system has been argued to positively impact on economic growth (World Bank 1994; Holzmann and Hinz 2005; Davis and Hu 2005). Figure 5 illuminates the linkage between pension reform and growth, which could be direct, or indirect. For example, higher growth might be due to less labour market distortion, given the closer linkage between contributions and benefits (see Section 5.2.2), and a higher saving rate (see Section 5.2.3). Besides those two channels, the improved financial markets, following pension reform, are also one underlying factor, which will be discussed in the next section. Another potential channel is through the increased corporate engagement, or pension fund activism. This occurs because of the wide use of indexation techniques in the pension funds industry, which hinders exit via sale of shares in underperforming companies which are in the index (Clark and Hebb 2004a). Empirical evidence at both micro and macro levels (Davis 2004b; Clark and Hebb 2004b), to some extent, suggests the beneficial impacts of pension funds' corporate engagement, although the effect is not uniformly agreed (Blair 2002; Orszag 2002). In addition, Davis and Hu (2005) find the direct linkage between pension assets growth and economic growth for both OECD countries and emerging market economies, which is consistent with the findings in Harichandra and Thangavelu (2004) and Hu (2005b,d).

If pension reform towards a funded system can contribute to higher growth, it will have profound implications for China's economy. For example, as noted in the beginning of the paper, the ratio of the population aged above 65 to the total population was 5% in 1960, but is forecast to increase to 24% in 2050 (UN 2004). In consequence, based on the funded model, if every person is established with an individual account, and these accounts are accumulated with their lifetime saving, the aggregate amount will be massive. As a result, these assets can serve as a useful engine (Davis and Hu 2005), stimulating economic growth over a long period. The beneficial impacts are most likely to materialise and strengthen around 2020, since any major reforms need a relatively long period to be established effectively in such a large country as China. In 10 or 20 years, all externalities, quantitative and qualitative, will be able to show positive effects, thus boosting growth. These positive externalities include more developed financial markets (see the next section), less distorted labour markets (see Section 5.2.2), a higher saving rate (see Section 5.2.3), and more experienced and competent regulators (see Section 5.1.6). Therefore, pension reform is not only important in itself, but also of crucial importance in helping China maintain sustainably high economic growth in this century (Lin 2004). From the policy perspective, a successful pension reform will have far reaching impacts on Chinese society.

5.2.5 Qualitative impacts

Besides the impacts mentioned above, pension asset growth can have some positive qualitative implications for the financial sector and economic growth (Davis 2005; Walker and Lefort 2002). The first positive externality is financial innovation (Bodie 1989). Although observable in both OECD countries and EMEs (emerging market economies), the impacts are larger for the latter than the former, given the underdevelopment of financial markets in EMEs. In China, financial innovation means that more financial instruments might be developed and introduced. For example, in the funded system, for inflation protection, zero coupon bonds or inflation-linked bonds are desirable. Also, it is necessary to develop derivative markets, e.g. options and futures, to hedge the risk (Cheng 2005). Some of these securities come to the market, influenced directly or indirectly by pension funds in many countries, e.g. Chile (Acuna and Iglesias 2001). If China's pension reform leads to rapid growth of the pension fund industry in the near future, new financial instruments will come into being as well in China's financial markets. Meanwhile, in order to avoid the risks specific to China's conditions, the NSSF has been actively lobbying the authorities to allow pension funds to invest abroad (see Section 3). If their request is, and very likely to be, authorized some time in the future, it is very likely to be a starting point of lifting such restrictions from other institutions; in consequence, it might help and facilitate further financial liberation in China.

Another qualitative improvement is concerned with corporate governance (Tenev et al 2002). As we discussed in Section 5.2.4, pension asset growth can facilitate pension funds' corporate engagement, which might arise from the increasing demand by owners for more transparency and accountability, particularly after the Enron, Worldcom and Parmalat scandals. In the Chinese case, we believe that whether pension funds will be actively and positively engaged in corporate governance depends on a number of issues. First, the critical issue is when the non-tradable State shares in most listed firms³⁵ will become fully tradable. It is a central question, since if those shares, accounting for 2/3 of the total shares in most cases, are controlled by the government and not tradable, corporate governance by any institutions is not possible, given that all the remaining shares are only equivalent to 1/3 of the total (Cheng 2005). The second question is when the prudent person rules (PPR), or a more liberalised investment system will be adopted in China. As noted in Sections 3.3 and 5.1.3, there are quantitative restrictions on institutions' investment in China. However, in order to facilitate pension funds' corporate engagement, it is more appropriate to implement the PPR, as in the Anglo-Saxon countries (Davis and Steil 2001). In this case, however, more developed mechanisms for monitoring and supervising the financial markets need to be established, so as to prevent deliberate share price manipulations, as happened and condemned in early 2000s in China (Wu 2001). Despite these questions waiting to be solved, some encouraging signs have emerged in China. For example, the NSSF and occupational pension funds have frequently appeared to be among the top shareholders in listed firms' annual reports, as shown in Section 5.1.3. In addition, the NSSF is expected to be largest institutional investor in China in the future (Li and Gao 2005), since the government has requested 10% of the newly listed firms' shares during the IPOs to be transferred to the NSSF³⁶.

³⁵ It is worth to note that the majority of listed firms in China is state-owned. For the very small number of fully private firms, all shares are tradable in the market.

³⁶ But as we discussed in Section 5.1.2, the state share selling was terminated in 2001, following the large share price drop. The government, however, does not give up this plan. It is expected that a fully compromised scheme will be drawn up in the near future.

The third issue is that pension asset growth can have impacts on China's exchange rate regime. Until July 2005, China's exchange rate policy was fixed to the US dollar at the nominal rate of RMB/US\$ 8.27, which was steadily depreciated from 1.5 RMB to the dollar in 1978 (Lardy 2005). For years, politicians in western countries, principally from the US, have argued that China's controlled exchange rate makes Chinese goods artificially cheap, and distorts the world trade patterns, although many economists challenge it and argue that the revaluation of the Chinese currency would help little in reducing US's trade balances, and might destabilise the world market and the global financial system (Mundell 2005; Greenspan 2005). Besides the political aspect, the rapid accumulation of foreign, largely US dollar, reserve holdings by the People's Bank of China, the central bank, has a consequence of increasing the money supply, and the accompanying risk of a high inflation and the overheating of the Chinese economy (Greenspan 2005). Therefore, the Chinese government has been under pressures to revalue its currency, and allow it to stop pegging on the US dollar. A revaluation of 2% in July 2005 was a good step towards a more flexible exchange rate system (PoBC 2005), and was sought by the government to mitigate the international pressures.

Institutional investors, e.g. pension fund growth can play a role in this case, if international investment is allowed some time in the future. It has been argued that for some emerging markets, foreign assets might be better to be held and managed through pension funds, rather than central banks (Davis 2005; SFRC 2005). One benefit is that the pension funds' international investment can reduce inflationary pressures by leaking some funds abroad. In addition, currently, the majority of China's foreign reserves is used to buy government bonds, particularly US government bonds. Therefore, if pension funds are allowed to manage a portion of these assets, a stable and safe return can be achieved and pension fund investment is more diversified in terms of risk, for the reason of professional asset management of pension fund managers. Another important positive effect is that if in many countries, particularly Asian countries, a "global saving glut" does exist, as argued by Bernanke (2005), it might be wise to facilitate capital flows through market forces, e.g. global pension fund investment, rather than the central banks, which is more vulnerable to "dangerous political grandstanding" (SFRC 2005).

5.3 Summary

In this section, we reviewed and analysed China's financial structure, preconditions, and benefits of pension reform. It is revealed that China has the basic conditions needed for a pension reform towards funded pillars, e.g. relatively sound banking sector, rudimentary stock market and basic accounting standards etc, not least by a comparison to Chile in Section 5.1. Despite these, China's financial system is still underdeveloped when compared to other countries, particularly to advanced OECD countries. In this context, pension reform is needed in itself for the purpose of tackling the issue of insufficient retirement provision; in addition, it serves as a powerful engine to improve broader issues, e.g. financial development and economic growth (Davis 2004; Holzmann and Hinz 2005; Hu 2005b).

With more and more pension assets invested in domestic and global stock markets, better accounting standards, e.g. International Accounting Standards (IAS), and more

transparent information disclosure will become a norm in the markets. It helps enhance the quality of Chinese listed firms, and thus investors' confidence about the stock markets (Shirai 2002; Chen et al 2003). In addition, the requirements for better information disclosure can facilitate the development of credit rating and performance evaluation agencies, which is helpful in selecting best performers. This development is useful in that sponsors of pension plans need to compare the performance of fund managers and entrust their pension assets. Besides the impacts on the performance evaluation industry and also the research industry potentially, pension funds, as long-term investors, might help maintain financial stability, in that they have superior information about firms, thus driving share prices back to fundamentals, and reducing market volatility (Davis and Steil 2001; Walker and Leford 2002).

Meanwhile, as we noted earlier, pension funds have beneficial impacts on other aspects of financial structure as well, which is also very important during China's economic reform process. For example, it stimulates growth of bond markets and efficiency of the banking sector, which is mainly due to the close link and interaction between pension reform towards funded systems and financial markets (Davis 1995, 1998). Last, it is worth noting all the benefits above are two sided. In other words, when the financial markets become more developed, following pension reform and growth of pension funds, such positive effects will also make further pension reform towards a funded system easier, e.g. in terms of debt financing, and investment returns.

6 Empirical work

In previous sections we reviewed/analysed the Chinese pension system and also provided some practical solutions to the Chinese pension crisis, as well as assessing preconditions. In this section, we report on an empirical simulation investigation of the impacts of several policy options on the pension system. Policy options we look at include changes in contribution rates, alternative pension fund investments, changes in retirement ages and transaction costs. By employing a stochastic simulation technique, it is hoped to demonstrate the quantitative extent to which the changes in those variables impact on the pension benefits. Our analysis is based on the purely funded model.

6.1 Model specification

The model, which is same as that in McCarthy and Zheng (1996) and Cairns (2003), is as follows:

$$B_{N2} = \sum_{t=N1}^{N2} \left[(cW_{\eta} - TC_{\eta}) \prod_{\eta=t}^{N2} (1+r_{\eta}) \right] \quad (1)$$

$$B_t = (1+r_t)B_{t-1} - A \prod_{\eta=N2+1}^t (1+\pi_{\eta}), \quad t \in [N2+1, N3] \quad (2)$$

where in Equation 1, B is the balance of pension fund accumulation, c the contribution rate, W income or wage, TC the transaction cost and r the annual rate of investment returns. A is the pension payment and π the inflation rate in Equation 2.

In addition, we assume a person starts working at the age of $N1$, retires at $N2$ and dies at $N3$. t and η denote the time dimension. A similar methodology was used by OECD (2005d), where they looked at how retirement benefits from mandatory public pensions change with different assumptions, e.g. level of individual earning and return on DC pensions. In addition, their simulation analysis included work relating to both DC and DB components (Hu 2006).

Equation 1 above mathematically describes the asset accumulation process of a person from the time he/she starts working at $N1$ to the time he/she finishes working at $N2$, while Equation 2 is concerned with pension fund decumulation during the post-retirement period from $N2+1$ to $N3$. We assume that pension payment is linked to inflation; therefore an inflation variable π is included into the equation. In addition, consistent with the fully funded nature of the pension scheme in our model, the end-year balance of pension assets should not be greater than zero and ideally equal to zero. In other words the interest of pensioners is maximised if the account balance is zero, i.e. $B_{N3} = 0$ when the person dies. In order to derive the function of B_{N3} in terms of variables we are interested in, we expand Equations 1 and 2, by undertaking the mathematical manipulations as follows:

Substituting $t = N2 + 1$ and $t = N2 + 2$ into Equation 2 respectively, we have

$$B_{N2+1} = (1 + r_t)B_{N2} - A \prod_{\eta=N2+1}^{N2+1} (1 + \pi_\eta), \quad t : N2 + 1 \quad (3)$$

$$B_{N2+2} = (1 + r_t)B_{N2+1} - A \prod_{\eta=N2+1}^{N2+2} (1 + \pi_\eta), \quad t : N2 + 2 \quad (4)$$

Then we substitute Equation 3 into Equation 4, getting

$$B_{N2+2} = (1 + r_{N2+2})[(1 + r_{N2+1})B_{N2} - A \prod_{\eta=N2+1}^{N2+1} (1 + \pi_\eta)] - A \prod_{\eta=N2+1}^{N2+2} (1 + \pi_\eta) \quad (5)$$

$$B_{N2+2} = (1 + r_{N2+2})(1 + r_{N2+1})B_{N2} - (1 + r_{N2+2}) \times A \prod_{\eta=N2+1}^{N2+1} (1 + \pi_\eta) - A \prod_{\eta=N2+1}^{N2+2} (1 + \pi_\eta) \quad (6)$$

Based on Equations 3 and 6 we can identify that both equations are a sum of the geometric series with the number of terms determined by time t . Therefore we write down equations of B_t when $t = N2 + 3$ and $t = N3$ accordingly

$$B_{N2+3} = (1 + r_{N2+3})(1 + r_{N2+2})(1 + r_{N2+1})B_{N2} - (1 + r_{N2+3})(1 + r_{N2+2}) \times A \prod_{\eta=N2+1}^{N2+1} (1 + \pi_\eta) \\ - (1 + r_{N2+3}) \times A \prod_{\eta=N2+1}^{N2+2} (1 + \pi_\eta) - A \prod_{\eta=N2+1}^{N2+3} (1 + \pi_\eta) \quad t : N2 + 3 \quad (7)$$

$$B_{N3} = (1 + r_{N3})(1 + r_{N3-1})(1 + r_{N3-2}) \dots (1 + r_{N2+1}) \times B_{N2} \\ - (1 + r_{N3})(1 + r_{N3-1}) \dots (1 + r_{N2+2}) \times A \prod_{\eta=N2+1}^{N2+1} (1 + \pi_\eta)$$

$$\begin{aligned}
& -(1+r_{N3})(1+r_{N3-1})\dots(1+r_{N2+3}) \times A \prod_{\eta=N2+1}^{N2+2} (1+\pi_{\eta}) \\
& \cdot \\
& \cdot \\
& -(1+r_{N3}) \times A \prod_{\eta=N2+1}^{N3-1} (1+\pi_{\eta}) \\
& - A \prod_{\eta=N2+1}^{N3} (1+\pi_{\eta}) \quad t : N3
\end{aligned} \tag{8}$$

If we set Equation 8 equal to zero and undertake some manipulation, the value of A could be calculated as follows:

$$A = \frac{(1+r_{N3})(1+r_{N3-1})(1+r_{N3-2}) \times \dots \times (1+r_{N2+1}) \times B_{N2}}{(1+r_{N3})(1+r_{N3-1})\dots(1+r_{N2+2}) \times \prod_{\eta=N2+1}^{N2+1} (1+\pi_{\eta}) + \dots + \prod_{\eta=N2+1}^{N3} (1+\pi_{\eta})} \tag{9}$$

Given the value of A we can easily compute replacement rates by dividing A by wages of the year before retirement.

6.2 Data description

All data of asset returns as well as wages and inflation rates are given in Table 55. In this simulation work, we used 4 different assets, i.e. bank deposits, government bonds, domestic equities and global investment. A quick look at the data in Table 55 shows that real returns on the first two assets were very low, i.e. below 1% and even lower. In comparison, returns on domestic equities and global investment were much higher. The high returns achieved by global investment are much due to the persistent devaluation of the Chinese RMB in the past 10 years. We discuss these data in more detail below.

Wages (W) are defined as the annual real income after inflation rates are considered. The inflation rate is proxied by the consumer price index (CPI). The transaction cost (TC) is defined as a proportion of wages. In the paper, in order to assess the impacts of different rates of transaction costs on the contributions, we used 2%, 5% and 10% respectively. The medium rate, i.e. 5% is based on and in line with investment and administration regulations on occupational pensions in China (NCSSF 2001). The rate is slightly lower than the management cost of 8% observed in Hungary (Matits 2004). The upper limit, i.e. 10% is estimated based on one paper (Whitehouse 2000b) where administrative charges are compared across both OECD and developing countries. The contribution rates are assumed to be at the level of 10%, 20% and 30%. These levels of contribution rates are consistent with the current pension system in China as discussed in Section 2.3.3.

In addition, we have return data for eight different portfolios, which are constructed from our historical and simulated data series. Portfolio 1 refers to a portfolio consisting of bank deposits only, portfolio 2 government bonds only, portfolio 3 domestic stock only and portfolio 4 global investment only. Portfolio 5 is a “naïve”

portfolio with four types of assets allocated equally (25-25-25-25), i.e. bank deposits 25%, government bonds 25%, domestic stocks 25% and global investment 25%. Portfolio 6 is based on the latest portfolio construction of Chinese National Social Security Fund (NSSF) as shown in Section 3.3.1; the structure is 40-50-10-0, i.e. bank deposits 40%, government bonds 50%, domestic stocks 10% and zero global investment. Portfolio 7 has a 5-23-45-27 structure, reflecting the 2004 asset allocation of the UK top 100 pension funds (Clark and Hu 2005a). The last portfolio, i.e. portfolio 8 consists of 50% bank deposits and 50% government bonds, which is consistent with pension fund investment practice in China except the very recent investment structure of the NSSF (see Section 3.3.3 for details).

In the simulation work, we assume that a representative person starts working at the age of 22 in 1993³⁷. The year 1993 is selected since it is the earliest year for which we have return data for all assets as well as wages and inflation rates. We also assume that the person could live longest until 2051 when he/she is 80. Given that we only have data observations up to 2004, observations from 2005 to 2051 have to be simulated first. As for wages, the annual growth rate is estimated to be 4.6% during 2000-2025 and 3% up to 2075 (McCarthy and Zheng 1996). Their estimates, similar with those in Sin (2005), are based on the purpose-built econometric model specified in the paper, and the underlying economics is that when the economy gets richer, growth slows. The simulation of inflation rates is based on the assumption that these rates are normally distributed; therefore we simulate the data from 2005 to 2051 by using the historical mean and standard deviation. The simulation of rate of returns on all eight portfolios are conducted in the same way as that in the inflation rates, i.e. using historical mean and standard deviation to simulate observations from 2005 to 2051. For the simulations, we used the full sample of these variables as shown in Table 55. All simulations were programmed and conducted with Matlab 6.5.

Regarding data source and observation period, wages (1978 – 2000) were obtained from the MOLSS (2005) and inflation rates (1978 – 2004) from the NBS (2005). Rates of returns on bank deposits (1980 – 2004) were from the IMF database (2005) and government bond yields (1993 – 2004) from Datastream. Returns on domestic stocks (1992 – 2004) were collected and derived from statistical yearbooks on Shanghai Stock Exchange and Shenzhen Stock Exchange websites. As shown in Tables 32 and 55, China's stock market is very volatile based on historical data. As a variant, we assume that the stock market will be more developed in the future. Therefore, we use another standard deviation, i.e. 14.7%, equal to around half of the original one. In both cases, however, the mean returns on equities are set to be the same. Returns on global investment (1973 – 2004) were derived from returns on global equity yields and global bond yields with a 50-50 split, as in Davis (2002a, 2002b). Global returns were corrected by allowing for currency risk since the exchange movement frequently has a significant impact on returns denominated by local currency (Hu 2005c). Details on the above statistics can be found in Table 55.

6.3 Empirical results

³⁷ In China children typically start going to school at the age of 7, and stay in the school until around 18. Then those school graduates might go to four-year university and graduate at 22.

In this section we report the extent to which replacement rates respond to changes in a number of variables, i.e. contribution rates, retirement ages, transaction costs and investment portfolios. A similar simulation was conducted by Alier and Vittas (2000). They, however, only researched the impacts of different investment strategies on replacement rates in the US. In addition, a World Bank paper (Friedman 1996) looks at potential implications of raising the retirement age and moving to price indexation for replacement rates in China. In this paper, we extend their studies by investigating more variables. For example transaction costs are found to have a non-negligible impact on replacement rates (Whitehouse 2000b), therefore it is interesting to see the quantitative effect. Meanwhile we select eight investment portfolios, which is larger than the number of investment portfolios used in Friedman et al (1996) and thus more realistic. Moreover we include global investment in our analysis, which is very imperative for the Chinese case, since the authorities are about to allow pension funds to be invested abroad, particularly the National Social Security Fund (NSSF).

6.3.1 Simulation results in basic model, a scenario with the highest replacement rate, and a scenario with the lowest replacement rate

Before proceeding to details of how replacement rates move with changes in the variables, we first present the simulation results relating to the basic model which serves as a benchmark in the study. Based on the discussion of the Chinese pension system in previous sections, the specification of the basic model is as follows: a typical person retires at 60 and dies at 75. The contribution rate is 20% of payroll with a transaction cost of 5% of wages. The investment strategy is a 50-50-0-0 approach, i.e. 50% of assets are allocated to bank deposits and government bonds respectively. Table 56 gives the simulation results of replacement rates with the basic model. The mean of our simulated replacement rates is 15.7%, with a standard deviation at 1%. The 15.7% replacement rate looks very low, but it is due to our assumption that all assets are allocated to bank deposits and government bonds, with real returns being 0% and 1% respectively³⁸.

For each stochastic simulation, 1,000 replications are conducted. The mean is the simple average of 1,000 replications and the STDEV standard deviation of replications. The distribution of 1,000 simulated replacement rates is given in Figure 6. The upper panel shows the values of replacement rates in each replication, while the lower panel reveals the histogram of simulated results. 1,000 replications are computed, since simulations generated random results by the computer, and thus we seek to obtain results as representative and/or accurate as possible. Figure 6 clearly shows the distribution and gives us a visual image of how dispersed the results are. Both graphs in Figure 6 are useful in our analysis. For the sake of saving space, however, we will only present the lower panel for the remainder of our simulation work.

The 15.7% replacement rate found above is very low, and apparently not sufficient to support a typical retiree's post-retirement life. This ratio is also lower than the 38% replacement rate promised by the current Chinese authorities in pillar 1B (Table 6). In the remaining part of this section and the next two sections, we simulate different

³⁸ If we used higher estimates of returns on bank deposits and bonds, replacement rates would be more satisfactory. In the following part of the paper, we identify the extent to which higher returns on simulated replacement rates by including high-yield assets, i.e. equities and international investment.

scenarios, seeking to improve our results. Table 56 gives the results under two scenarios; Scenario A refers to the case where the average replacement rate is highest, and Scenario B the case where the average replacement rate is lowest. It is worth nothing, however, that Scenarios A/B is not necessarily the most optimal/sub-optimal. A very high replacement rate is not necessarily the most optimal choice, since in many cases it requires a contribution rate which is prohibitively high, therefore politically impossible. In order to achieve the highest and also relatively realistic replacement rate, we specify that the person retires five years later, i.e. at the age of 65 in comparison to 60 in the basic model. Meanwhile we assume that he/she dies at 80. The contribution rate is 30%. The investment strategy is the 5-23-45-27 type, i.e. 5% of fund assets allocated to bank deposits, 23% to government bonds, 45% to domestic stocks and 27% to global investment. It is in line with the asset allocation strategy of the UK's top 100 pension funds as of 2004 (Clark and Hu 2005a). Transaction cost is assumed to be 2%. Conditioning on all these assumptions, the mean of replacement rates is 93%, the standard deviation 8.3% and coefficient of variation 11.2. The last column in Table 56 gives the simulation results under Scenario B. The mean replacement rate is just 4.5% given a 20% contribution rate³⁹. Other assumptions include the retirement age at 55, the mortality age at 80, investing 100% in bank deposits and transaction costs of 10%. The corresponding coefficient of variation is 8.4, less than that in both basic model and Scenario A.

