WHAT IS THE EU-CHINA SOCIAL PROTECTION REFORM PROJECT?

As a successor of the EU-China Social Security reform project (2006-2011), the European Commission and the Government of China have promoted the "EU-China Social Protection Reform Project" (SPRP), a new cooperation initiative aimed at promoting social equity and inclusiveness of economic development throughout Chinese society – as well as cooperation and dialogue between the EU and China in the same field.

The Commission implemented the project through a grant contract with a consortium of specialized public authorities and mandated bodies of the EU Member States in the area of social protection. The consortium is led by Italy and gathers institutions from Belgium, the Czech Republic, France, Poland, Romania, and Spain.

The objective of the EU-China SPRP is to strengthen institutional capability for developing policies, for implementing legal and regulatory frameworks and for supervising systems of social insurance, social assistance, and financial management in the area of social security. In particular, the Project's purpose is pursued through three Components, each of one connected to a specific Chinese government entity playing the role of partner of the consortium.

Component 1- Consolidation of institutional capacity for social protection policy development and reforms in collaboration with the National Development Reform Commission (NDRC)

Component 2- Enhancing of institutional capacity for financial management and supervision concerning social security funds in collaboration with the Ministry of Finance (MoF)

Component 3- Improving of legal framework and policy for social assistance in collaboration with the Ministry of Civil Affairs (MoCA).

Website: http://www.euchinasprp.eu Contact: bjoffice@eucsprp.org

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Introduction

The Component 2 of the EU-China Social Protection Reform Project has the specific aim of enhancing the institutional capacity for financial management and supervision concerning social security funds in collaboration with the Ministry of Finance (MoF). More specifically, among the eleven results that the project is expected to achieve, three are explicitly assigned to this component, namely:

- **Project Result 6:** The capacity of MoF financial management and supervision of central and local model of social security system and the extension of social security system coverage are enhanced, in particular in the fields of division of expenditure responsibilities, mid -terms budgeting of fund, and performance assessment model.

- **Project Result 7:** Enhance the top-level design ability in the basic pension insurance; establish actuarial analysis models for basic pension insurance reform.

- **Project Result 8:** The capacity of the MoF in the management of social insurance funds, focusing on fiscal support budgeting, account system, investment techniques and adjustment mechanisms for pension benefits is strengthened.

The Project foresees that the Component 2 EU Resident Expert in China will collect all the results of the Situational Analysis phase, which aims at "**understanding the current Social Protection framework in China**", in order to point out information useful to achieve the expected results. The situational analysis would focus on a set of topics identified by the MoF.

The present document is the collection of reports drafted in 2015 and 2016 by Chinese and European experts on four topics that directly contribute to the achievement of Results 6 and 7 (see table below).

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Component 2 Enhancing institutional capacity for financial management and supervision concerning social security funds in collaboration with the Ministry of Finance (MoF)						
Result	**Topic ID**	**TITLE**	**Chinese Expert.**	**EU Best practices Experts**	**Date of Panel Discussion**	**Date of Workshop**
R6	2.1.2	Division of decision power and expenditure responsibilities on social security between central and local government	Zhao Fuchang	Mel Cousins	17th September 2015	15th December 2015
R6	2.1.2	Social security coverage on informal employment: methodologies and tools of analysis and management	Zhou Xiao	Mel Cousins Marta Fana	16th December 2015	12th July 2016
R7	2.2.1	Nominal personal account reform in the basic pension insurance system	Li Zhen	Roberto Notaris	17th September 2015	15th December 2015
R7	2.2.2	Models and Methodologies for the	Wang Xiaojun	Legini Angela Carlo Mazzaferro	16th December	12th July 2016

		Social and Economic sustainability analysis in social protection system			2015	

In line with the main priorities of the MoF, the C2 first started the situational analysis on topics 2.1.1 and 2.2.1 in April 2015, while the research on the topics 2.1.2 and 2.2.2 started at a second stage in July 2015. Following this framework, Chinese experts were selected to conduct assessment reports on the respective topics, which include:

- A general description of the current situation;
- The most relevant statistical data;
- An overview about ongoing activities and plans aiming at improving the current situation, including current reform, efforts, proposals and possible pilot projects;
- A list of open issues.

The draft reports were submitted to peer review through a panel discussion, involving also selected EU experts that presented a selection of EU experience on the same field. After the Panel Discussion meeting, the Chinese experts reviewed their papers, taking into account the suggestions received by the participants of the panel and the EU experts finalized their reports based on the consultation with Chinese experts, MoF officials and Resident Expert. Finally, during the Workshops EU experts presented selected EU practices and experiences aiming at debating reform proposals related to the analyzed topics. The workshop gathered MoF's Staff and top managers, the Component 2 EU Resident Expert