In addition, it can be observed that in Table 56, the mean replacement rates under scenario A had two results, one is 93% as discussed above, while the other one is 120%. These two replacement rates corresponds to two different assumption regarding China's stock market volatilities from 2005 onwards (see Table 55). The higher replacement rate is achieved by higher compounded equity returns, and resulting portfolio returns, under the assumption that China's stock market in the future, i.e. 2005 onwards, will be half as volatile as that in the past. When high volatility and low volatility assets are concerned, and assuming that they both have same expected average returns over periods, the overall compounded return for the latter is always higher than that for the former, in that the latter grows money at a greater rate, when we compound interest or returns over years (Merrill Lynch 2005; also see Equation 2). The magnitude of the difference varies depending on investment horizon, and might be marked if a long horizon is involved, e.g. life-time investment over 20 or 30 years. Last, the distributions of simulated replacement rates are reported in Figures 7 and 8.

6.3.2 Simulation results with changes in contribution rate, retirement age and transaction cost

In this section we quantitatively measure the extent to which replacement rates respond to changes in three variables, i.e. the contribution rate, retirement age and transaction costs. In the first simulation, we change the contribution rates to a lower level at 10%, and a higher level at 30% respectively. The portfolio is still assumed to adopt a 50-50-0-0 investment approach, i.e. 50% in bank deposits and 50% in bonds. All other specifications are the same as those in the basic model. When the contribution rate is 10%, Table 57 shows that the replacement rate is just 5.2% with the coefficient of variation at the level of 11.1. Figure 9 also shows that 1,000

³⁹ We tried to use a 10% contribution rate. Based on our programme, however, no results came.

simulated results are distributed in the range of 5% and 6%. When we specify a larger contribution, i.e. a 30% contribution rate, the person would have a wealthier retirement life since the replacement rate becomes 26.2%, which is 10% higher than that in the basic model. The corresponding distribution graph is Figure 10. As we mentioned earlier, a high replacement rate achieved by increasing the contribution rate is not necessarily a good strategy, since it might not be reasonable in reality, particularly from the political point of view. The simulation results here are mainly used to demonstrate the quantitative effects of changing a particular variable on replacement rates, thus serving as empirical evidence supporting any potential policy modifications.

The second simulation relates to changes in the retirement age or the pensionable age as in OECD (2005d). For this work we consider two cases; one is retirement at the age of 55, the other is at 65. Raising the retirement age further to 65 and even more is highly debated in many countries, mainly in OECD countries. The justification is that since people live longer due to medical improvement, it is natural to require people to retire later, and it is indeed one of most effective ways to tackle the issue of an ageing population (PPI 2003; Turner 2005). By raising the retirement age to 65 in China, the person could have a 28% replacement rate with a 20% contribution rate. The standard deviation is 2.1% and the corresponding coefficient of variation is 13.0. When the person retires at 55, the replacement rate would be lower, i.e. 10%. The subsequent coefficient of variation is 9.4. By comparing these two results as well as results in the basic model, it is revealed that changing the retirement age is very effective in terms of pension provisions since it acts as a double-edge sword, i.e. increasing contribution years and reducing benefit years simultaneously. As regards a retirement pattern, i.e. 55-60-65, the corresponding replacement rates are 10%-16%-28%. The results are consistent with findings in Friedman et al (1996). Figures which reveal distributions of replacement rates are Figures 11 and 12 respectively.

Transaction costs have been argued, and also empirically investigated to be able to have sizable implications for asset accumulation (James et al 2001; Whitehouse 2000a). It is mainly due to the long term horizon of pension fund management and planning. In Table 57, significant differences with alternative transaction costs are revealed. In the first case, transaction costs are set to be 2% of wages. While keeping other specifications the same as those in the basic model, the resultant replacement rate is 19%. When transaction costs are assumed to be 10% of wages, the replacement rate is 11%. In both cases, the coefficients of variation are not much different, i.e. 10.9 and 11.2 respectively. In addition, Figures 13 and 14 reveal that in both cases, there are similar distributions except that the 2% case enjoys a higher mean replacement rate. The findings serve as quantitative evidence in favour of providing a less costly pension system. Therefore, in order to reduce transaction costs in China, small individual accounts could be aggregated into large blocks and managed on a centralised basis (James et al 2001; Turner 2005), e.g. the central clearing house established in Swedish pension reform (Weaver 2005). In addition, as noted in Section 4.1, the Chinese authorities need to unify the pension system along both horizontal and vertical dimensions, which is expected to be able to reduce transaction costs by improving institutional efficiency and mitigating bureaucratism.

6.3.3 Simulation results with changes in investment strategies

The last part of our simulation work is related to pension fund investment. The issue of pension fund investment is highly debated in current literature (Davis 2002b; Hu 2005c; Reisen 1997), since it is one of the most important factors determining the balance of asset accumulation over a long management period. In this work we consider seven portfolios as mentioned in Section 6.2; they are an all-bank deposit portfolio, all-government bond portfolio, all-stock portfolio, all-global investment portfolio and three other portfolios with a mixture of these four assets. The simulation results of replacement rates are given in Table 58. In comparison to 16% replacement rate in the basic model, all but one replacement rates in Table 58 are larger, and in many cases it is much larger. The largest replacement rate is achieved by investing 100% assets in foreign assets. The corresponding risk, however, is also highest at level of 8%.

Another two investment strategies which lead to relatively high returns are the 25-25-25-25 type and the 5-23-45-27 type, in which cases, the mean replacement rates are 34%/38% and 43%/55% respectively. The two numbers in each pair are related to two cases; the first number is calculated based on the high risk assumption of China's stock market, while the second number is based on the low risk assumption of China's stock market (see Section 6.2). The former corresponds to higher overall compounded returns on both equities and the whole portfolio, while the latter corresponds to lower overall compounded returns, although it is assumed that they both have same expected returns if averaging annual returns over periods. There is a 9/17% replacement rate difference between these two strategies. However, if accounting for the cost advantage associated with naïve (equal weigh) diversification, the beneficial effect of the latter strategy is likely to be smaller. The finding is to some extent consistent with results in Bateman and Thorp (2005), where it is found that an investor who adopts a naïve diversification strategy performs as well as actively managed superannuation funds in Australia.

In addition, besides the all-domestic strategy, the 5-23-45-27 strategy leads to the largest replacement rate. As a result, we used this strategy as one component for Scenario A in Section 6.3.1. The all-stock case was disregarded since it is not realistic. Meanwhile, the all-deposit investment strategy gives the worst return, i.e. 12% replacement rate, which is lower than that in the naïve strategy by a ratio of 3, and that in the 5-23-45-27 strategy by a ratio of 4. Last, distributions of replacement rates under all 7 strategies are presented in Figure 15 through Figure 21, which gives us the visual results complementary to findings represented in Table 58. For example, Figure 20 gives the distributions of replacement rates with the investment strategy of 40-50-10-0, and Figure 21 shows the case relating to the investment strategy of 5-23-25-27. By comparing these two Figures, it is clearly shown that these two graphs in Figure 21 are more dispersed than those in Figure 20. For example, the values of replacement rates range from 15% to 25% in the top panel of Figure 20, while they vary from 30% to 58% in the top panel of Figure 19. These features are reflected by the higher standard deviations of the 5-23-25-27 strategy in Table 58.

6.3.4 Summary of the simulation results

In this section, we employed simulation technique to assess alternative policy options. The analysis was conducted according to a range of different dimensions, i.e. the contribution rate, retirement age, transaction costs and investment strategy. Inter alia,

increase in contribution rate would raise the replacement rate; this option, however, is politically unpleasant, given its current high level of contributions in China (Section 3). Raising the retirement age is one option to mitigate the Chinese pension crisis, and the impact is quite effective, i.e. enhancing the replacement rate nearly 3 times, if the worker serves 10 more years. This policy, however, is likely to provoke resistance from the public, like in the UK (Turner 2005); therefore, if this option is considered, the increase is better to match demographic changes. The impacts of different transaction costs on the benefits are quite large as well. This is consistent with our previous results and recommendations in Section 4. The last empirical work relates to pension fund investment. By computing benefits with different mixes of investment approaches, it was shown that an appropriately designed investment strategy can lead to a quite satisfactory replacement rate. In this context, pension fund global diversification and investment in equities can improve our results significantly.

7. Policy recommendations

In previous sections, we have sought to identify structural shortcomings of the Chinese pension system, assess the current preconditions, and then empirically investigate the quantitative impacts of changing a number of variables on replacement rates. Based on historical review, critical analysis and empirical findings above, we in this section seek to provide some policy recommendations regarding how to improve the Chinese pension system so as to make it more sustainable in the future.

7.1 Unifying the system

As noted in previous sections, the Chinese pension system is separated between rural and urban areas, different provinces, and central and local governments; different pension rules and policies apply in different regions. Such horizontal isolation is devastating, since it creates labour immobility and economic inefficiency. For example, in China there are around 150 million rural migrants working in urban areas. They, however, are entitled to different pension regulations from other urban workers. Moreover only a small portion of those rural migrants participate in the urban pension system, since the design is less favourable for them and they receive only very little benefit from the system. Therefore a national unified pension system needs to be established in China. The new unified system should not discriminate between people based on origin, gender and type of employment etc.

In addition, the system should be unified vertically, i.e. unifying pensions administration. One advantage of integrating vertically is that it reduces administration costs or transaction costs. Our simulation work in Section 6 shows that if transaction costs decrease it has sizable impacts on the pension income received by retirees. In order to integrate or unify the system vertically, local branches of the MOLSS should be granted more power and be able to minimise the influence of local governments. Therefore local branches of labour and social security authorities would follow policies set by their highest officials in Beijing. In this context, whenever top officials of the MOLSS in Beijing order pension reform, labour authorities at provincial or municipal levels would be able to implement the reform without such local modifications which meet local government's regional need but undermine the system's national interest.

The pension system's unification could be achieved by effectively implementing a national social security law. A national social security law can serve as a catalyst for quickening the Chinese pension reform. Such a law will provide a legal framework under which a national pension system is provided. In this context, any evasion from the system is against law, thus it is expected to increase participation and coverage rates. In addition, passage of such law indicates government's determination to conduct a serious pension reform at a national level, thus increasing public confidence in the system.

7.2 Improving incentives

As noted before, based on our latest statistics China had a pension coverage rate of only 21%. This rate is low and must be addressed and solved as soon as possible. If the current system continues into the middle of this century without any material changes, most Chinese will face a very hard post-retirement life at that time. One way to encourage more people to participate in the pension system is to redesign the system so that people feel they are treated in a fair manner. In other words, the Chinese authorities need to improve people's incentives of joining the system. For example, the contribution rate to the multi-pillar model's social pooling component needs to be reduced to a level which is just sufficient to cover basic living cost, i.e. with the replacement rate at 20-30%. All complementary retirement income is obtained from the fully funded individual accounts.

Based on the World Bank estimation (1997), a 5-9% contribution rate is enough to fulfil the purpose. In China, however, an 18%-20% contribution rate applies instead. The extra part of the excessive contribution collections is used by the Chinese government to meet the cash shortfall inherited from the past system. As a result, it is unfair for current working generations, thus affecting their participation incentives. In our view, it is more desirable to contribute at a fair and low rate just to meet basic needs. The rest of retirement income should be mainly from individual accounts under a DC regime, subject to an appropriate investment strategy. As we will discuss in the next section and also in the empirical results demonstrated in Section 6, as long as pension funds are invested properly and professionally, it is not difficult to achieve a decent level of replacement rates. Transition costs or implicit pension debts (IPD), inherited from the old system, however, still need to be addressed (see next section).

7.3 Implicit pension debts (IPD)

Estimates regarding China's IPD range from 46% to 69% of GDP in 1994 (World Bank 1997). The latest median estimate from the World Bank put the number at 141% of GDP for 2001, which approximates US\$ 1.6 trillion (Sin 2005). We believe that charging employers and employees at a high contribution rate is not sensible and workable, which in turn tends to reduce incentives to participate in the pension system, as discussed in Section 7.2. Generally, there are a number of methods to finance old pension liabilities, e.g. issuance of recognition bonds, increase in taxation revenues etc. For the Chinese case, the government currently prefers to finance the debt by using proceeds from state asset sales. Such interest shown by the authorities is mainly inspired by the large volume of state assets accumulated during the past

decades. For example, a conservative estimate places the value of China's SOEs assets at over US\$1 trillion for 2001 (James 2003). Moreover, it is argued that the pension debt in China can be easily financed by selling SOEs assets (Friedman et al 1996).

As a result, some widely used options to pay off IPD in other countries, i.e. bonds and taxation, although suggested in Wang et al (2001) and Li and Gao (2005), are currently dismissed in China. In Section 5.1.2, we mentioned that the plan for state share sales terminated in October 2001, largely because of the negative stock market response. For example, the market indices dropped by 30% with a few days of the plan's announcement (Asher and Newman 2002). Therefore, it is urged that the government should solve the issue of state share sales as soon as it can. To this end, the crucial point is to find a comprise plan accepted by the individual investors, institutions, and the state, as disused in Section 5. At the same time, the authorities might consider other options, e.g. bond issuance, so as to reduce the financing volatility. In addition, as analysed by Sin (2005) and James (2002), a number of parametric reforms could be employed, e.g. increase in the retirement age, and decrease in benefit levels for the existing system.

7.4 Diversifying pension fund investment

Based on modern finance theory, an internationally diversified portfolio is most likely to maximise return for given risk (Solnik 1998; Davis 2002b; Hu 2005c). In China, however, pension fund assets are heavily invested in bank deposits and government bonds, thus leading to a low return over the past decades. In Section 6, we provided quantitative evidence that a diversified investment approach could achieve a much high return and thus a higher replacement rate. Hence, Chinese pension funds should adopt a more diversified asset allocation approach. The process, however, needs to be phased in gradually, rather than a one-off change.

In the short and medium terms, portion of Chinese pension funds should be allowed to be invested abroad, which is expected to earn a stable and relatively high return, since international markets in comparison to the Chinese stock market are much more developed and mature. As noted in Section 3.3, all pension fund assets in China, except those in pillar 2, and the NSSF are not allowed to invest in domestic equities. This restriction is not justified and should be lifted as soon as possible. Despite this, however, an investment limit based on domestic stocks at certain levels, e.g. up to 40% in our view is still justified. The underling reason is that it is too risky to invest an in-proportional portion of pension assets in a market where there is no major hedging financial product and serious structural shortcomings persist (Green 2003a; Liu 2005). In the long term when the Chinese stock market becomes deep and liquid (Green 2003b), however, prudent person rules are more justifiable. In this case, fund managers are not subject to any investment restriction and could conduct asset allocation task from a purely financial perspective. Benefits of employing prudent person rules were empirically studies and consolidated in a number of pension studies (Solnik 1998; Davis 2002a; Hu 2005c).

7.5 Preconditions of pension reform

We believe that reforming any pension system is a very difficult and complicated task. Therefore, in order to achieve a successful reform, in terms of pension reform itself and the positive externalities, it is better to look at other aspects of the economy carefully as well (Davis 1998, 2005a; Blake 2003; Mitchell 2000, 2004; Vitas 2000). For example, a sound and healthy banking industry is necessary since banks are crucial in the settlement and clearing etc. In China, it is analysed that the current banking system, although suffering from many problems, is sufficient to support pension reform. In addition, a working insurance industry is needed in order to develop the annuities markets. The current industry in China grows rapidly, and is also able to offer some annuities products in the market, which implies that the basic conditions are met. The current Chinese stock market is large, and has more than 1000 listed companies. In this sense, it meets the preconditions for pension reform to diversify risk and achieve high returns. A more developed market, however, is desirable, in that it would maximise the benefits of pension reform. For example, a less volatile stock market is helpful, since it produces stable and high investment returns, particularly for long-term investors.

Macro-economic stability and financial stability are essential since pension fund investment could not function properly in a high inflation regime. In this context, one relevant point relates to inflation-protected bonds. Currently, there is no such bond in China. Therefore, to preserve pension values and facilitate pension reform, the authorities should consider issuing inflation-linked bonds with long maturities. Meanwhile financial regulators should be relatively experienced and capable of supervising markets, which also contributes to financial stability. Another precondition is basic financial knowledge for individual investors. It is not an immediate issue now, but becomes increasingly important, given the rapid growth of China's occupational pension industry (Hu 2005e). Good accounting standards and practices are also important in that it enhances the quality of listed firms in the stock markets, and help Chinese investors to focus on fundamentals (Cheng 2005). The current accounting standards are not sufficient to prevent frauds and accounting manipulation. Credit rating agencies and financial analysts are needed in pension reform, because they facilitate pension sponsors to select best performers. Good corporate governance is also relevant there, in that it increases investors' confidence in investing in listed firms. This issue, however, is complex due to the 2/3% of non-traded shares in most listed SOEs (Tenev et al 2002).

7.6 Family support

Another issue is concerned with family support. In our view, traditional family support is still of crucial importance in China, which is against the background that the extended family network is breaking down during China's recent industrialisation. As noted in Section 3, millions of younger workers migrant to work in urban areas in China, thus leaving old parents behind at home villages. However, supporting older parents is so deeply rooted in Chinese culture that it is likely to remain over a relatively long term (McCarthy and Zheng 1996). It is reflected by the fact that most migrant workers still regularly remit money back to their parents or close relatives in their home villages. Besides such strong culture, we also noted in Section 4.5 that, in

term of pension provisions, the family mechanism is less costly and more secure given the small size of pooling unit. In the long term, when the Chinese economy becomes more developed, the importance of traditional family support might be weakened gradually, while in the short term it is desirable to preserve such traditional value. Indeed experiences in Hong Kong and Taiwan suggest that even when the economy becomes developed family support still plays an important role (Li 1999). This traditional family support mechanism is strengthened by the passage of Family Support Law in 1981, which gives adult children the legal obligation to support their parents if their parents are not able to live by themselves alone.

8. Conclusions

China, as the largest developing country in the world, is working hard to realise its ambition of becoming a middle income country around 2050. Over the past decades, it has witnessed high economic growth and successfully transformed from a central planning economy to a market economy. Despite impressive economic expansion, a number of issues have to be addressed and solved as quickly as possible, e.g. banking reform and income equality (Feldstein 2003; OECD 2005a). Failure to tackle any of these problems will have a devastating impact on Chinese economy. In this paper we sought to address one of these problems, i.e. pension reform.

China, currently a young country, is about to undergo a dramatic demographic transformation in this century. Forecasting statistics (UN 2004) estimate that the 65+/total population ratio will be 16% of the total population in 2030 and 24% in 2050. Similar to other countries (Hu 2005b), the rise in old age dependency ratios in China is mainly due to two factors, i.e. increasing life expectancy and a decreasing fertility rate (Munnell 2004). The one-child family planning policy, together with a system of birth permits and penalties to enforce it (Jackson and Howe 2004), to a large extent contributes to the decreasing fertility rate. Against the background of a rapidly ageing population, however, China is very badly prepared to cope with the increasing number of the elderly. Inter alia, the current pension system features a low coverage rate, poor participation rate, a high contribution rate etc. In this paper we sought to find solutions to China's coming pension crisis.

In Section 2 we reviewed the pension system over the period from 1949-2004. Over that period, the Chinese pension system has undergone a great transformation, from a solely government sponsored PAYG system to a multi-pillar model recommended by the World Bank (Friedman et al 1996; World Bank 1997). Sections 3 and 4 identified current questions related to the Chinese pensions system, and then sought to provide some practical advice about how to improve the system. Section 5 discussed pension reform's external environment in China, with particular focus on the current development of the financial structure in China, and then presented the reform benefits. Section 6 conducted an empirical study; we simulated the impact of different policy alternatives on pension provisions from a range of aspects, i.e. retirement age, contribution rate and investment strategy. Section 7 concluded the paper by summarising results and main findings.

Based on our critical analysis and empirical results from the simulation work, a number of policy recommendations were proposed in the paper.

First, Chinese authorities need to unify the system, which implies a unification along both horizontal and vertical dimensions, i.e. a system fair to everyone without discrimination against region, background and type of employment etc. A unified national law is help in this case. Under such a legal framework, uncertainties and confusions, felt by many people resulting from frequent changes in pension policies during the past decade, will also be eased. In consequence, public confidence and participation will increase.

Second, participation incentives need to be improved. Besides unification efforts above, the current policy by using the cash surplus from employers and employees contributions to pay off costs inherited from the past system should be altered. In other works, historical pension costs should be borne by the government through general taxes and bond issuance, rather than the current working population.

Third, again in order to encourage participation, a smaller contribution rate is applied to meet pensioners' basic retirement needs. All the complementary income is met with the relatively large funded DC component. The relatively high replacement rate could be achieved by appropriate fund management.

Fourth, as regards pension fund investment, it is more appropriate to diversify asset allocation so as to achieve a stable and high return. In this context, assuming that the exchange rates are not too volatile, international investment should be gradually phased in, in that the risk is largely diversified away by investing in different countries, which are expected to be not perfectly correlated to each other.

Fifth, besides portfolio diversification, our empirical results also suggest the positive effects of implementing a range of policy alternations, i.e. raising the retirement age, reducing transaction costs. In this case, the most effective way to improve the replacement rate is to raise the retirement age, which serves as a double-edge sword in that it implies simultaneously a shorter pension benefit period and a longer pension contribution period.

Sixth, traditional family support is still crucial in China and expected to continue its important role in the foreseeable future. It is not only because culture of supporting older is deeply rooted in China, but also family insurance in some cases is more efficient and less costly than the social insurance system.

Last but not least, given the complexity of reforming a pension system, in order to maximise the benefits of a pension reform, a range of pre-conditions need to be addressed. Among others are stable macro-economy, sound banking system, healthy insurance industry, relatively experienced financial regulator, and good accounting and audit practices etc.

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Table

Table 1 Selected socio-economic development indicators comparison, as of 2003

	China	Low income economies	Lower middle income economies	High income OECD economies	World
Economy					
GDP per capita growth (annual %)	9.29	6.92	5.69	1.72	2.83
GDP per capita (constant 2000 US\$)	1,067.35	432.39	1,493.61	28,108.71	5,345.16
GDP per capita, PPP (constant 2000 international \$)	4,726.41	1,925.62	4,845.21	26,120.58	7,161.78
Population and demographics					
Population growth rate (annual %)	0.62	1.81	0.86	0.49	1.17
Population aged 65 and above (% of total)	7.30	4.15	6.94	14.90	7.12
Mortality rate, infant (per 1,000 live births)	30.00	79.81	31.39	5.43**	56.80
Life expectancy at birth (years)	70.80	58.08	69.21	78.53	66.76
Education*					
Literacy rate, adult total (% of people ages 15 and above)	90.92	57.99	89.77	N.A.	79.07
Literacy rate, youth total (% of people ages 15-24)	98.86	72.36	96.75	N.A.	86.62
Health**					
Health expenditure per capita (current US\$)					
Health expenditure, total (% of GDP)	68.00	29.44	84.01	3,088.23	523.75
	5.80	5.49	5.98	11.13	10.05

Source: World Development Indicators (WDI 2005). *, as of 2000; **, as of 2002.

Table 2 GDP per capita growth, 5-year average (%), 1961-2004

	China	Low income economies	Lower middle income economies	High income OECD economies	World
1961-1965	0.2	1.5	1.9	4.1	3.4
1966-1970	4.6	1.9	3.9	4.2	3.1
1971-1975	3.6	0.5	5.1	2.3	1.6
1976-1980	5.2	0.9	3.9	2.8	2.0
1981-1985	9.3	1.4	2.2	2.0	0.9
1986-1990	6.3	2.5	2.2	3.0	1.9
1991-1995	10.7	1.6	3.8	1.3	0.8
1996-2000	7.2	2.9	3.2	2.4	1.9
2001-2004 ^a	7.9	3.6	4.8	1.5	1.3
Average ^b	6.1	1.9	3.4	2.6	1.9
Average ^c	8.3	2.4	3.2	2.0	1.4

Source: World Development Indicators (WDI 2005); a, 4-year average between 2001 and 2004; b, average between 1961-2004; c, average between 1981-2004.

Table 3 Demographic statistics of China, 1960-2003

Year	1960	1970	1980	1990	2000	2003
Fertility rate, total (births per woman)	3.39	5.78	2.54	2.1	1.9	1.88
Life expectancy at birth, total (years)	36 ^a	60	65	69	70	71
Population ages 65 and above (% of total)	4.84	4.31	4.75	5.56	6.98	7.30
Population growth (annual %)	-0.12 ^b	2.76	1.25	1.47	0.71	0.62
Population, total (in million)	667	818	981	1,140	1,260	1,290

Source: World Development Indicators (WDI 2005); a, 36 years was estimated for 1960, due to the widespread national famine during 1958-1961; b, the negative growth rate in 1960 was again due to the famine.

Table 4 A comparison of retirement age, eligibility and replacement rate, 1951-1978

	1951	1953	1958	1978
Retirement age ^a				
Men	60	60	60	60
Women	50	50	50	50
Qualifying years of total employment				
Men	25	25	25	10
Women	20	20	15	10
Qualifying years of employment at current place of work				
Men	10	5	5	n.a
Women	10	5	5	n.a
Replacement rate %	35-60	50-70	50-70	60-90
Memo: life expectancy at birth (years) ^b	41	41	45	65

Source: Song, S and G, Chu, 1997; Yearbook of Labour Statistics of China, various years; UN population statistics from Memo data; a, those women in the managerial position are allowed to retire at 55. In addition, those workers employed in hazardous industries, e.g. mining, are allowed to retire five years earlier than normal, e.g. at the age of 55 for men and 45 for women; b, 41 was the 5-year average estimate for 1950-1955, 45 the estimate for 1956-1960, and 65 for 1976-1980.

Table 5 Selected pension statistics in China, 1978-1988

Year	No. of pensioners (millions)	Expenditure (RMB billion)*	Dependency ratio** %
1978	3.1	1.7	3.3
1979	6.0	3.3	6.0
1980	8.2	5.0	7.8
1983	12.9	8.7	11.2
1984	14.8	10.6	12.5
1985	16.4	15.0	13.3
1986	18.1	19.5	14.1
1987	19.7	23.8	14.9
1988	21.2	32.1	15.6

Source: Yearbook of labour statistics of China (1998). *, in nominal terms; **, dependency ratio, ratio of the number of retirees to that of the working population

Table 6 The structure of the 1997 pension reform in China

Pillar	Contribution rate %	Replacement rate %	PAYG/funded	Mandatory/voluntary	Status
1A	Enterprise:17 Individual:0	20	PAYG	Mandatory	In operation
1B	Enterprise:8 Individual:3	38	Funded	Mandatory	In operation*
2	Enterprise: N.A. Individual: N.A.	N.A.	Funded	Voluntary	Not finalized
3	Individual: N.A.	N.A.	Funded	Voluntary	Not finalized

Source: Ministry of Labour and Social Security, and Hussain (2001). *, in operation in principle since the individual accounts are empty (see text for details).

Table 7 Statistical summary of Chinese National Social Security Fund (NSSF) 2000-04, RMB bn and %

Source/year	2000	2001	2002	2003	2004
Transfer from central government budget	20.0 (100.0)	67.4 (84.7)	97.7 (80.7)	97.7 (77.6)	114.8 (74.6)
Transfer from the state shares in SOEs		12.2 (15.3)	21.0 (17.3)	21.4 (17.0)	26.1 (17.0)
Lottery income			2.38 (2.0)	6.9 (5.5)	12.9 (8.4)
Investment income		0.98 (1.2)	3.09 (2.5)	6.5 (5.2)	16.9 (11.0)
Total assets	20.00	80.51	124.19	132.50	170.80

Source: National Council of Social Security Fund (NCSSF) Annual Statistics, various years; all statistics are in stocks; the numbers within the brackets are the weights in percentage relative to the total assets; see Section 3.3.3 for details on asset allocation.

Table 8 Rural pension coverage in China, 1999-2003

Year	Participants	Rural working population	Coverage rate
	Million	Million	%
1999	64.6	615.5	10.5
2000	61.7	651.3	9.5
2001	60.0	616.0	9.7
2002	54.6	616.5	8.9
2003	54.3	612.6	8.9

Source: MOLSS Statistics, various years. United Nations Population Database (2004). WDI (2005). The pension coverage ratio was calculated by dividing the number of year-end participants by the number of rural working population, i.e. aged above 15.

Table 9 Urban pension^a statistics in China, 1989-2003

	Pension Participants	Pensioners	Dependency ratio ^b	Urban working population	Coverage ratio ^c
	Million	Person	%	Million Person	%
1989	48.2	8.9	18.5	216.9	26.3
1990	52.0	10.9	20.9	228.9	27.5
1991	56.5	16.8	29.7	239.1	30.7
1992	77.7	18.4	23.7	249.4	38.6
1993	80.1	20.8	26.0	259.7	38.8
1994	84.9	22.4	26.4	270.3	39.7
1995	87.4	23.6	27.0	281.2	39.5
2000	104.5	33.8	32.4	343.0	40.3
2001	108.0	33.8	31.3	357.0	39.7
2002	111.3	36.1	32.4	371.9	39.6
2003	116.5	38.6	33.1	391.7	39.6

Source: NBS Statistics (2004). United Nations Population Database (2004). WDI (2005); a, all pension statistics are referred to the pillar one of the multi-pillar system in China; b, the dependency ratio is the number of pensioners divided by the number of pension participants; c, the pension coverage ratio was calculated by dividing the number of year-end participants by the number of urban working population, i.e. aged above 15.

Table 10 A comparison of coverage rates and GDP per capita as of 2002^a, %

	Coverage rate	GDP per capita
	%	US\$ (constant 2000)
Argentina	55.4	6,452.7
Bolivia	23.1	1,011.8
Costa Rica	69.3	4,208.4
El Salvador	36.7	2,128.1
Mexico	71.9	5,805.6
Peru	27.2	2,084.7
Uruguay	41.4	5,136.8
Malaysia	60.5	3,882.6
Singapore	65.3	22,152.5
Philippines	28.3	1,008.1
Thailand	25.1	2,143.6
Average ^b	45.8	3,838.8
China	20.7	982.7

Source: coverage rate Claramunt (2004) and Holzmann et al (2000), and GDP per capita WDI (2005) World Development Indicators; a, coverage data of 4 Asian countries (but China) are as of 1997; b, average between 7 Latin American countries and 4 Asian countries.

Table 11 A comparison of contribution rates for the social security pension between countries (11OECD+11EMEs) 2004

	Country		Insured person	Employer	Total
	Code	Name	%	%	%
OECD	AUS ^a	Australia	0.00	0.00	0.00
	BEL ^b	Belgium	7.50	8.86	16.36
	CAN	Canada	4.95	4.95	9.90
	DEU	Germany	9.75	9.75	19.50
	ESP	Spain	4.70	23.60	28.30
	FRA	France	6.55	8.20	14.75
	GRE	Greece	6.67	13.33	20.00
	ISL	Iceland	4.00	6.00	10.00
	JPN	Japan	6.79	6.79	13.58
	GBR	Britain	11.00	12.80	23.80
	USA	USA	6.20	6.20	12.40
EMEs	NOR	Norway	7.80	14.10	21.90
	BRA	Brazil	7.65	20.00	27.65
	CHL ^c	Chile	10.00	0.00	10.00
	CHN^d	China	8.00	22.00	30.00
	CRT ^e	Croatia	15.00	0.00	15.00
	EGY	Egypt	13.00	17.00	30.00
	FJI	Fiji	8.00	8.00	16.00
	HUN	Hungary	8.50	18.00	26.50
	IDN ^f	Indonesia	2.00	3.70	5.70
	KOR	Korea	4.50	4.50	9.00
	MEX ^g	Mexico	1.13	3.15	4.28
SGP ^h	Singapore	20.00	13.00	33.00	
THA	Thailand	3.00	3.00	6.00	
ZAF ⁱ	South Africa	0.00	0.00	0.00	
Average_OECD					15.87
Average_EMEs					16.39
Average_All					16.14

Source: SSA (2004). Contributions herein are used to cover old age, disability and survivors.

- a. Refers to the social security.
- b. Disability pensions are financed under the Sickness and Maternity Programme.
- c. Enterprises contribute to 0% except 2% of salary for employees working under arduous conditions.
- d. It includes contributions to basic pension and work injury insurance; for more details see Table 12.
- e. Refers to basic pension.
- f. Refers to provident funds.
- g. The government pays 10.14% of the total employer contributions.
- h. Relevant to monthly wages greater than S\$750. If wages are less than S\$750, smaller contribution rates apply. In addition, depending on the member's age, 0 to 22% of the contributions are used to finance home purpose and education.
- i. The government bears all cost.

Table 12 Summary of contribution rates for overall social welfare programme in China (%), 2004

	Pensions	Unemployment insurance	Medical insurance	Work injury insurance ^a	Maternity insurance	Provident funds ^b	Total
Employers	20	2	6	2	1	8	39
Employees	8	1	2	0	0	8	19
Both	28	3	8	2	1	16	58

Source: MOLSS Statistics (2005) and author's estimates.

a. According to the "Work injury insurance regulations" (MOLSS 2004), the contribution rates for work injury insurance are not fixed. Local governments are given the rights to decide their own collections so as to balance the payouts and contribution collections in different industries and localities. In order to complete the table, I estimated the 2% contribution rate based on information in Table 18.

b. Provident funds are accumulated funds for the purpose of housing purchase.

Table 13 Number of retirees by enterprise ownership 1997-2004, '000 persons

Year	SOEs ^a	COEs ^b	Public inst. ^c	Govt. ^d	HK, MA & TW firms ^e	Foreign firms ^f	Others ^g	Total_A	Total_B	Total
	1	2	3	4	5	6	7	1+2+3+4	5+6+7	1-7
1997	19,081	6,217	4,887	2,132	92	105	719	32,317	916	33,233
1998	20,665	6,042	4,735	2,163	94	139	1,811	33,605	2,044	35,649
1999	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0	n.a.
2000	20,189	5,800	5,805	2,515	155	114	2,420	34,308	2,688	36,996
2001	21,613	5,890	6,544	2,631	132	123	2,966	36,678	3,221	39,899
2002	22,595	6,080	6,611	2,736	185	252	3,501	38,022	3,938	41,960
2003	23,936	6,175	7,201	2,902	166	175	4,413	40,214	4,754	44,967

Source: MOLSS Statistics (2004).

a. State owned enterprises.

b. Collective owned enterprises.

c. Public institutions, e.g. universities, hospitals.

d. Government in all levels.

e. Firms established by funds from Hong Kong, Macau and Taiwan.

f. Firms with any other ownerships.

Table 14 Number of retirees by enterprise ownership 1997-2004, %

Year	SOEs	COEs	Public inst.	Govt.	HK, MA & TW firms	Foreign firms	Others	Total_A	Total_B	Total_C
	1	2	3	4	5	6	7	1+2+3+4	5+6+7	1+2
1997	57.4	18.7	14.7	6.4	0.3	0.3	2.2	97.2	2.8	76.1
1998	58.0	16.9	13.3	6.1	0.3	0.4	5.1	94.3	5.7	74.9
1999	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
2000	54.6	15.7	15.7	6.8	0.4	0.3	6.5	92.7	7.3	70.2
2001	54.2	14.8	16.4	6.6	0.3	0.3	7.4	91.9	8.1	68.9
2002	53.8	14.5	15.8	6.5	0.4	0.6	8.3	90.6	9.4	68.3
2003	53.2	13.7	16.0	6.5	0.4	0.4	9.8	89.4	10.6	67.0

Source: MOLSS Statistics (2004). Key: see Table 13.

Table 15 Pension payment by enterprise ownership 1997-2003, RMB bn

Year	SOEs	COEs	Public inst.	Govt.	HK,MA&TW firms	Foreign firms	Others	Total A	Total B	Total
	1	2	3	4	5	6	7	1+2+3+4	5+6+7	1-7
1997	89.9	21.2	31.0	14.5	0.4	0.6	3.5	157	4	161.0
1998	104.4	22.0	36.8	16.1	0.5	0.7	9.6	179	11	190.0
1999	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0	n.a.
2000	118.8	24.2	46.8	20.1	0.9	0.8	13.2	210	15	224.8
2001	135.9	29.1	68.2	29.6	1.9	2.2	19.9	263	24	287.0
2002	167.5	35.1	77.5	34.9	1.3	2.5	25.1	315	29	344.0
2003	184.2	37.8	92.0	40.4	1.4	1.5	32.8	354	36	389.9

Source: MOLSS Statistics (2004). Key: see Table 13.

Table 16 Pension payment by enterprise ownership 1997-2004, %

Year	SOEs	COEs	Public institutions	Government	HK,MA&TW firms	Foreign firms	Other firms	Total A	Total B	Total C
	1	2	3	4	5	6	7	1+2+3+4	5+6+7	1+2
1997	55.8	13.2	19.2	9.0	0.3	0.3	2.2	97.2	2.8	69.0
1998	54.9	11.6	19.3	8.5	0.3	0.4	5.0	94.3	5.7	66.5
1999	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
2000	52.8	10.8	20.8	9.0	0.4	0.3	5.9	93.4	6.6	63.6
2001	47.3	10.2	23.8	10.3	0.7	0.8	6.9	91.6	8.4	57.5
2002	48.7	10.2	22.5	10.2	0.4	0.7	7.3	91.6	8.4	58.9
2003	47.2	9.7	23.6	10.4	0.4	0.4	8.4	90.9	9.1	56.9

Source: MOLSS Statistics (2004). Key: see Table 13.

Table 17 Asset returns in China 1993-2004, %

Year	Nominal returns			Inflation	Real returns		
	Deposit	Govt bond	Equity ^a		Deposit	Govt bond	Equity
1993	10.98	13.86	31.70	14.58	-3.60	-0.72	17.12
1994	10.98	13.86	-19.54	24.24	-13.26	-10.38	-43.77
1995	10.98	13.86	-1.45	16.90	-5.92	-3.04	-18.34
1996	7.47	9.00	82.20	8.32	-0.85	0.68	73.88
1997	5.67	9.00	16.23	2.81	2.86	6.19	13.42
1998	3.78	5.22	0.70	-0.84	4.62	6.06	1.55
1999	2.25	2.88	21.61	-1.41	3.66	4.29	23.02
2000	2.25	2.88	33.29	0.26	1.99	2.62	33.04
2001	2.25	2.88	-23.79	0.46	1.79	2.42	-24.26
2002	1.98	2.79	2.22	-0.77	2.75	3.56	2.98
2003	1.98	2.79	-11.68	1.16	0.82	1.63	-12.84
2004	2.25	2.79	-7.44	3.90	-1.65	-1.11	-11.34
MEAN (1993-2004)	5.2	6.8	10.3	5.8	-0.6	1.0	4.5
STDEV (1993-2004)	3.9	4.8	29.3	8.4	5.1	4.6	30.8
MEAN (1997-2004)	2.8	3.9	3.9	0.7	2.1	3.2	3.2
STDEV (1994-2004)	1.3	2.2	18.8	1.9	1.9	2.4	19.3

Source: Datastream, National Bureau of Statistics of China (NBS), and World Development Indicator (WDI) (2005); a, calculated as percentage changes in weighted stock market indices between Shanghai and Shenzhen Stock Exchanges.

Table 18 Asset accumulations by type of social insurance 1990-2003, RMB bn

Year	Total	Pensions ^a	Unemployment insurance	Medical insurance	Work injury insurance	Maternity insurance
1990	11.7	9.8	1.9			
1991	17.0	14.4	2.6			
1992	25.3	22.1	3.2			
1993	30.4	25.9	4.1	0.0	0.3	0.1
1994	36.6	30.5	5.2	0.1	0.7	0.1
1995	51.7	43.0	6.8	0.3	1.3	0.3
2000	132.8	94.7	19.6	11.0	5.8	1.7
2001	162.3	105.4	22.6	25.3	6.9	2.1
2002	242.3	160.8	25.4	45.1	8.1	3.0
2003	331.4	220.7	30.4	67.1	9.1	4.2

Source: MOLSS Statistics (2004); a, assets accumulated in pillars 1A and 1B.

Table 19 Asset allocation of National Social Security Fund (NSSF) by type of assets 2001-2003

		In RMB bn			
Risk level	Instruments	2001	2002	2003	2004
Very low	Deposit & others	52.2	94.9	77.7	66.7
Low	Government bonds and others	27.0	28.0	48.0	74.4
Medium	Other investment	1.3	1.3	0.0	11.3
High	Stocks/Mutual funds	0.0	0.0	6.7	18.4
	Total	80.5	124.2	132.5	170.8
		In %			
Risk level	Instruments	2001	2002	2003	2004
Very low	Deposit & others	64.9	76.4	58.7	39.1
Low	Government bonds and others	33.6	22.5	36.3	43.6
Medium	Other investment	1.6	1.0	0.0	6.6
High	Stocks/Mutual funds	0.0	0.0	5.1	10.8
	Total	100.0	100.0	100.0	100.0

Source: National Council of Social Security Fund (NCSSF) Statistics.

Table 20 Asset allocation of rural pension funds by type of assets 1999-2003

		In RMB bn				
Instruments	1999	2000	2001	2002	2003	
Bank deposits	9.2	9.7	9.9	11.0	11.0	
Government bonds	3.3	3.5	3.9	3.3	3.5	
Management by government ^a	3.5	2.9	4.9	5.7	6.5	
Others	2.4	2.4	2.8	3.2	4.4	
Total	18.4	19.6	21.6	23.3	26.0	
		In %				
Instruments	1999	2000	2001	2002	2003	
Bank deposits	49.9	49.7	45.9	47.2	42.5	
Government bonds	17.8	17.8	18.2	14.3	13.6	
Management by government ^a	19.0	14.8	22.7	24.6	25.1	
Others	13.2	12.5	13.2	13.8	16.8	
Total	100.0	100.0	100.0	100.0	100.0	

Source: MOLSS (2004). Note: a, refers to such fund managed by the local authorities. The funds are always regarded as the fiscal revenues, and the related investment procedures are very opaque.

Table 21 Returns of rural pension funds 1999-2003

	Nominal return	Inflation rate	Real return
1999	4.82	-1.41	6.23
2000	2.86	0.26	2.60
2001	2.89	0.46	2.43
2002	3.11	-0.77	3.88
2003	2.89	1.16	1.73
Mean	3.31	-0.06	3.37

Source: MOLSS (2004).

Table 22 Returns of the NSSF 2002-2004

	Nominal return	Inflation rate	Real return
2002	2.59	-0.77	3.36
2003	3.56	1.16	2.40
2004	3.10	3.9	-0.80
Mean	3.08	1.43	1.65

Source: National Council of Social Security Fund (NCSSF) Statistics.

Table 23 Pension fund assets and returns by type in China, 2003

	Pillar 1A+1B	Pillar 2	NSSF	Rural Pensions
Assets (RMB bn)	220.7	35.0	132.5	26.0
Assets (%)	0.5	0.1	0.3	0.1
Real returns (%)	1.2	1.2/2.4 ^a	2.4	1.7
Estimated total returns (%)	1.6/1.7 ^b			

Source: Tables 18-22; a, returns for assets in Pillar 2 are not available, so we estimate it at the lower bound 1.2% as pillar 1, and the upper bound 2.4 as the NSSF; b, the returns on Chinese pension funds are estimated by weighting returns by four different components, i.e. Pillar 1A+1B, Pillar 2, the NSSF, and rural pension funds. 1.6% is estimated based on 1.2% return for Pillar 2, while 1.7% is based on 2.4% return for Pillar 2.

Table 24 A comparison of pension funds' real returns, 2003

Country	Australia	Canada	UK	Philippine	Mexico	Malaysia	China
Return %	26.2 ^a	10.7	16.1 ^b	8.8	3.9	3.6 ^c	1.6/1.7 ^d

Source: Hu (2005c); a, the high return was due to 59% return achieved by equity investment in 2003; b, Watson Wyatt Worldwide (2005); c, as of 2001 (Thillainathan 2003); d, Table 23.

Table 25 Pension fund investment regulations across countries as of 2001

	Equity	Real Estate	Bonds	Investment Funds	Loans	Bank Deposits	Foreign assets
OECD countries							
Australia	No limit	No limit	No limit	No limit	No limit	No limit	No limit
Canada	No limit	25%	No limit	No limit	No limit	No limit	30%
Denmark	70%	No limit	No limit	70%	No limit	No limit	High-risk assets (domestic & foreign shares and unlisted securities) limited to 70%, min 80% currency matching limit
Italy	No limit	Direct investment not allowed	No limit	20% for close-end funds	0	20%	67% currency matching limit, 5% for debt & equity securities issued by non-OECD residents
Japan	No limit	No limit	No limit	No limit	No limit	No limit	No limit
Netherlands	No limit	No limit	No limit	No limit	No limit	No limit	No limit
Spain	no limit (quoted); 10% (unquoted)	No limit	No limit	No limit	10% (if no mortgage guarantee)	15%	No limit on investment in OECD securities
UK	No limit	No limit	No limit	No limit	No employer-related loans	No limit	No limit
USA	No limit	No limit	No limit	No limit	No employer-related loans	No limit	No limit
EMEs							
Czech Republic	25% (non-listed)	No limit	No limit	25%	0	10%	Permitted on securities traded in OECD markets
Fiji ^a	Authorized investments include: stocks and government securities in Fiji, the UK, Australia, Canada and New Zealand, loans secured by first legal mortgage, debentures of any city or town in Fiji, and bank deposits						n.a.
Hong Kong	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	70% currency matching limit
Hungary ^b	50% (MPF) 60% (VPF)	5% directly, 10 together with real estate investment (MPF) 10 % directly or through real estate investment funds (VPF)	30% (corporate, municipalities), no limit on financial institutions 25 (mortgage)	50%	0 (MPF) 30% of the projected fund income to the liquidity and operational reserves during the majority of the loan (VPF)	No limit	30%

					5% to fund members (VPF)			
Korea	40%	15%	n.a.	n.a.	n.a.	n.a.	10%	
Malaysia ^c	n.a.	n.a.	70% government bonds	n.a.	n.a.	n.a.	n.a.	
Mexico	0	0	No limit (federal government), No limit (AAA corporate), 35 (AA corporate), 5 (A corporate)	0	0	250,000 in Mexican pesos and US\$ 25,000 in foreign currency plus the required amount for currency matching	Not allowed generally	
Poland ^d	OPF	40% (listed on primary market), 10% (listed on secondary market or unlisted)	0	30% (mortgage), 15% (municipal), 10% (corporate)	10% (National Investment Funds), 10% (close-ended), 15% (open-ended)	Equal to investment in the shares of the borrower	20%	5%
	EPF	No limit	0	5%	No limit	Equal to investment in the shares of the borrower	No limit	5%
Thailand ^e	60% on low-risk instruments; 40% on other assets						n.a.	
Turkey	No limit	0	No limit	10	10	10	15%	

Source: all data are from Yermo (2003) until specified otherwise.

- Data from Fiji National Provident Fund (www.fnpf.com.fj).
- MFF, mandatory pension fund; VPF, voluntary pension fund.
- Data from Davis (2002b).
- OPF, open pension funds; EPF, employee pension funds, NIP, national investment funds.
- Data from the Government Pension Fund (www.gfp.or.th)

Table 26 Empirical results of the implications of pension funds for financial development

Variable ^a		All		OECD		EMEs	
		A ^b	B ^b	A	B	A	B
PCDMBOFIGDP	Short term	0.03708*	0.04012	0.01454	-0.13214**	0.02993	0.12856**
	Long term	-0.00151	0.00847	-0.00127	-0.03987**	-0.01238	0.03830***
CREDIT	Short term	-0.04291**	-0.13198*	0.00210	-0.17661*	-0.15416*	0.04061
	Long term	-0.02833*	-0.04192*	0.00210	-0.05252*	-0.09363*	-0.06626**
DMBTFA	Short term	0.02473***	0.00101	-0.09833***	-0.04429	0.05691**	0.11320
	Long term	0.02377*	-0.01349***	0.04004	0.02718	0.03284***	0.14327*
STKCAP	Short term	0.30419*	0.34786***	0.63711*	0.89834*	0.19722*	-0.38154
	Long term	0.13411*	0.09992**	0.13324**	0.10420	0.10004*	-0.01734
STKTRD	Short term	0.33685**	0.81232***	1.39857*	3.12497*	0.04871	-0.63489
	Long term	0.10399	-0.00047	0.47207*	0.64437*	0.23459***	-0.24607
STKTNV	Short term	0.01546	0.95407***	0.76833*	2.64679*	-0.11897	0.15174
	Long term	-0.02118	-0.03833	0.19866	0.51356*	0.04247	-0.15179
PUBBND	Short term	0.21266*	0.23950*	0.01877	0.04614	0.29412*	0.23943
	Long term	0.08060**	-0.03846	-0.27031*	-0.24126*	0.11001**	-0.24614*
PRIBND	Short term	0.27914*	0.20547	0.11086	0.12460	0.41275*	0.04577
	Long term	0.07651*	0.01312	0.10422	0.08581	0.15088**	0.03620

Source: Hu (2005b); a, PCDMBOFIGDP, private credit provided by monetary bank and other financial institutions to GDP, CREDIT, domestic credit provided by banking industry, DMBTFA, domestic monetary bank assets to total financial assets, STKCAP, stock market capitalisation to GDP, STKTRD, stock market traded to GDP, STKTNV, stock market turnover to GDP, PUBBND, public bond capitalisation to GDP, PRIBND, private bond capitalisation to GDP; b, A represents the OLS estimator, and B represents the TSLS estimator.

Table 27 A comparison of financial systems with different legal origins (%), as of 1999

	English origin ^a	French origin	German origin	Scandinavian origin	Sample average	China
Bank credit/GDP	62	55	99	49	73	111
Total value traded/GDP ^b	58	18	55	25	47	32
Market capitalisation/GDP ^c	31	7	37	8	27	11
Overhead cost/bank total asset	4	5	2	3	3	12

Source: Almanac of China's Finance and Banking (2000); China Statistical Yearbook (2000). Cited in Allen et al (2005); a, origin refers to the legal origin of the company law or commercial law; b, total value traded/GDP, the ratio of the total value traded of shares to GDP; c, market capitalisation/GDP, the ratio of stock market capitalisation to GDP.

Table 28 A comparison of financial systems between regions (%), as of 2004

	Low income	Middle income	OECD ^a	World	China
Bank credit/GDP	47.2	76.4	209.1	171.1	167.0
Stock market capitalisation/GDP	44.5	45.7	106.9	97.4	38.8
Total value traded/GDP	45.2	25.1	112.9	98.5	45.4
Stock market turnover	112.7	60.3	113.6	105.2	113.3

Source: World Development Indicators (2005); a, high-income OECD countries.

Table 29 Balance sheet of the central bank in China, 2005

	RMB bn	US\$ bn	in %
Foreign assets	5760.5	711.2	60.6
Of which: Foreign exchange	5634.7	695.6	59.3
Monetary gold	33.7	4.2	0.4
Other foreign assets	92.1	11.4	1.0
Claims on government	293.0	36.2	3.1
Of which: Central government	293.0	36.2	3.1
Claims on deposit money banks	852.3	105.2	9.0
Claims on specific depository institutions	95.2	11.8	1.0
Claims on other financial institutions	1418.5	175.1	14.9
Claims on non-financial institutions	9.5	1.2	0.1
Other assets	1076.6	132.9	11.3
TOTAL ASSETS	9505.5	1173.5	100.0
Reserve money	5827.1	719.4	61.3
Of which: Currency issue	2294.3	283.3	24.1
Deposit of financial institutions	3516.4	434.1	37.0
Deposits of non-financial institutions	16.4	2.0	0.2
Bond issue	1618.7	199.8	17.0
Foreign liabilities	62.4	7.7	0.7
Deposits of government	1051.0	129.8	11.1
Of which: Central government	0.0	0.0	0.0
Own capital	22.0	2.7	0.2
Other liabilities	924.3	114.1	9.7
TOTAL LIABILITIES	9505.5	1173.5	100.0

Source: The People's Bank of China (2005). Data are as of July 2005.

Table 30 Statistical summary of assets held by Chinese financial institutions, 1995-2003

Year	SOBs ^a	RCCs ^b	UCCs ^c	Insurance companies	TICs ^d	Non-deposit intermediaries	Other commercial banks	Foreign banks	Total
In RMB bn									
1995	5,373.3	679.1	303.9		458.6	49.0	536.9	4.3	7,405.1
1996	6,582.7	870.7	374.8		563.7	82.0	770.0	5.5	9,249.4
1997	7,914.4	1,012.2	498.9		636.4	100.4	948.6	7.6	11,118.6
1998	8,860.9	1,143.1	560.6		802.5	121.0	1,128.2	11.8	12,628.2
1999	9,970.6	1,289.2	630.2	260.4	907.5	137.1	1,376.9	19.1	14,591.0
2000	10,793.7	1,393.1	678.5	337.4	975.9	160.8	1,828.3	37.9	16,205.6
2001	11,188.2	1,610.8	780.0	459.1	1,088.3	223.7	2,255.7	34.2	17,640.0
2002	13,549.6	2,205.2	119.2	649.4	1,544.1	408.1	2,997.7	31.8	21,505.2
2003		2,674.6	148.7	912.3		495.6			4,231.2
in %									
Year	SOBs	RCCs	UCCs	Insurance companies	TICs	Non-deposit intermediaries	Other commercial banks	Foreign banks	Total
1995	72.6	9.2	4.1		6.2	0.7	7.3	0.1	100.0
1996	71.2	9.4	4.1		6.1	0.9	8.3	0.1	100.0
1997	71.2	9.1	4.5		5.7	0.9	8.5	0.1	100.0
1998	70.2	9.1	4.4		6.4	1.0	8.9	0.1	100.0
1999	68.3	8.8	4.3	1.8	6.2	0.9	9.4	0.1	100.0
2000	66.6	8.6	4.2	2.1	6.0	1.0	11.3	0.2	100.0
2001	63.4	9.1	4.4	2.6	6.2	1.3	12.8	0.2	100.0
2002	63.0	10.3	0.6	3.0	7.2	1.9	13.9	0.1	100.0

Source: Almanac of China's Finance and Banking 2000-2003.a, State-owned banks; b, Rural credit cooperatives; c, Urban credit cooperatives; d, Trust and investment companies.

Table 31 A comparison of financial structure between China and Chile (%), 1980-2004

Country Name	Year	Financial intermediary and banking industry					Stock market			Life insurance market	Bond market	
		Liquid liabilities to GDP	Central Bank Assets to GDP	Deposit Money Bank Assets to GDP	Private credit by deposit money banks and other financial institutions to GDP	Financial system deposits	Stock market capitalization to GDP	Stock market total value traded to GDP	Stock market turnover ratio	Life insurance penetration	Private bond market capitalization to GDP	Public bond market capitalization to GDP
Chile	1980	22.7	15.9	31.9	30.8	18.9	29.0	2.0	6.8	0.2	n.a.	n.a.
	1985	33.9	40.7	60.2	53.2	23.4	12.2	0.3	2.8	1.0	n.a.	n.a.
	1990	36.9	28.1	45.1	47.7	28.2	39.6	2.5	6.4	1.6	9.3	19.8
	1995	33.3	13.8	44.5	57.0	30.1	101.8	15.5	15.3	1.8	13.4	27.6
	2000	41.6	12.8	58.8	66.6	38.8	87.6	8.2	9.3	2.7	17.4	27.7
	2001	40.5	13.1	60.5	69.2	37.8	83.0	6.2	7.5	2.8	22.3	30.5
	2002	38.2	12.8	61.2	70.1	35.5	77.1	4.6	6.0	2.5	23.7	28.1
	2003	37.3	11.1	61.7	75.0	34.6	86.4	8.8	10.2	2.6	19.4	27.4
China	1980	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	1985	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	1990	72.0	6.2	79.5	79.5	54.4	n.a.	n.a.	n.a.	0.2	4.7	3.9
	1995	93.6	4.1	81.4	80.1	76.6	6.3	7.1	113.0	0.3	3.4	4.6
	2000	145.0	1.9	126.8	119.2	123.0	42.6	66.8	157.0	1.0	8.7	13.7
	2001	152.1	2.5	130.9	121.3	129.2	47.6	38.2	80.2	1.3	9.2	15.7
	2002	164.6	2.9	138.7	126.9	145.2	39.2	26.2	67.0	2.0	9.9	17.6
	2003	176.4	2.7	147.9	135.5	159.8	40.6	33.8	83.1	2.3	10.3	18.9

Source: Financial Structure Database (Beck, Demirguc-Kunt and Levine 2005).

Table 32 The world top 15 stock markets by capitalisation, 2003

Rank	Exchange	US\$ bn	P/E ratio
1	NYSE	11,329.0	n.a.
2	Japan (Tokyo)	2,953.1	122.1
3	Nasdaq	2,844.2	n.a.
4	London	2,460.1	18.3
5	Euronext	2,076.4	14-20 ^a
6	Deutsche Börse	1,079.0	n.a.
7	TSX Group	888.7	19.7
8	Swiss Exchange	727.1	19.3
9	Spanish Exchanges (BME)	726.2	19.4
10	Hong Kong	714.6	19.0
11	Borsa Italiana	614.8	15.7
12	Australian	585.4	23.9
13	Shanghai+Shenzhen (Total ^c)	513.0	36.5/36.2 ^b
14	Taiwan	379.1	24.8
15	Korea	298.2	10.1
20	Shanghai+Shenzhen (Tradable ^d)	171.0	36.5/36.2 ^b

Source: World Federation of Exchanges, www.fibv.com. a, the P/E ratios for the Euronext (Euronext Amsterdam, Euronext Brussels, Euronext Lisbon, Euronext Paris) varied between 14 and 20; b, 36.5 for SHSE and 36.2 for SZSE; c, stock market capitalisation of all shares; d, stock market capitalisation of tradable shares only (around 1/3 of total shares) (see Section 5.1.2 for details).

Table 33 Statistical summary of the Chinese stock market, 1990-2004

Years	Listed Firms (A and B-share)	Market Capitalisation (total) RMB bn	Market Capitalisation (tradable) RMB bn	Stock turnover RMB bn	Total Investors (Million)	Market Capitalisation/GDP (%)	Shanghai Stock index	Growth rate %	Shenzhen Stock index	Growth rate %
1990	8	1.2	n.a.	N.A.	N.A.	0.1				
1991	14	10.9	n.a.	4.4	0.4	0.5	207		72	
1992	53	104.8	n.a.	68.7	2.5	3.9	540	161.4	242	234.3
1993	183	355.2	n.a.	362.7	8.7	10.3	819	51.7	239	-1.2
1994	291	369.1	n.a.	818.2	11.7	7.9	713	-13.0	155	-35.2
1995	323	347.4	93.8	403.6	14.6	5.9	726	1.9	139	-10.4
1996	530	984.7	n.a.	2133.2	32.3	14.5	976	34.4	337	142.1
1997	745	1752.9	n.a.	3072.2	33.8	23.5	1178	20.6	375	11.4
1998	851	1950.6	574.6	2354.4	39.1	24.9	1216	3.3	366	-2.4
1999	949	2647.1	821.4	3132.0	44.8	32.3	1497	23.1	438	19.7
2000	1088	4809.1	1608.8	6082.7	58.0	53.8	1947	30.1	602	37.4
2001	1160	4352.2	1446.3	3830.5	66.5	44.7	1521	-21.9	439	-27.0
2002	1224	3832.9	1248.5	2799.0	68.8	36.4	1548	1.8	453	3.0
2003	1287	4245.8	1317.9	3211.5	70.8	36.2	1398	-9.7	384	-15.2
2004	1377	3705.6	1168.9	2069.7	72.1	29.3	1329	-4.9	338	-11.9

Source: China Statistical Yearbook (2004); China Securities Regulatory Commission (2005); Shanghai Stock Exchange & Shenzhen Stock Exchange Factbook (2004); World Development Indicator (WDI) (2005).

Table 34 A comparison of volatility^a, 1994-2005^b

	China	EME ^c	EAFE ^d	WRLD ^e
1994	0.133	0.073	0.042	0.035
1995	0.050	0.047	0.036	0.025
1996	0.125	0.036	0.022	0.022
1997	0.130	0.071	0.047	0.042
1998	0.177	0.118	0.056	0.056
1999	0.164	0.063	0.030	0.031
2000	0.129	0.065	0.047	0.049
2001	0.095	0.087	0.039	0.047
2002	0.045	0.068	0.068	0.068
2003	0.058	0.047	0.046	0.044
2004	0.078	0.057	0.037	0.033
2005	0.057	0.041	0.030	0.020
Mean	0.104	0.064	0.042	0.039

Source: Datastream; a, standard deviation of monthly total stock returns (capital gains plus dividends); b, 2005 refers to January 2005 to October 2005; c, emerging market economies; d, Europe, Asia, and Far East; e, world developed countries.

Table 35 A comparison of stock market growth rate^a (%), 1991-2004

Years	Canada	Japan	UK	Korea	Singapore	Turkey	Argentina	Mexico	South Africa
1991	9.7	-1.6	2.9	-13.4	24.2	-49.0	423.8	111.5	23.6
1992	-12.3	-17.2	-1.2	-4.0	0.3	-45.8	-9.6	29.2	-15.5
1993	24.4	26.3	20.1	29.2	55.5	216.3	49.5	36.1	20.6
1994	-7.6	12.6	-3.6	28.1	-4.3	-25.6	-6.7	-4.1	17.3
1995	21.8	1.0	16.5	2.8	6.2	-8.3	-14.7	-49.7	9.4
1996	31.2	-9.0	22.5	-38.3	5.8	37.0	26.1	25.0	-9.6
1997	16.9	-26.0	24.4	-62.7	-27.4	49.1	24.1	41.7	-2.5
1998	-9.5	1.7	9.5	108.3	-15.5	-39.9	-22.1	-39.0	-31.3
1999	37.1	72.9	18.7	115.1	67.8	164.6	24.5	72.6	53.7
2000	16.3	-24.1	-14.6	-49.3	-25.5	-30.6	-29.5	-13.8	-20.5
2001	-21.3	-34.5	-17.0	16.2	-19.9	-41.9	-37.1	4.6	-17.7
2002	-10.8	-14.5	-17.6	11.3	-13.3	-2.5	-45.5	-11.3	28.2
2003	42.7	31.4	25.9	16.6	31.7	32.8	98.6	19.4	48.9
2004	22.6	12.7	19.9	16.8	18.9	38.8	10.9	41.4	39.6
Mean	11.5	2.3	7.6	12.6	7.5	21.1	35.2	18.8	10.3
SD ^b	20.4	28.1	15.9	50.7	29.3	80.2	118.2	42.7	27.1

Source: a, calculated by the author using stock market price index data from Datastream; b, standard deviation.

Table 36 A comparison of the life insurance industry across countries, 2000

Rank	Country ^a	Density ^b	Penetration ^c
		US\$	%
1	JPN	2877	8.7
2	GBR	2663	12.6
3	CHE	2297	7.8
4	USA	1390	4.5
5	SWE	1348	5.9
6	DNK	1084	4.1
7	AUS	1059	6.1
8	KOR	855	9.9
9	HKG	790	3.7
10	CAN	670	3.2
15	CYP	411	4.0
20	MYS	76	2.2
25	CZE	51	1.2
30	HRV	19	0.5
35	CHN^d	8	1.1
	CHN^e	40	3.4
40	CRI	6	n.a.
45	EGY	2	0.2
50	ROM	2	0.1

Source: OECD (2003) and Wu (2005); a, The World Bank 3-digit country code is used; b, Density is the life premium per capita in US\$; c, Penetration is the total life premia divided by the GDP in %; d, as of 2000; e, as of 2004

Table 37 Life premium growth in China over 1992-1999

	Premium	Growth rate
	RMB bn	%
1992	2.1	
1993	14.9	609.5
1994	15.2	2.0
1995	20.8	36.8
1996	32.5	56.3
1997	61.1	88.0
1998	76.8	25.7
1999	87.2	13.5
2000	100	14.7
2001	142	42.0
2002	227	59.9
2003	301	32.6
2004	323	7.3
Average	108.0	82.4

Source: Wu (2004) and CIRC (2005).

Table 38 Historical data of China's insurance industry, 1999-2004 (RMB bn)

	2004	2003	2002	2001	2000	1999
Premium	432	388	305	211	160	139
1. Property insurance	109	87	78	69	60	52
2. Life-related insurance	323	301	227	142	100	87
a) Death insurance	12	10	8	7	8	7
b) Health insurance	26	24	12	6	7	4
c) Life insurance	285	267	207	129	85	77
Payment	100	84	71	60	53	51
1. Property insurance	57	48	40	33	31	28
2. Life-related insurance	44	36	30	27	22	23
a) Death insurance	4	3	3	3	3	3
b) Health insurance	9	7	5	3	1	1
c) Life insurance	31	26	23	20	18	19
Expenses	44	36	31	26	22	18
Investment						
1. Bank deposit	497	455	303	193	124	93
2. Other investment	571	383	250	171	130	89
a) Government bonds	265	141	111	80	96	68
b) Investment funds	67	46	31	21	13	1
Total asset	1,185	912	649	459	337	260

Source: CIRC (2005).

Table 39 List of investment regulation changes on insurance assets, 1980-2005

Year	Investment regulations	Regulation details
1980-1987	n.a.	Bank deposits only
1987-1995	n.a.	Bank deposits and many others, but mainly in the real state industry, stock market and other high risk sectors
June 1995	Insurance Law	Bank deposits, Government bonds and financial bonds
August 1998	n.a.	Repo in the money market
May 1999	Directives on the Investment in corporate bonds	Corporate bonds, limited to those rated above AA+, and issued by the central government controlled SOEs; the upper limit is 10% of the total assets at the end of last month
October 1999	Provisional regulations on the investment of insurance assets on mutual funds	The upper limit on mutual funds is 15% of the total assets at the end of last month
March 2001	n.a.	The upper limit on mutual funds is 100% on those commercial insurance accounts which are designed to achieve high returns
March 2001	n.a.	Investment in the corporate bonds issued by telecom sectors allowed
June 2003	Provisional regulations on the investment of insurance assets in corporate bonds	All corporate bonds rated above AA; the upper limit is 20% of the total assets
October 2004	Provisional regulations on the investment of insurance assets in equities	Common stock; convertible bonds; 30% investment limit on one issuer; investment on those firms who had misbehaviours in the recent past is not allowed
August 2005	Provisional regulations on the investment of insurance assets in bonds	Government bonds, no limit; financial bonds, 30% upper limit, and no limit in some cases; corporate bond, 10-30% upper limit
September 2005	Provisional regulations on the investment of insurance companies' overseas assets ^a	Foreign government bonds; MBS (mortgage-backed securities); money funds; equity investment limited to those issued by Chinese firms listed in the NYSE, LSE, Frankfurt SE, Tokyo SE, Singapore SE and HK SE. Limit ranges 5% to 20% of the allowable assets ^b .

Source: CIRC (China Insurance Regulatory Committee), and Wu (2004a); a, for some Chinese insurers, they have a certain amount of assets outside the Chinese territory. These assets mainly come from the IPO capitals, injection funds from the foreign partners for those joint-ventures, and those business involving foreign markets. It is estimated that foreign assets within the Chinese insurers were equivalent to US\$ 10bn as of 2004. (www.cei.gov.cn); b, for each major insurer, the SAFE (State Administration of Foreign Exchange) issues a limit within which the foreign assets could be free invested abroad. For example, the PINGAN Company has a US\$1.75bn quota, allowed for a free investment abroad.

Table 40 Statistical summary of China's mutual fund industry, 2001-2005

Year	Open-end funds				Closed-end funds				Total			
	No. of funds		Assets		No. of funds		Assets		No. of funds		Assets	
	No.	%	RMB bn	%	No.	%	RMB bn	%	No.	%	RMB bn	%
2001	2	4	3.5	5	48	96	62.4	95	50	100	65.9	100
2002	14	21	35.3	32	53	79	74.4	68	67	100	109.7	100
2003	49	48	58.6	44	53	52	74.9	56	102	100	133.5	100
2004	99	65	206.7	73	53	35	74.9	27	152	100	281.6	100
2005 ^a	127	71	348.3	81	53	29	80.9	19	180	100	429.2	100

Source: www.hexun.com; a, as of June 2005.

Table 41 Summary of asset allocation of China's mutual funds, 1998-2005

	Total assets	Equity		Bond		Deposit		Others	
		RMB bn	%	RMB bn	%	RMB bn	%	RMB bn	%
1998	11	7	63	0	0	0	0	4	37
1999	45	30	68	0	0	0	0	15	32
2000	83	57	69	0	0	0	0	26	31
2001	75	34	46	0	0	0	0	41	54
2002	107	51	53	0	0	0	0	55	47
2003	149	100	66	0	0	0	0	50	34
2004	336	158	53	141	36	0	6	20	5
2005 ^a	448	161	51	201	33	9	9	52	7

Source: www.hexun.com; a, as of June 2005; total assets, in some cases, are different from those in Table 34, which might be due to the different calculation methods used in different reports as well as rounding errors.

Table 42 Return on Chinese open-end mutual funds (%), 2001-2005

	Nominal return	Inflation rate	Real return ^a	Market return ^b	Over-performance ^c	Growth rate of net assets
2001	0.55	0.46	0.09	-9.80	10.35	0.79
2002	0.09	-0.77	0.86	-11.85	11.94	-5.03
2003	2.29	1.16	1.14	-13.99	16.28	9.40
2004	2.95	3.90	-0.95	-5.00	7.96	-1.08
2005 ^d	0.08	1.30	-1.22	-12.03	12.11	-2.09
Memo	The ratio of net assets to GDP was very small, i.e. 1-3%					

Source: www.hexun.com, and Datastream; a, return on net assets minus inflation rate; b, weighted stock market return by Shanghai and Shenzhen stock capitalisations; c, return on net assets minus market return; d, as of October 2005.

Table 43 Return on US mutual funds (%), 1971-2005

	Nominal return	Inflation rate	Real Return ^a	Market return ^b	Over-performance ^c	Growth rate of net assets	Asset/GDP ratio
1971-1975	8.46	6.79	1.67	5.87	2.58	1.43	3.69
1976-1980	10.76	8.93	1.83	14.89	-4.13	26.63	3.26
1981-1985	13.69	5.51	8.18	15.44	-1.75	32.19	9.33
1986-1990	13.54	3.97	9.58	13.82	-0.28	17.39	17.01
1991-1995	13.40	3.13	10.28	17.41	-4.01	21.85	29.98
1996-2000	22.37	2.48	19.90	19.37	3.00	20.29	61.75
2001-2004	16.37	2.34	14.03	1.40	14.98	4.28	66.97
Memo	Growth rate of net assets: 1941-50 (141.9), 1951-60 (163.5), and 1961-70 (106.9)						

Source: www.hexun.com, Datastream, and ICI (Investment Company Institute); a, return on net assets minus inflation rate; b, S&P 500 market return; c, return on net assets minus market return.

Table 44 Distribution of 100 most invested equities by mutual funds

		No of funds	% of stock market capitalisation ^a
2001	Min	1.0	0.0
	Mean	1.1	0.0
	Median	1.0	0.0
	Max	2.0	0.0
2002	Min	1.0	0.0
	Mean	2.0	0.0
	Median	1.0	0.0
	Max	9.0	0.0
2003	Min	1.0	5.9
	Mean	12.2	10.9
	Median	10.5	10.1
	Max	45.0	23.6
2004	Min	5.0	17.9
	Mean	25.8	29.3
	Median	24.0	27.7
	Max	65.0	62.7
2005^b	Min	3.0	20.1
	Mean	28.2	32.4
	Median	25.5	30.9
	Max	81.0	61.6
Average	Min	2.2	8.8
	Mean	13.9	14.5
	Median	12.4	13.7
	Max	40.4	29.6

Source: www.hexun.com; a, % of the stock market capitalisation related to the tradable shares only, which approximates 1/3 of the total shares; b, as of June 2005.

Table 45 Distribution of the 10 most invested equities for each mutual fund

		Total	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
2001	Min	29.1	4.4	3.5	3.4	3.2	2.7	2.7	2.6	2.5	2.2	2.0
	Mean	49.7	8.8	6.2	6.0	5.9	4.9	4.9	3.7	3.6	3.0	2.7
	Median	49.7	8.8	6.2	6.0	5.9	4.9	4.9	3.7	3.6	3.0	2.7
	Max	70.3	13.2	9.0	8.7	8.6	7.1	7.1	4.8	4.7	3.8	3.5
2002	Min	25.1	5.7	2.9	2.7	2.2	2.0	2.0	1.8	1.7	1.6	1.6
	Mean	44.3	10.8	6.5	5.3	4.4	3.9	3.5	3.0	2.8	2.4	2.3
	Median	40.8	9.2	5.7	4.5	3.7	3.4	2.8	2.8	2.6	2.3	2.2
	Max	69.9	18.6	13.0	9.4	9.0	8.7	7.8	5.2	4.5	3.2	3.2
2003	Min	10.3	4.9	3.0	0.0	2.8	2.4	2.0	1.8	1.7	0.0	0.0
	Mean	58.8	11.1	8.7	7.2	6.2	5.5	5.0	4.6	4.1	3.8	3.4
	Median	60.7	9.3	7.6	7.0	6.3	5.6	4.9	4.5	4.0	3.9	3.6
	Max	100.0	38.1	23.6	17.2	13.0	11.1	8.4	8.2	7.1	6.4	5.9
Average	Min	28.4	6.4	4.0	2.9	3.6	3.1	2.9	2.4	2.3	1.6	1.5
	Mean	50.9	10.2	7.1	6.2	5.5	4.8	4.5	3.8	3.5	3.1	2.8
	Median	57.3	10.6	7.4	6.7	6.2	5.4	4.9	4.0	3.8	3.4	3.1
	Max	65.0	20.8	13.1	9.8	8.1	7.3	6.0	5.1	4.5	3.7	3.5

Source: www.hexun.com; 1st to 10th refers to the Nth largest share in each mutual fund's portfolio, in terms of asset allocation to this particular share.

Table 46 Distribution of numbers of open-end mutual funds invested in two selected equities

		Total	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
2002	China Telecom	9 (10)	5	1	1	1	1	0	0	0	0	0
2003	Sinopec	19 (43)	4	2	1	6	1	1	1	1	1	2

Note: Number in bracket is the total number of total funds; 1st to 10th refers to the Nth largest share in each mutual fund's portfolio, in terms of market value.

Table 47 Statistical summary of the NSSF assets managed by mutual funds and allocated to 162 stocks under 11 portfolios, 2004

	Rank of the NSSF portfolio as the largest shareholders	Number of held shares	Stock capitalisation
Panel A		Million	RMB mn
Min	10	0.21	1.89
Average per stock	5	2.93	22.34
Median	5	1.88	16.89
Max	1 (24) ^a	12.66	94.92
Total	n.a.	384.28	3597.13
Average per portfolio/fund	n.a.	34.93	327.01
Panel B			
Stock market capitalisation ^b (RMB bn)	n.a.	n.a.	1169
%	n.a.	n.a.	3.1
Stock market capitalisation ^c (RMB bn)	n.a.	n.a.	3706
%	n.a.	n.a.	1.0

Source: www.cnfund.com; a, number in bracket is the frequency; b, refers to the tradable shares only; c, refers to all shares.

Table 48 Statistical summary of occupational pension funds allocated to 26 stocks in Shanghai and Shenzhen, 2004

	Rank of the NSSF portfolio as the largest shareholders	Number of held shares	Stock capitalisation
		Million	RMB mn
Min	10	0.1	1.0
Mean	6	2.9	19.3
Median	7	0.9	8.8
Max ^a	1(2)	24.9	136.5
Total	n.a.	68.6	463.1

Source: www.cnfund.com; a, number in bracket is the frequency.

Table 49 Summary of China's institutional investors, 2001-2004 (RMB bn, %)

	2004	2003	2002	2001
Mutual funds	336 (2.7) ^a	140 (1.2)	107 (1.0)	75 (0.8)
Insurance companies	1,185 (9.4)	912 (7.8)	649 (6.2)	459 (4.7)
Pension funds				
a) NSSF ^b	171 (1.3)	133 (1.1)	124 (1.2)	81 (0.8)
b) Occupational pension ^{c,d}	0.5 (0.0)	0.5 (0.0)	0.5 (0.0)	0.5 (0.0)
Securities companies ^d	51 (0.4)	51 (0.4)	51 (0.5)	51 (0.5)
Underground funds ^d	650 (5.1)	650 (5.5)	650 (6.2)	650 (6.7)
Total	2,394	1,886	1,582	1,316
GDP	12,667	11,729	10,520	9,731
All institutions/GDP ^e , %	18.9	16.1	15.0	13.5
All institutions/GDP ^f , %	13.8	10.5	8.9	6.8
Pension funds/GDP, %	1.4	1.1	1.2	0.8

Source: see Section 5.1.3 for details; a, figures in brackets are % of GDP; b, National Social Security Fund; c, occupational pensions in Shanghai and Shenzhen; d, data are estimated to be same across all four years (see Section 5.1.3 for details); e, total institutions/GDP with underground funds; f, total institutions/GDP without underground funds.

Table 50 Comparison of institutional investors and pension funds between China and other countries, 2001

Ratio	Country	%
All institutions/GDP	China	13.5
	OECD-all ^a	163.1
	OECD-advanced	315
	OECD-developing	11.1
Pension Fund/GDP	China	0.8
	OECD-all	18.9
	OECD-advanced	34.4
	OECD-developing	3.3
	All EMES ^b	11.5
Memo: Pension Fund/GDP	Chile ^b	12.7

Source: OECD Institutional Investors (2004), Hu (2005b; Davis 2005a), www.hexuen.com, NCSSF (2005), and CIRC (2005); a, OECD countries are classified into three groups, i.e. all OECD countries (OECD-all), those advanced OECD countries (OECD-advanced), and those less advanced OECD countries (OECD-developing), e.g. Turkey and Korea; b, refers to 33 emerging market economies, including Asian, Latin American, African and Eastern European countries, the data are as of 2002.

Table 51 Government bond issuance and repayment in China, 1981-2003, (RMB bn)

Year	Issuance size	Growth rate	Repayment ^a	% of GDP	Growth rate
	RMB bn	%	RMB bn	%	%
1981	4.87		n.a.		
1982	4.38	-9.93	n.a.		
1983	4.16	-5.13	n.a.		
1984	4.25	2.28	n.a.		
1985	6.06	42.51	n.a.		
1986	6.25	3.13	0.80	0.08	
1987	11.71	87.28	2.32	0.19	190.48
1988	13.22	12.90	2.84	0.19	22.69
1989	26.39	99.67	1.93	0.11	-32.14
1990	19.72	-25.26	11.34	0.61	487.67
1991	28.13	42.60	15.67	0.72	38.15
1992	46.08	63.82	34.24	1.29	118.53
1993	38.13	-17.24	22.43	0.65	-34.50
1994	102.86	169.74	36.50	0.78	62.71
1995	151.09	46.89	78.41	1.34	114.83
1996	184.78	22.30	126.63	1.87	61.50
1997	241.20	30.54	182.04	2.44	43.76
1998	322.88	33.86	224.58	2.87	23.37
1999	371.50	15.06	179.23	2.18	-20.19
2000	415.70	11.90	155.22	1.73	-13.40
2001	448.35	7.85	192.34	1.98	23.91
2002	567.90	26.66	246.77	2.35	28.30
2003	n.a.		287.66	2.45	16.57

Source: www.ndac.gov.cn (National Debt Association of China); a, includes both principal and interests.

Table 52 Bond issuance by issuer in 2004 and 2005

	2004			2004-October 2005		
	Issuance size		Issuance frequency	Issuance size		Issuance frequency
	RMB bn	% of GDP		RMB bn	% of GDP	
Government bonds	480.9	3.8	2	295.9	2.1	1
Treasury bills	1,703.7	13.5	11	1,628.0	11.8	9
Policy financial bonds	434.8	3.4	3	351.4	2.5	4
Commercial bank bonds	74.8	0.6	1	75.9	0.5	1
Securities companies bonds	2.7	0.0	0	2.4	0.0	0
Corporate bonds	32.6	0.3	2	75.3	0.5	4
Total	2729.5	21.5	19	2428.9	17.6	19

Source: Liu (2005); see Section 5.1.4 for definitions of different bonds; 2004 GDP is from WDI (2005), and 2005 GDP is estimated to grow at 9%.

Table 53 Distribution of Yield to Maturity of China's bond markets

		2005	2004	2003
Government bonds^a (36)	Min	0.75	2.38	0.00
	Mean	2.52	4.38	1.04
	Median	2.66	4.65	0.56
	Max	3.63	5.17	3.73
Corporate bonds^a (38)	Min	0.66	0.16	0.93
	Mean	2.87	4.36	3.21
	Median	3.09	4.65	3.36
	Max	3.51	5.41	4.16

Source: www.hexun.com; a, refers to those bonds where are allowed to be traded in the market only. 36 are government bonds, and 38 are corporate bonds.

Table 54 Cross-country comparison of 10-year government bond returns (%), as of 2004

	Nominal return	Inflation rate	Real return
Australia	9.61	2.34	7.27
Canada	7.59	1.83	5.76
Denmark	9.11	1.16	7.95
Germany	9.22	1.67	7.55
Italy	9.13	2.21	6.92
Japan	0.91	-0.01	0.92
Netherlands	8.82	1.24	7.59
Norway	6.37	0.47	5.91
UK	6.75	2.96	3.78
USA	4.59	2.68	1.92
Mean	7.21	1.65	5.56
Argentina	16.83	4.42	12.41
Hong Kong	6.34	-0.43	6.77
India	-5.55	3.77	-9.32
Korea	7.94	3.59	4.35
Malaysia	5.63	1.45	4.17
Mexico	6.04	4.69	1.36
Singapore	5.40	1.66	3.74
South Africa	15.15	1.39	13.76
Thailand	5.34	2.77	2.57
Mean	6.90	2.59	3.54
China	2.99	3.90	-0.91

Source: nominal return (calculated by the author from Global Financial Data), inflation rate from World Development Indicators (2005).

Table 55 Data summary of asset returns (%) and wages (RMB)

Variable	Observation	Mean ^a	STDEV ^b	Source
Wage (RMB)	1978-2000	2,490	2,113	MOLSS (2005)
Inflation rate ^c	1978-2004	3.51	3.78	NBS (2005)
Deposit	1980-2004	0.00	4.74	IMF (2005)
Government bond	1993-2004	1.02	4.56	Datastream
Equity ^d	1992-2004	4.54	27.2/14.7 ^e	SSE and SZE
Global investment ^f	1973-2004	10.68	19.48	Hu (2005c)

- Average of returns. All return data are in real terms.
- Standard deviation.
- The observations of 1998, 1999, 1994 and 19995 were dropped due to the outlier concern.
- Weighted average of the market returns of Shanghai Stock Exchange and Shenzhen Stock Exchange.
- 27.1 is the standard deviation, derived from our observations. Given its high level and the assumption that China's stock market will be more developed in the future, we use a lower standard deviation, i.e. 14.7 (around half of the original one) as a variant.
- The currency risk was allowed for. The mean return was high since the Chinese currency, i.e. RMB was continually deteriorating against the US dollar over the past decades except last month (July 2005) when China revalued the RMB against the US dollar by around 2%.

Table 56 Replacement rates with the basic model, Scenario A and Scenario B

	Basic model	Scenario A ^a	Scenario B ^a
Retirement age	60	65	55
Mortality age	75	80	80
Contribution rate, %	20	30	20
Investment strategy ^b	50-50-0-0	5-23-45-27	100-0-0-0
Transaction cost, %	5	2	10
Replacement rate			
Mean ^c , %	15.7	93.0/119.6 ^c	4.5
STDEV ^c , %	1.4	8.3/10.4 ^c	0.4
Coefficient of variation ^d	11.4	11.2/11.5	8.4

- Scenario A refers to the case where replacement rate is highest, while scenario B the case where replacement rate is lowest.
- The four-digit code is the percentage allocation to bank deposits, government bonds, domestic stocks and foreign assets.
- The mean and the standard deviation reported in the table are computed via stochastic simulations with 1,000 replications. Whenever two figures are presented with a slash separator, the second figure is always the case where we assume that China's stock market will be less volatile in the future, therefore the standard deviation of 14.7 used.
- The ratio of the mean to the STDEV (standard deviation).

Table 57 Replacement rates with changes in contribution rate, retirement age and transaction cost

	Change in contribution rate		Change in retirement age		Change in Transaction cost	
Retirement age	60	60	55	65	60	60
Mortality age	75	75	75	75	75	75
Contribution rate, %	10	30	20	20	20	20
Investment strategy ^a	50-50-0-0	50-50-0-0	50-50-0-0	50-50-0-0	50-50-0-0	50-50-0-0
Transaction cost, %	5	5	5	5	2	10
Replacement rate						
Mean ^b , %	5.2	26.2	9.6	27.9	18.9	10.5
STDEV ^b , %	0.5	2.4	1.0	2.1	1.7	0.9
Coefficient of variation ^d	11.1	10.8	9.4	13.0	10.9	11.2

- The four-digit code is the percentage allocation to the bank deposits, the government bonds, domestic stocks and the global investment.
- The mean and standard deviation reported in the table are computed via stochastic simulations with 1,000 replications.
- The ratio of the mean to the STDEV (standard deviation).
- Mean divided by STDEV.

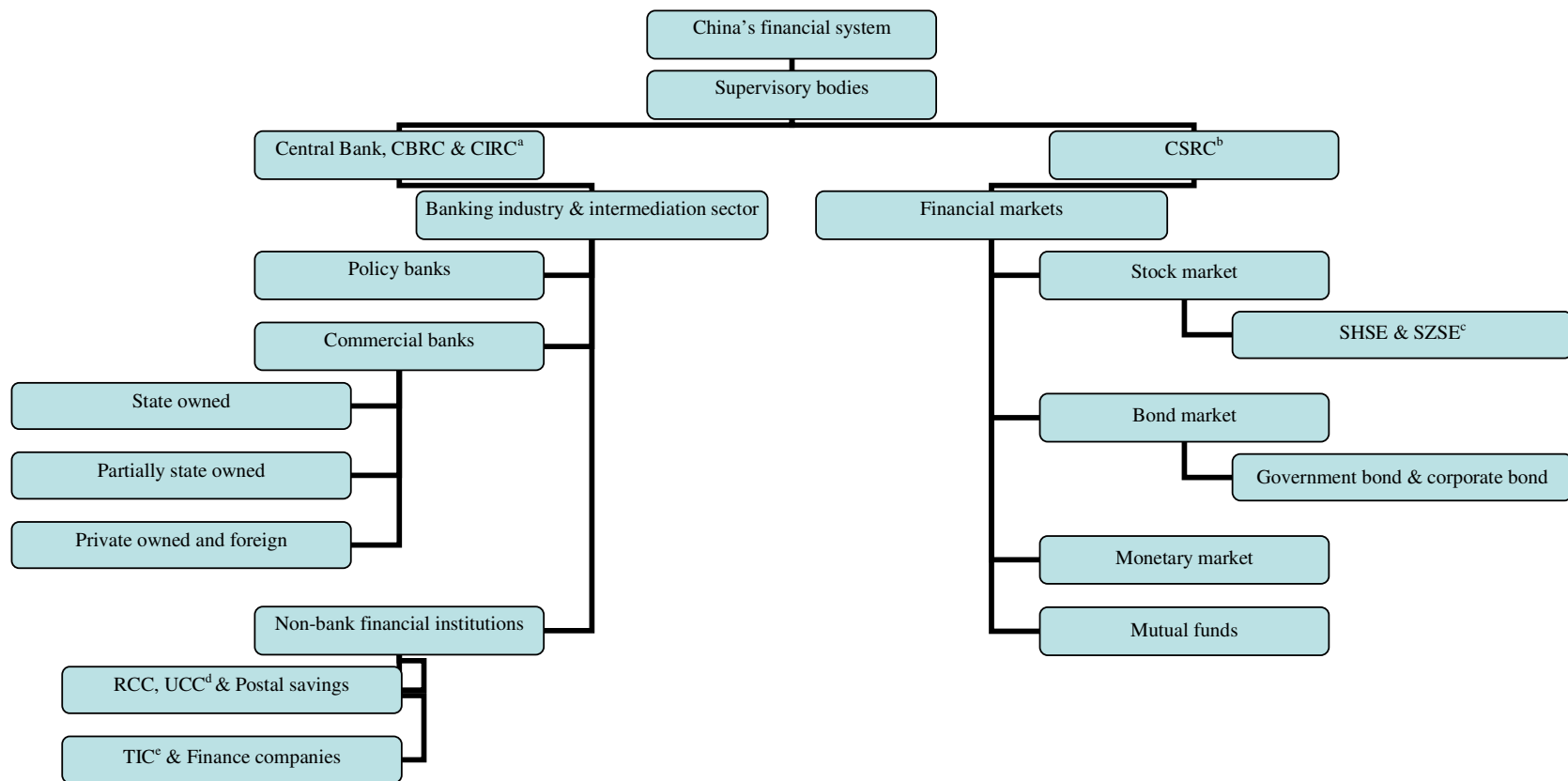
Table 58 Replacement rates with changes in investment type

Retirement age	60	60	60	60	60	60	60
Mortality age	75	75	75	75	75	75	75
Contribution rate, %	20	20	20	20	20	20	20
Investment strategy ^a	100-0-0-0	0-100-0-0	0-0-100-0	0-0-0-100	25-25-25-25	40-50-10-0	5-23-45-27
Transaction cost, %	5	5	5	5	5	5	5
Replacement rate							
Mean ^b , %	11.7	20.7	25.1/61.7	95.8	34.3/37.5	18.0/18.5	42.9/55.0
STDEV ^b , %	1.0	1.9	2.3/5.3	7.9	2.9/3.3	1.6/1.7	3.7/4.7
Coefficient of variation ^c	11.2	10.5	10.8/11.7	11.9	11.7/11.3	11.4/10.9	11.5/11.8

- The four-digit code is the percentage allocation to the bank deposits, the government bonds, domestic stocks and the global investment.
- The mean and the standard deviation reported in the table are computed via stochastic simulations with 1,000 replications. Whenever two figures are presented with a slash separator, the second figure is always the case where we assume that China's stock market will be less volatile in the future, therefore the standard deviation of 14.7 used.
- The ratio of the mean to the STDEV (standard deviation).

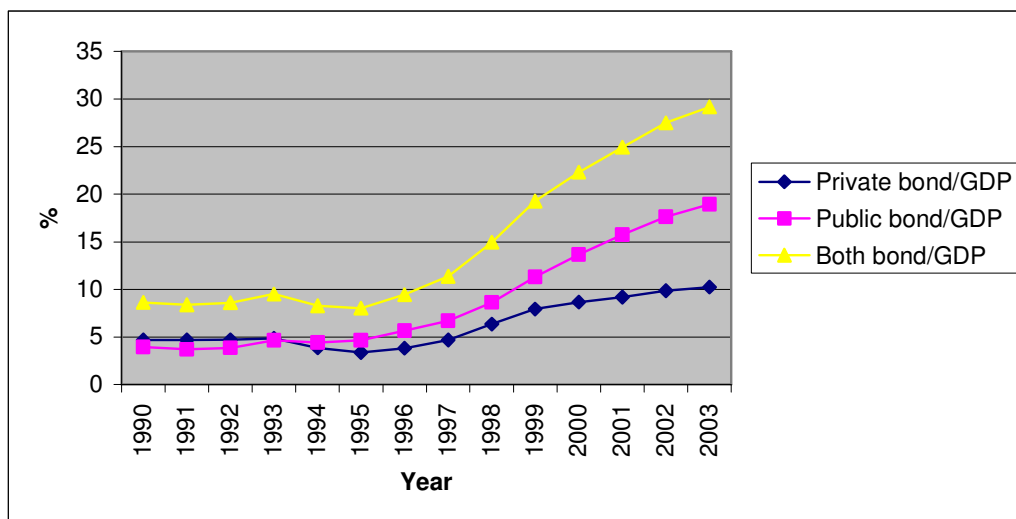
Figures

Figure 1The structure of China's financial system



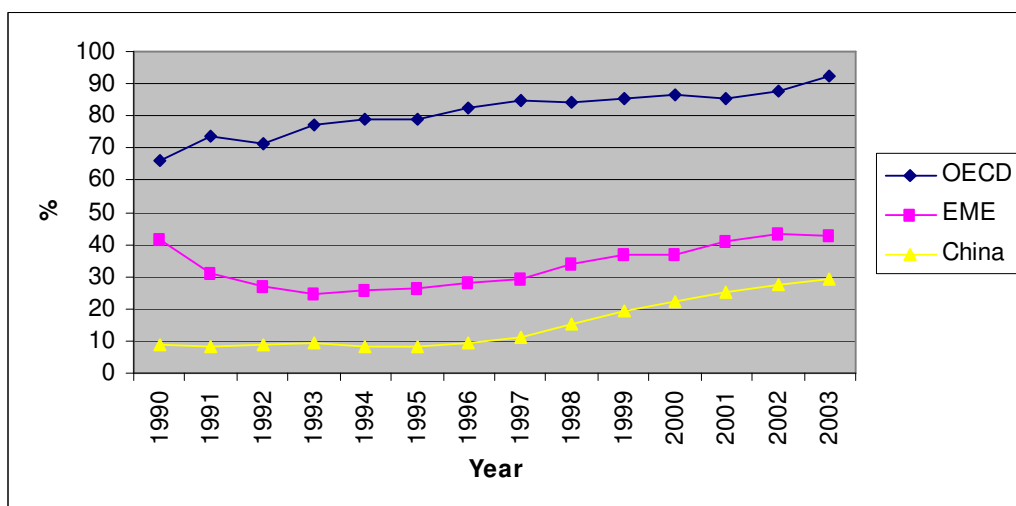
Source: Allen et al (2005); Hu (2005a); Herrero and Santabarbara (2005);
a, China Banking Regulatory Commission; China Insurance Regulatory Commission; b, China Securities Regulatory Commission;
c, Shanghai Stock Exchange, and Shenzhen Stock Exchange; d, Rural Credit Cooperative, and Urban Credit Cooperative Companies;
e, Trust and Investment Company.

Figure 2 China's bond market capitalisation to GDP (%), 1990-2003



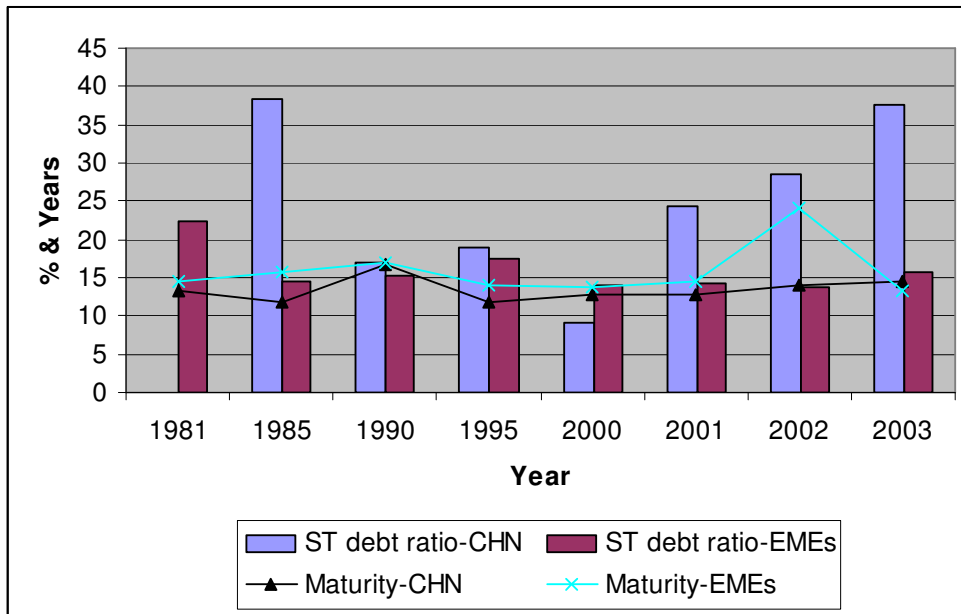
Source: Beck, Demirguc-Kunt and Levine (2005); the top line is for bond market capitalisation (both private and public) to GDP, the middle line is for private bond market capitalisation to GDP, and the bottom line is for public bond market capitalisation to GDP.

Figure 3 A comparison of bond market (both private and public) capitalisation to GDP (%), 1990-2003



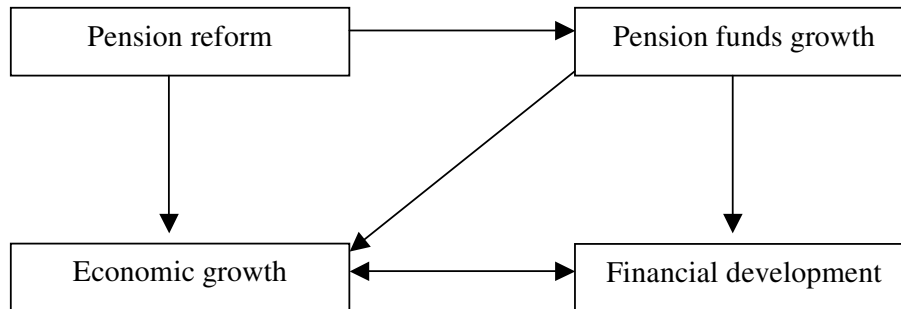
Source: Beck, Demirguc-Kunt and Levine (2005); the top line is for OECD, the middle line is for EMEs (emerging market economies), and the bottom line is for China.

Figure 4 Short-term debt ratio (%) and bond maturity (years), China and emerging markets



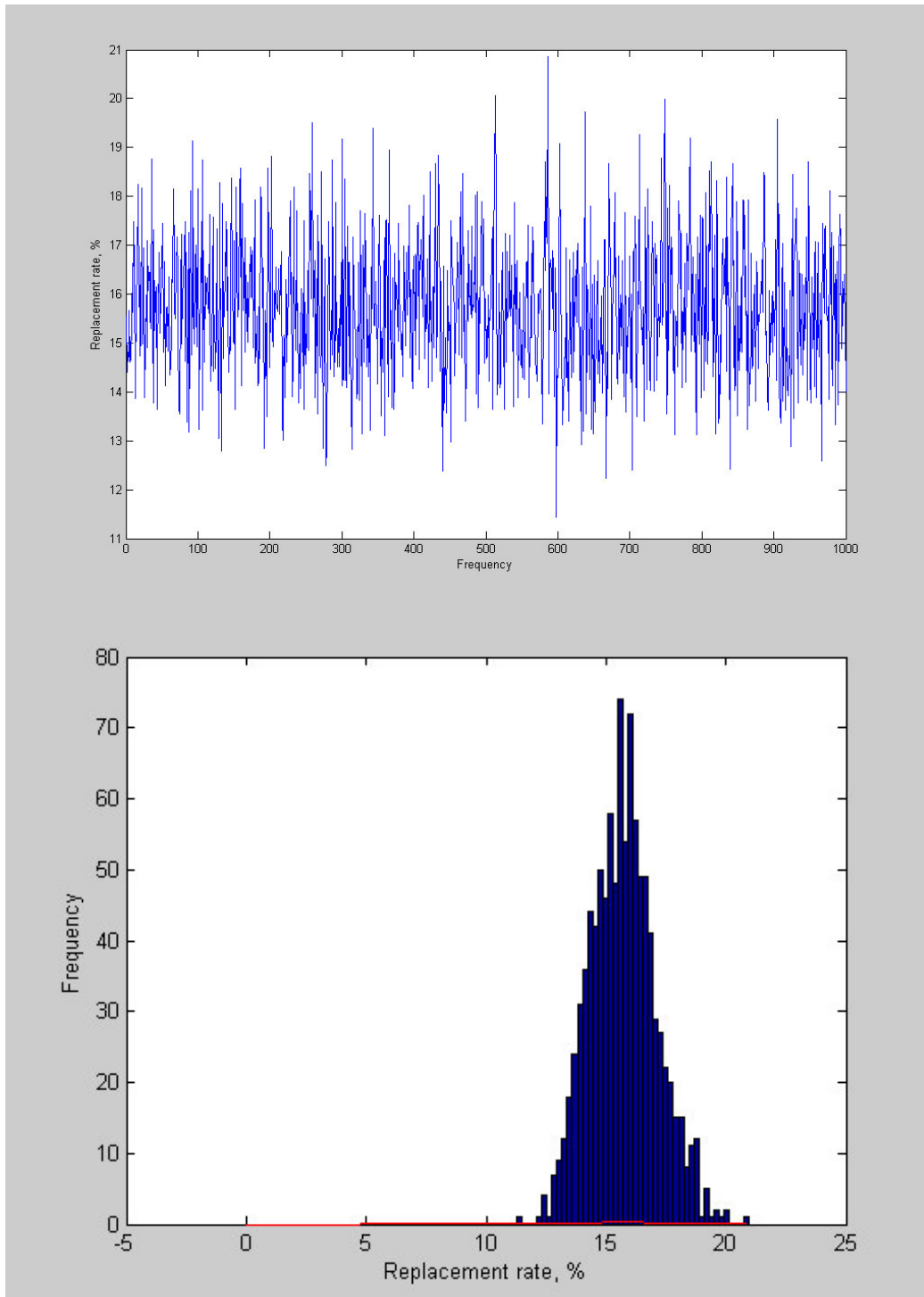
Source: Global Development Finance (2005); ST debt ratio is debts issued under 1 year divided by total debts; maturity is the average maturity for all new public debts during the year; CHN: China, and EMEs, emerging/developing markets; debts include those from international organisations (IMF), and those from governments (the central bank).

Figure 5 Links between pension reform, pension funds, economic growth and financial development



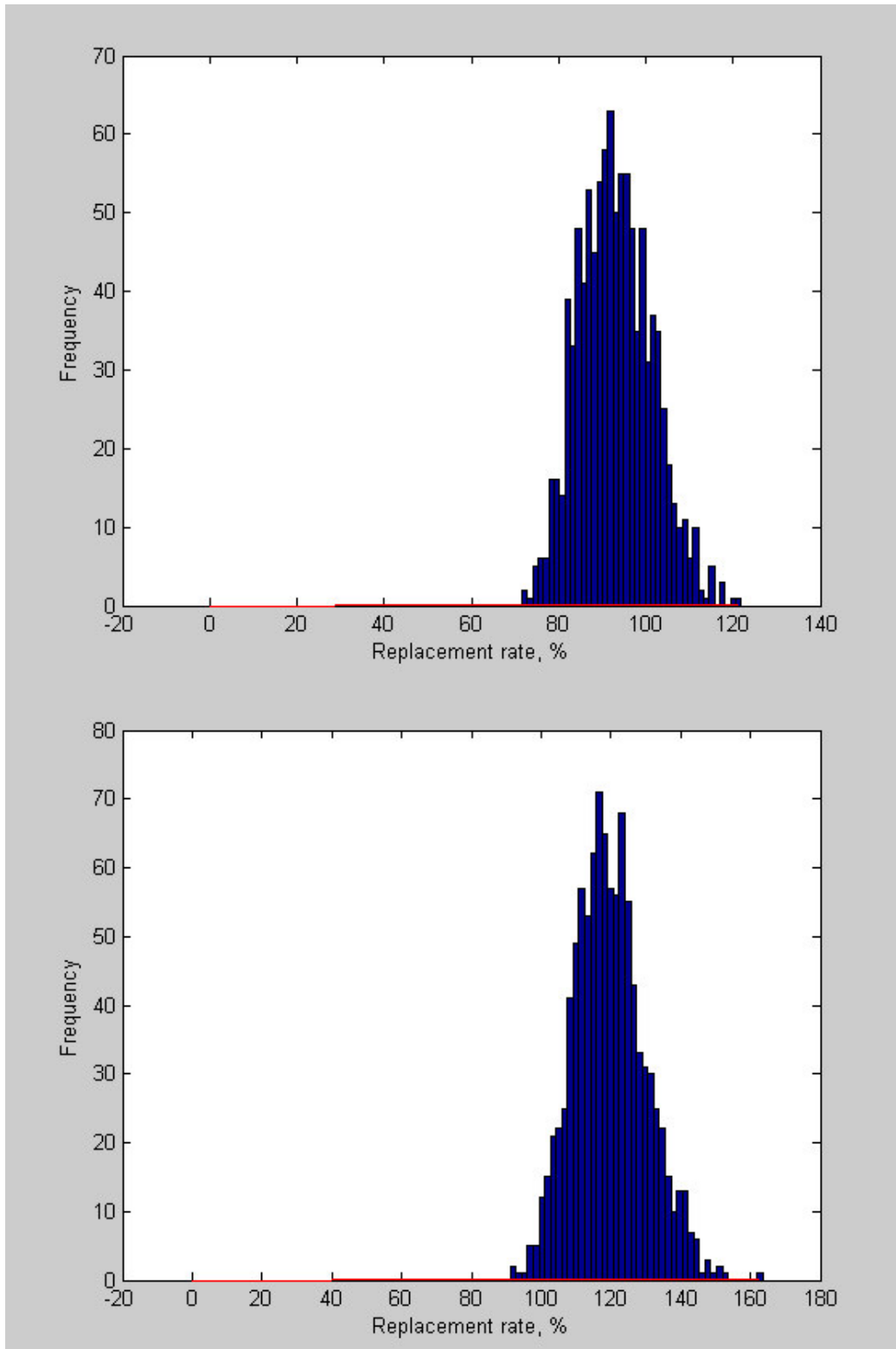
Source: Hu (2005b)

Figure 6 Distribution of replacement rates with the basic model



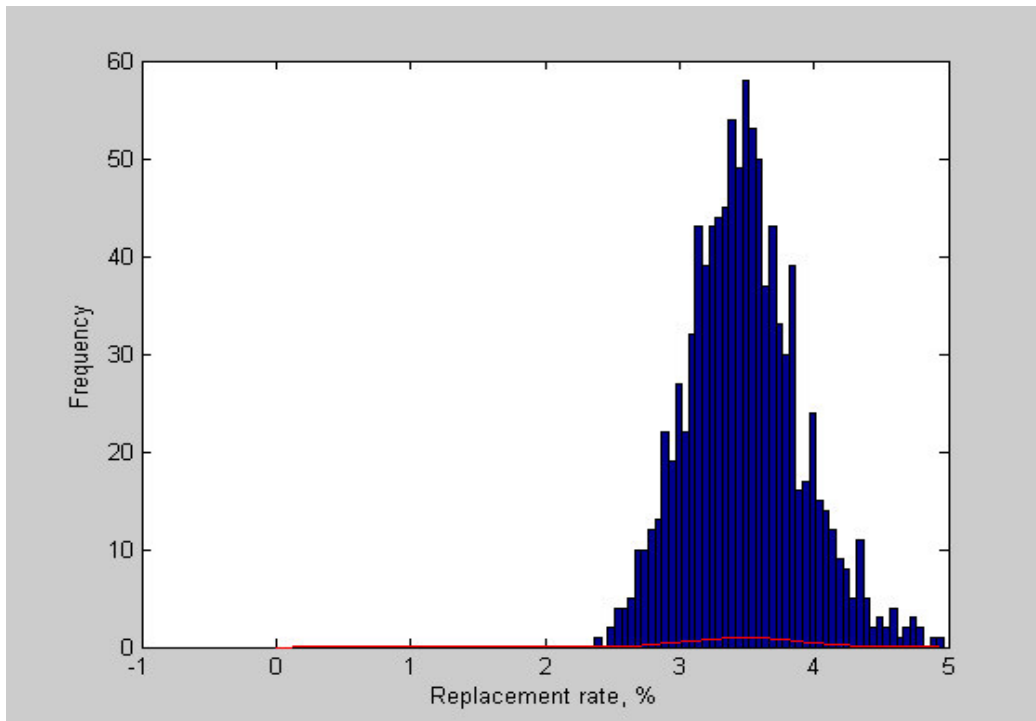
Notes: replacement rates are computed via stochastic simulations with 1,000 replications

Figure 7 Distribution of replacement rates with Scenario A



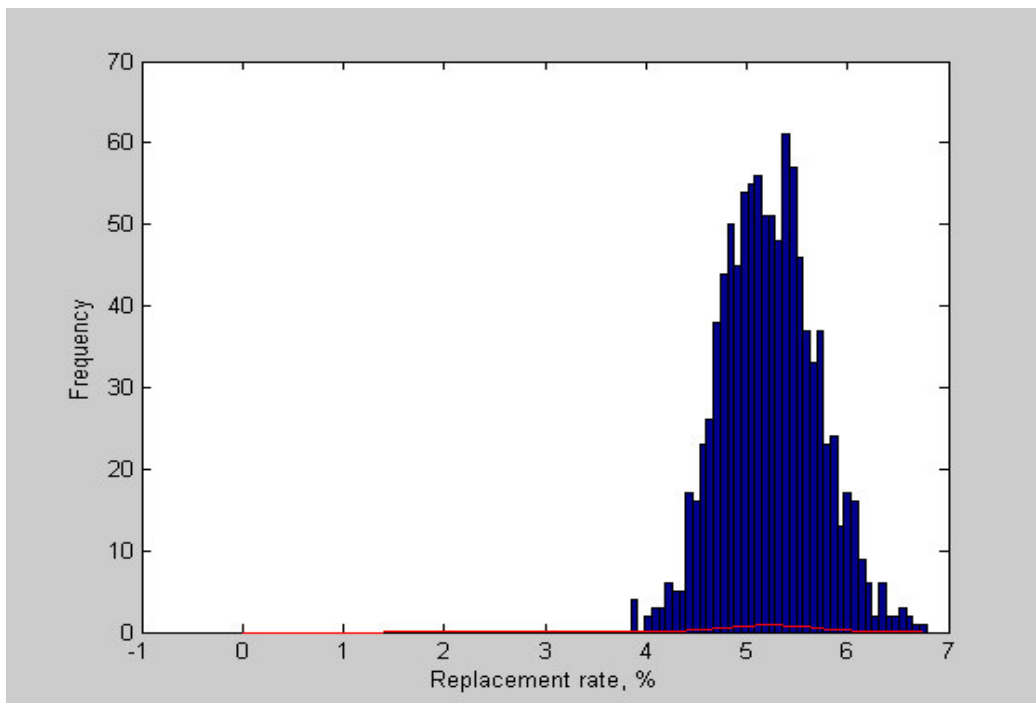
Notes: replacement rates are computed via stochastic simulations with 1,000 replications; Scenario A refers to the case where replacement rate is highest; the top panel is related to the assumption of the high risk of China's stock market, while the bottom panels is related to the assumption of the low risk of China's stock market.

Figure 8 Distribution of replacement rates with Scenario B



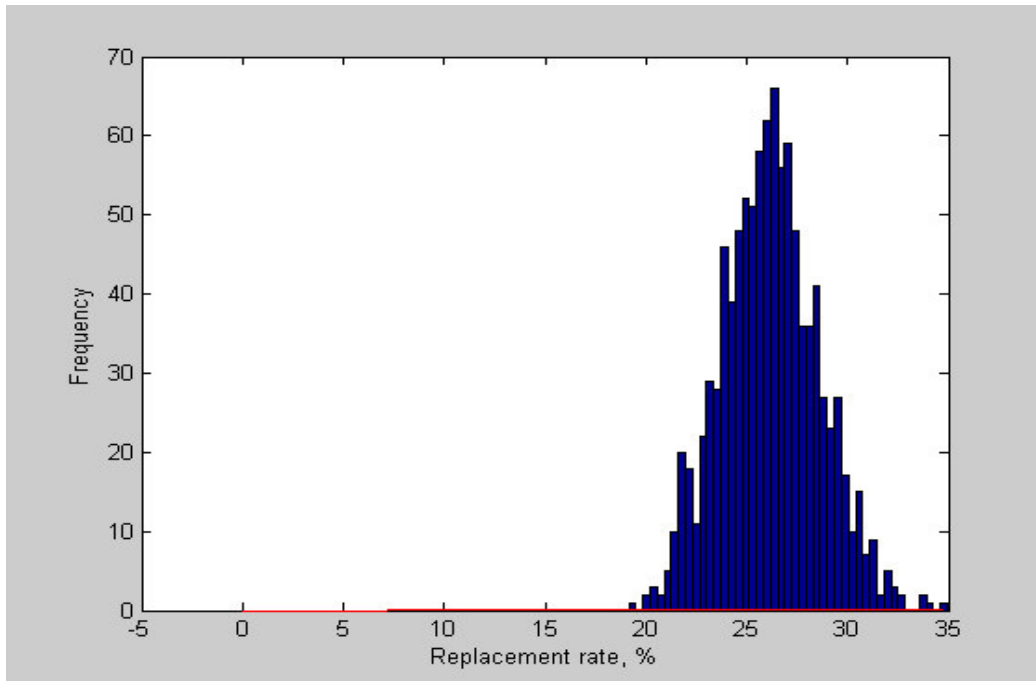
Notes: replacement rates are computed via stochastic simulations with 1,000 replications; Scenario B refers to the case where replacement rate is lowest.

Figure 9 Distribution of replacement rates with a 10% contribution rate



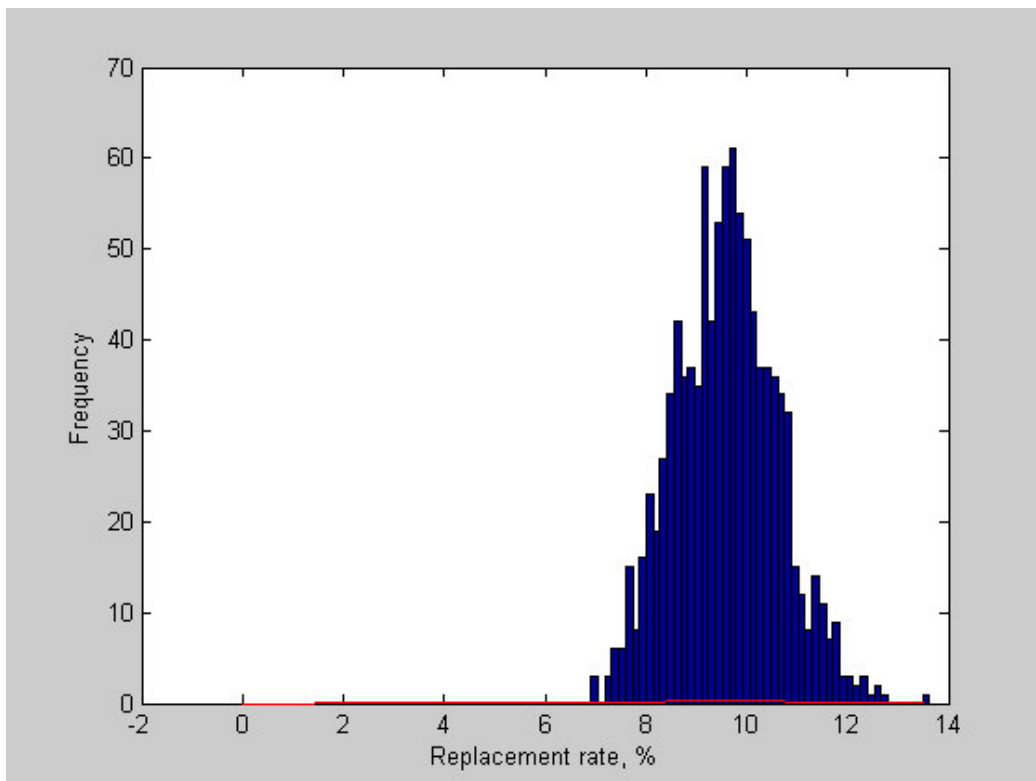
Notes: replacement rates are computed via stochastic simulations with 1,000 replications.

Figure 10 Distribution of replacement rates with a 30% contribution rate



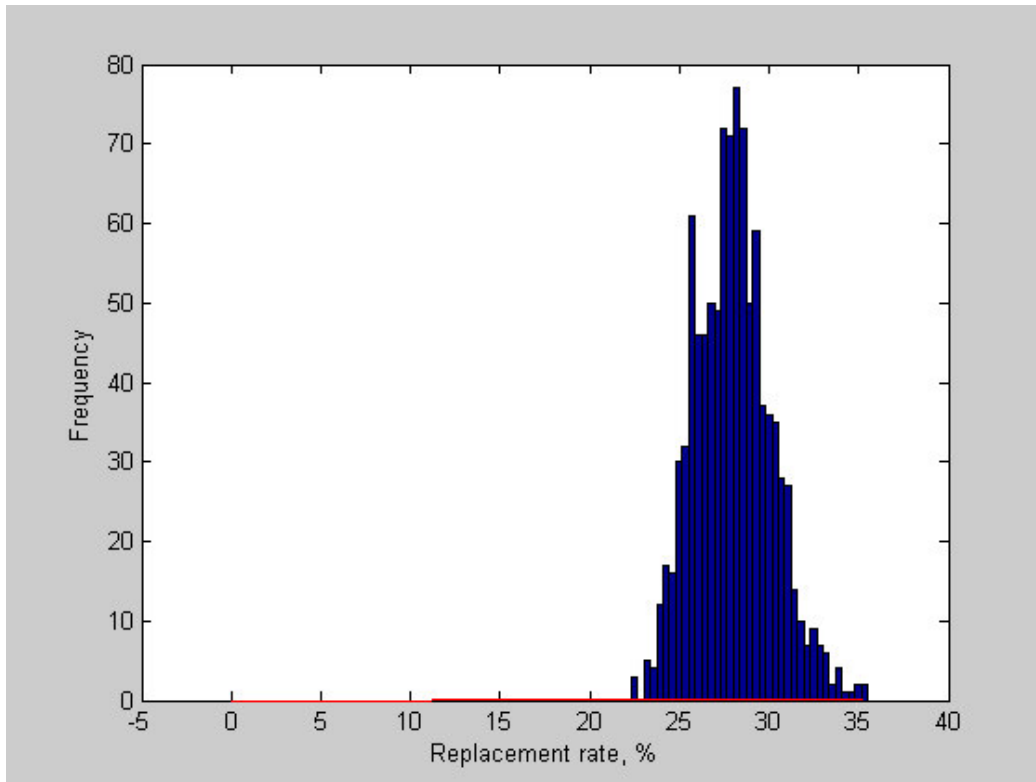
Notes: replacement rates are computed via stochastic simulations with 1,000 replications.

Figure 11 Distribution of replacement rates with a retirement age at 55



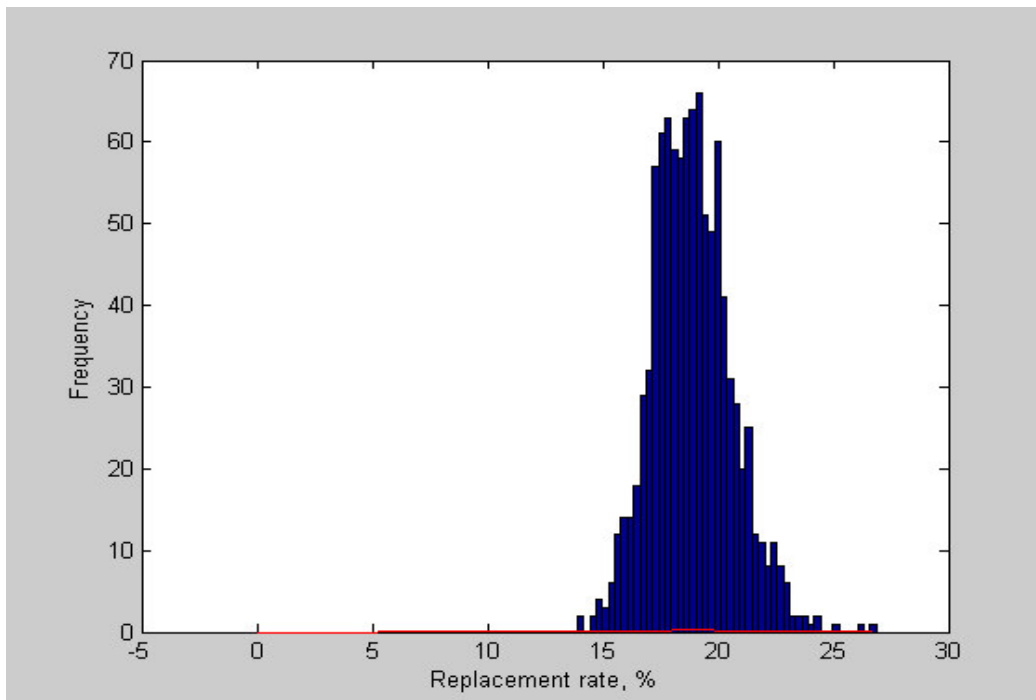
Notes: replacement rates are computed via stochastic simulations with 1,000 replications.

Figure 12 Distribution of replacement rates with a retirement at 65



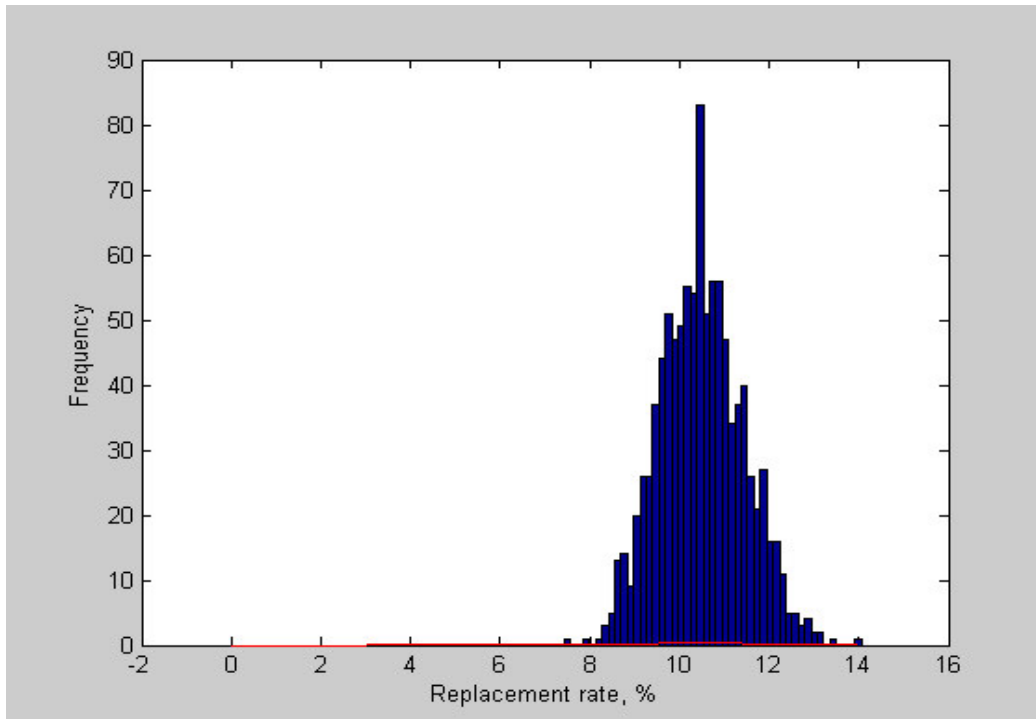
Notes: replacement rates are computed via stochastic simulations with 1,000 replications.

Figure 13 Distribution of replacement rates with a transaction cost at 2%



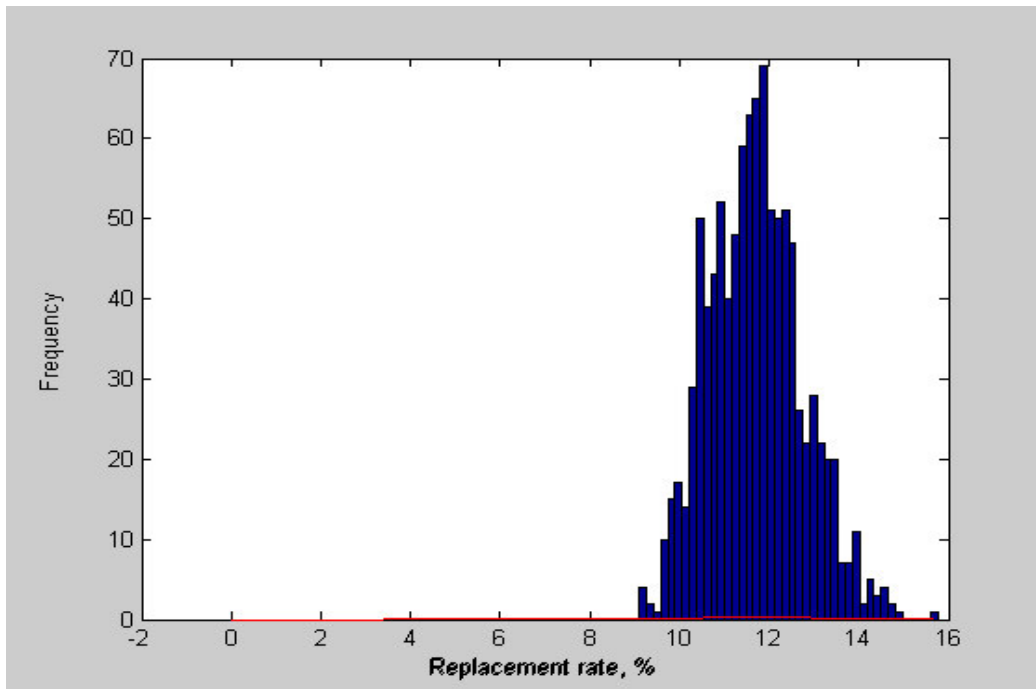
Notes: replacement rates are computed via stochastic simulations with 1,000 replications.

Figure 14 Distribution of replacement rates with a transaction cost at 10%



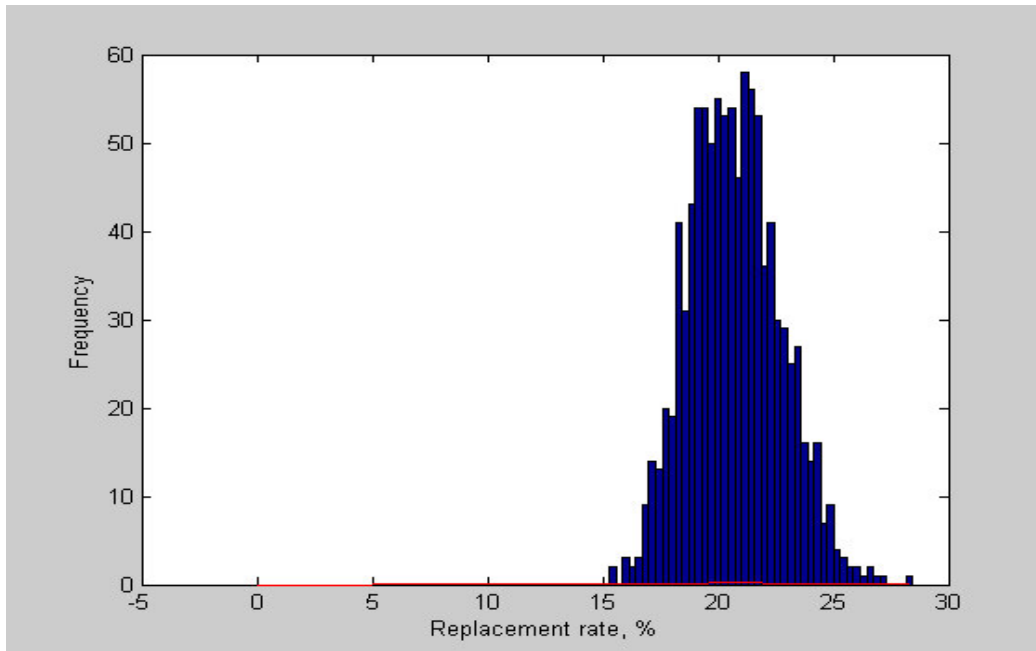
Notes: replacement rates are computed via stochastic simulations with 1,000 replications.

Figure 15 Distribution of replacement rates with investment type 100-0-0-0



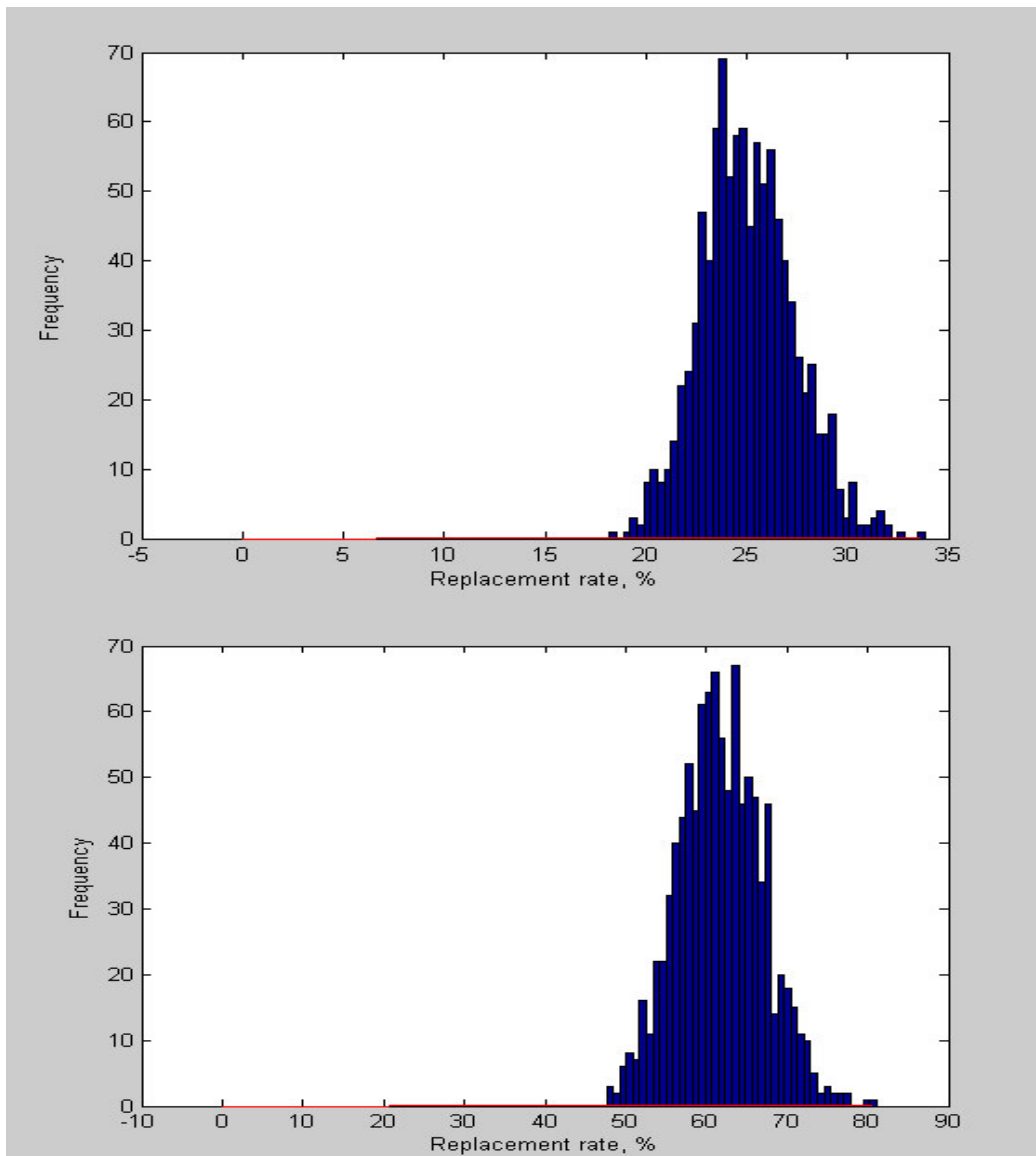
Notes: replacement rates are computed via stochastic simulations with 1,000 replications; for the four-digit number, 1st digit refers to the percentage of pension assets allocated to bank deposits, 2nd refers to bonds, 3rd refers to equities, and 4th refers to foreign assets (see Section 6.2 for details).

Figure 16 Distribution of replacement rates with investment type 0-100-0-0-0



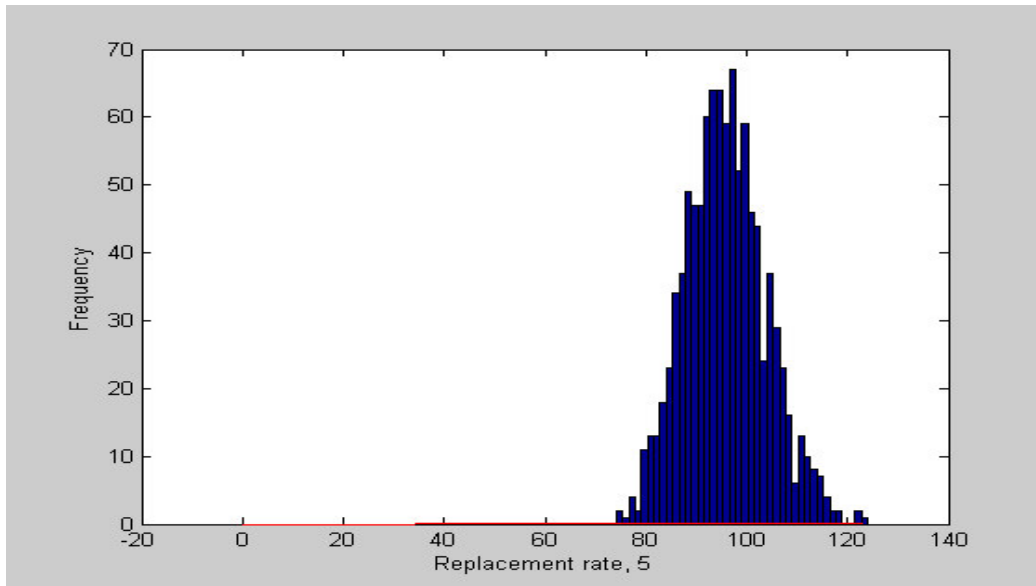
Notes: replacement rates are computed via stochastic simulations with 1,000 replications; for the four-digit number, 1st digit refers to the percentage of pension assets allocated to bank deposits, 2nd refers to bonds, 3rd refers to equities, and 4th refers to foreign assets (see Section 6.2 for details).

Figure 17 Distribution of replacement rates with investment type 0-0-100-0



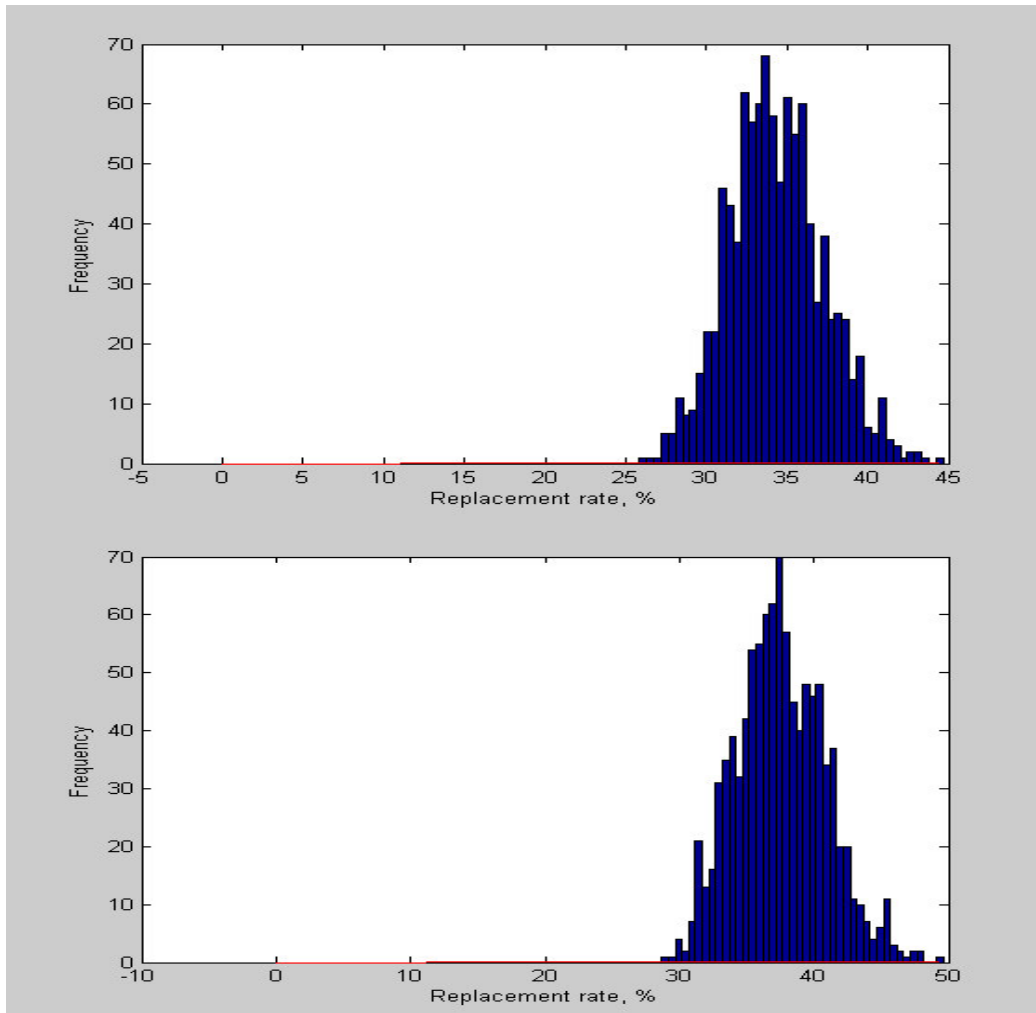
Notes: replacement rates are computed via stochastic simulations with 1,000 replications; for the four-digit number, 1st digit refers to the percentage of pension assets allocated to bank deposits, 2nd refers to bonds, 3rd refers to equities, and 4th refers to foreign assets (see Section 6.2 for details); the Notes: replacement rates are computed via stochastic simulations with 1,000 replications; the top panel is related to the assumption of the high risk of China's stock market, while the bottom panels is related to the assumption of the low risk of China's stock market.

Figure 18 Distribution of replacement rates with investment type 0-0-0-100



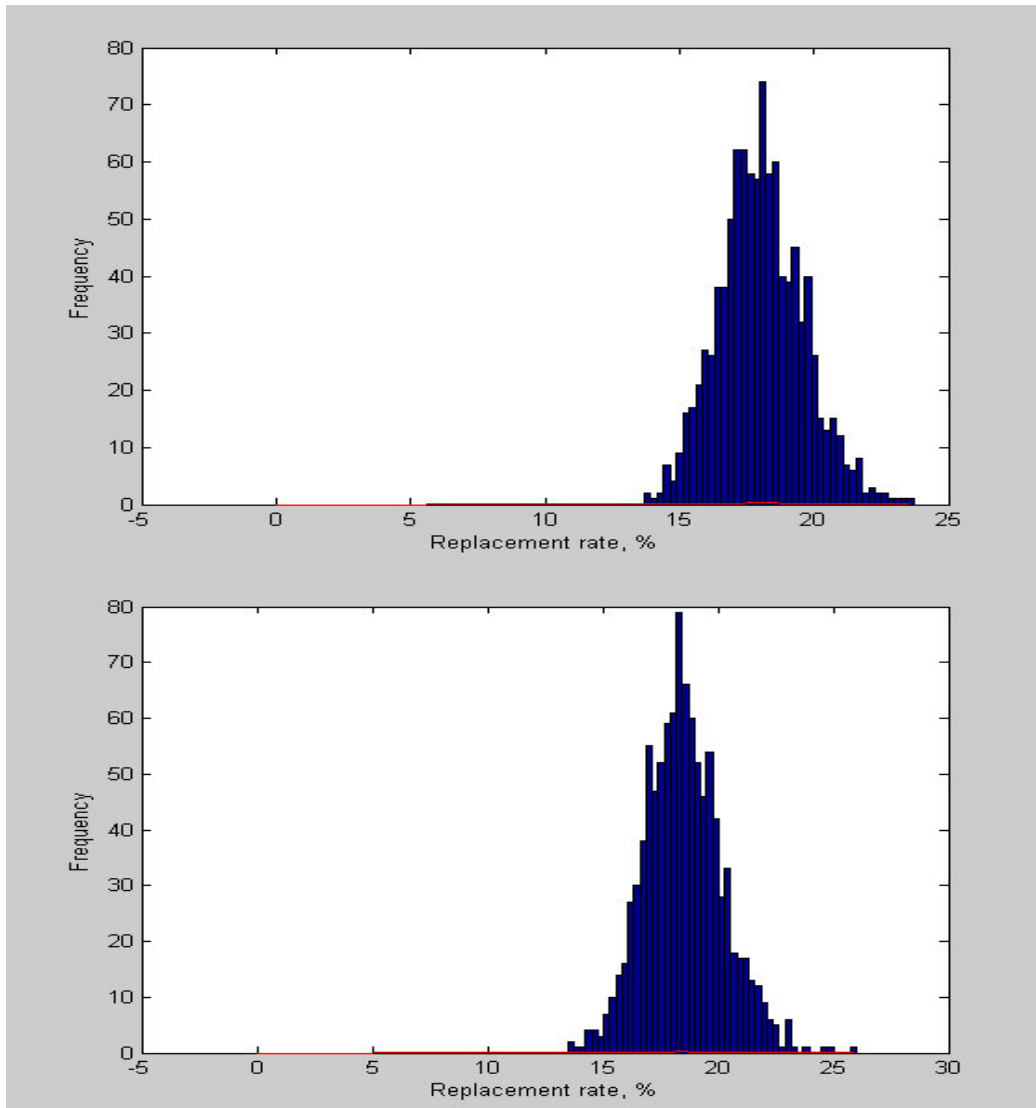
Notes: replacement rates are computed via stochastic simulations with 1,000 replications; for the four-digit number, 1st digit refers to the percentage of pension assets allocated to bank deposits, 2nd refers to bonds, 3rd refers to equities, and 4th refers to foreign assets (see Section 6.2 for details).

Figure 19 Distribution of replacement rates with investment type 25-25-25-25



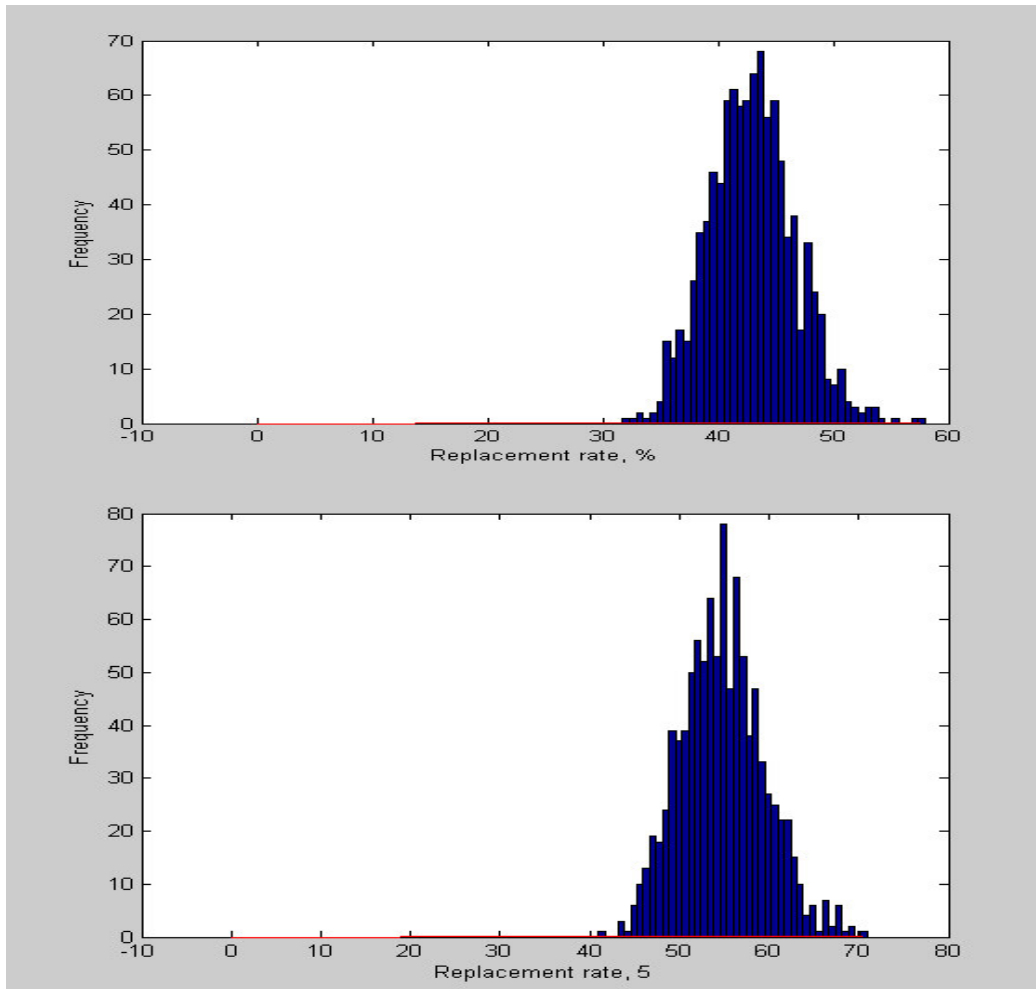
Notes: replacement rates are computed via stochastic simulations with 1,000 replications; for the four-digit number, 1st digit refers to the percentage of pension assets allocated to bank deposits, 2nd refers to bonds, 3rd refers to equities, and 4th refers to foreign assets (see Section 6.2 for details); the Notes: replacement rates are computed via stochastic simulations with 1,000 replications; the top panel is related to the assumption of the high risk of China's stock market, while the bottom panels is related to the assumption of the low risk of China's stock market.

Figure 20 Distribution of replacement rates with investment type 40-50-10-0



Notes: replacement rates are computed via stochastic simulations with 1,000 replications; for the four-digit number, 1st digit refers to the percentage of pension assets allocated to bank deposits, 2nd refers to bonds, 3rd refers to equities, and 4th refers to foreign assets (see Section 6.2 for details); the Notes: replacement rates are computed via stochastic simulations with 1,000 replications; the top panel is related to the assumption of the high risk of China's stock market, while the bottom panels is related to the assumption of the low risk of China's stock market.

Figure 21 Distribution of replacement rates with investment type 5-23-25-27



Notes: replacement rates are computed via stochastic simulations with 1,000 replications; for the four-digit number, 1st digit refers to the percentage of pension assets allocated to bank deposits, 2nd refers to bonds, 3rd refers to equities, and 4th refers to foreign assets (see Section 6.2 for details); the Notes: replacement rates are computed via stochastic simulations with 1,000 replications; the top panel is related to the assumption of the high risk of China's stock market, while the bottom panels is related to the assumption of the low risk of China's stock market.

Appendices

Appendix A. Classification of equity shares in China

The classification of the Chinese equity shares is complex in comparison to other advanced countries. Currently, there are six different types of shares in China, i.e., State share, Legal person share, Employee/staff share, A share, B share and H share (Liu 2005).

Different shares

The State shares are directly owned by the state via those government agencies as State Asset Management Bureau.

Regarding the Legal person shares, some are held indirectly by the state via State-owned enterprises (SOEs) or other government-affiliated organisations with the legal person status, while the remaining portion of Legal person shares are held by the non-government related organisations, be they domestic or foreign, with legal person status.

The Employee shares are shares offered to employees of the listed companies, be they workers or managers, usually under a substantial discount⁴⁰.

A shares, like the classic common stock in advanced equity markets, refer to those shares that are traded among the domestic residents and denominated in RMB (Chinese currency). B shares are traded in US dollars in Shanghai and HK dollars in the Shenzhen Stock Exchange, and were limited to the foreign investors⁴¹ initially; but since 2001, the domestic Chinese residents with the authorised foreign currency accounts have been allowed to purchase B shares (CSRC 2001; Chinadaily 2001).

H shares represent shares of the Chinese companies listed in Hong Kong, London, New York and Singapore Stock Exchanges⁴². Since most of such Chinese companies are listed in the Hong Kong Stock Exchange, then H designation is used customarily and in a general sense.

As of August 2003, there are sixty-six Chinese firms listed in HK, three in London⁴³, one in Singapore, and thirteen in New York (CSRC 2003)

Note that the State shares, Legal person shares and employee shares are not tradable, although transferable, while A shares, B shares and H shares are tradable in the Exchanges.

⁴⁰ This mainly happened in the early 1990 when stockification started. Now this practice has been phrased out (Green and Wall 2000).

⁴¹ Foreign investors are used here broadly, including foreign individuals and firms from other countries, those from Hong Kong, Marco, Taiwan and mainland Chinese citizens but living abroad (Shirai 2002).

⁴² But, some authors (Shirai 2002) give different names to those shares by breaking down H-share further into H-share for those listed in Hong Kong, L for those listed in London, N for New York and S for Singapore respectively.

⁴³ They are Beijing Datang Power Generation, China Petroleum & Chemical Corp. and Jiangxi Copper Co. (London Stock Exchange)

Difference between H and B-share

H shares and B shares are similar in that they are both traded in foreign currencies, but H shares differ from B shares in at least three ways (Fernald and Rogers 2002).

Firstly, H shares trade in more liquid and developed markets, e.g. in HK and London.

Secondly, H share companies must meet both the foreign securities rules and Chinese regulations, thus providing better information to investors.

Thirdly, H share companies tend to be much bigger and more profitable than companies issuing B shares.

Red chip share

Last, a concept, which is always mentioned when talking about the Chinese stock market and often appears in the media, is the Red Chip. Red chip is shares listed in the Hong Kong Stock Exchange by companies with a significant connection with the mainland China (Fan et.al. 2003).

To qualify for the Red chip issuance, a firm must meet three criteria (Walter and Howie 2001): a) with at least 35% shareholding directly held by a mainland China entity which might be a SOE, or provincial or municipal authority; b) with at least 35% shareholding directly held by a HK firm, listed or unlisted, which in turn is controlled by a mainland Chinese entity; c) with at least a 12 month trading record after meeting the criteria a and b.

Note that the major difference between the H share issuing firm and the Red chip issuing firm is that the former is a registered mainland Chinese firm but listed overseas, while the latter is both registered and listed overseas, principally in HK. This is the main reason why we hesitate to group Red chip to our above classification, since the Red chip issuing firms from the legal basis are not Chinese companies.

Appendix B. Programming code with Matlab 6.5

```
%Start working age:22,retirement age:60, mortality age:75, N1: no of contributory
years;
%years, c: contribution rate;
clear
N1=38
c=0.2

%beta:percentage of wages as transaction costs (Ae), wage; annual income;
beta=0.02;
Wage=[2921 3655 3603 4031 4690 5415 6331 8459 8848 9255
      9681 10127 10592 11080 11589 12122 12680 13263 13873 14512
      15179 15877 16608 17372 18171 19007 19881 20796 21752 22753
      23799 24894 26039 26820 27625 28454 29307 30187]
Ae=beta*Wage;
%investment type, bank deposit-Rt1, government bonds-Rt2; common stock-
Rt3,global investment-Rt4;
%global portfolio 25-25-25-25-Rt5, SSF portfolio 40-50-10-0-Rt6,global portfolio 5-
23-45-27-Rt7;
%portfolio 50-50-0-0 Rt8;
Rt1=[-0.036 -0.036 -0.133 -0.059 -0.009 0.029 0.046 0.037 0.020 0.018
      0.027 0.008 -0.017 -0.003 0.125 -0.012 0.008 0.044 -0.008 -0.025
      0.068 -0.041 0.038 -0.024 0.035 0.040 -0.039 0.025 0.049 -0.050
      0.017 -0.002 -0.058 -0.013 -0.008 -0.051 -0.093 -0.043];

Rt2=[-0.007 -0.007 -0.104 -0.030 0.007 0.062 0.061 0.043 0.026 0.024
      0.036 0.016 -0.011 0.054 0.047 0.012 -0.031 0.005 -0.026 -0.065
      -0.030 0.037 0.035 -0.008 0.013 0.031 0.019 0.022 0.104 -0.092
      0.025 0.023 0.040 -0.016 0.050 0.018 0.048 0.054];
Rt3=[0.171 0.171 -0.438 -0.183 0.739 0.134 0.015 0.230 0.330 -0.243
      0.030 -0.128 -0.113 0.649 0.023 0.335 0.021 -0.201 0.141 0.370
      -0.468 -0.291 -0.014 0.188 -0.239 -0.155 0.237 -0.366 0.368 0.311
      -0.153 0.249 0.444 0.142 0.310 0.085 0.051 0.023];
Rt4=[0.431 0.202 0.151 0.090 0.127 0.141 0.130 -0.017 -0.058 -0.060
      0.126 0.072 0.142 0.189 0.434 0.496 0.243 -0.159 0.178 -0.004
      -0.097 0.243 0.201 0.069 0.033 -0.066 -0.252 -0.210 -0.122 0.026
      0.141 0.151 -0.135 0.243 0.190 0.390 0.007 0.106];
Rt5=[0.140 0.082 -0.131 -0.046 0.216 0.091 0.063 0.073 0.080 -0.065
      0.055 -0.008 0.000 0.222 0.157 0.208 0.060 -0.078 0.071 0.069
      -0.132 -0.013 0.065 0.056 -0.040 -0.037 -0.009 -0.132 0.100 0.049
      0.008 0.105 0.073 0.089 0.136 0.110 0.003 0.035];
Rt6=[-0.001 -0.001 -0.149 -0.057 0.074 0.056 0.050 0.059 0.054 -0.005
      0.032 -0.001 -0.023 0.090 0.076 0.035 -0.010 0.000 -0.002 -0.005
      -0.035 -0.027 0.032 0.005 -0.003 0.016 0.018 -0.016 0.108 -0.035
      0.004 0.036 0.041 0.001 0.053 -0.003 -0.008 0.012];
Rt7=[0.190 0.128 -0.187 -0.068 0.368 0.114 0.058 0.111 0.140 -0.119
      0.057 -0.034 -0.016 0.355 0.144 0.287 0.068 -0.130 0.105 0.149
      -0.240 -0.059 0.058 0.100 -0.094 -0.078 0.041 -0.215 0.159 0.123
      -0.024 0.158 0.170 0.125 0.202 0.145 0.031 0.049]
```

```

Rt8=[-0.022  -0.022 -0.118 -0.045 -0.001  0.045  0.053  0.040  0.023  0.021
      0.032  0.012  -0.014  0.025  0.086  0.000  -0.012  0.024  -0.017  -0.045
      0.019  -0.002  0.037  -0.016  0.024  0.035  -0.010  0.024  0.076  -0.071
      0.021  0.011  -0.009  -0.014  0.021  -0.017  -0.022  0.005]

BA1=0;
Temp1=0;
for i=1:N1
    Temp1=c*Wage(i)-Ae(i);
    for j=i:N1
        Temp1=Temp1*(1+Rt7(j));
    end
    BA1=BA1+Temp1;
end
BA1
%output=gama*Wage(N1)
%Retirement age:A2,death age:A3, starting year:A2+1, N2:number of interval years;
A3=75;
A2=60;

N2=A3-A2;
%Inflation rate:normal distribution of inflation rate, delata:stardard deviation;
%Mean:Im, obtained from historical data 1978-2004,ex.1988-89,1994-1995
Im=3.51;
delta=3.78;

N3=1000;
for kku=1:N3

for i=1:N2
    InflationRate(i)=31;
    %InflationRate(i)=Im + delta*randn(1);
    while abs(InflationRate(i)) >= 30
        InflationRate(i)=Im + delta*randn(1);
    end
end
InflationRate=InflationRate/100;

Rto1=[0.000  -0.082  0.060  -0.028  -0.098  0.005  0.071  0.003  0.008  -0.001
      0.008  0.042  0.009  0.036  0.024  0.006];
Rto2=[0.070  0.007  0.069  0.020  -0.054  0.003  -0.013  -0.068  -0.009  -0.017
      0.043  0.025  0.050  0.023  0.004  0.006];
Rto3=[-0.261  -0.185  0.036  0.350  -0.139  0.501  -0.205  0.244  -0.358  -0.222
      -0.101  0.114  0.622  0.079  -0.081  0.203];
Rto4=[0.004  0.247  0.319  0.204  0.647  0.076  0.190  -0.276  0.000  -0.261
      0.086  -0.150  -0.024  -0.069  0.077  0.291];
Rto5=[-0.047  -0.003  0.121  0.137  0.089  0.146  0.011  -0.024  -0.090  -0.125
      0.009  0.008  0.164  0.017  0.006  0.127];

```

```

Rto6=[0.009 -0.048 0.062 0.034 -0.080 0.054 0.001 -0.008 -0.037 -0.031
       0.015 0.041 0.091 0.034 0.003 0.026];
Rto7=[-0.100 -0.019 0.121 0.216 0.095 0.247 -0.040 0.020 -0.163 -0.174
       -0.012 0.019 0.285 0.024 -0.014 0.172]
Rto8=[0.035 -0.037 0.065 -0.004 -0.076 0.004 0.029 -0.033 0.000 -0.009
       0.025 0.034 0.029 0.029 0.014 0.006]

```

```

Br=zeros(1,N2);
Br(1)=BA1;
temp_Rto=zeros(1,N2);
temp_Rto(N2)=1+Rto7(N2);
for kk=N2-1:-1:1
    temp_Rto(kk)=temp_Rto(kk+1)*(1+Rto7(kk));
end
temp_inflation=zeros(1,N2);
temp_inflation(1)=1+InflationRate(1);
for kk=2:N2
temp_inflation(kk)=temp_inflation(kk-1)*(1+InflationRate(kk));
end

```

```

%compute the denominator;
sumDeno=temp_inflation(N2);
for kkj=1:N2-1
    sumDeno=sumDeno+temp_Rto(kkj+1)*temp_inflation(kkj);
end

```

```

output=temp_Rto(1)*BA1/sumDeno

```

```

gama(kku)=output/Wage(N1);

```

```

end
xx=1:N3
figure;
plot(xx,gama);

```

```

figure;
xx=linspace(0,max(gama),100);
hist(gama,xx);
hold on;
mean_gama=sum(gama)/N3
stand_devi_gama=std(gama)
Y = normpdf(xx,mean_gama,stand_devi_gama);
hold on;
plot(xx,Y,'r');

```

Notes: The codes above relate to the computation of the basic model (see Section 6). For all other simulations, slight changes on relevant codes are involved.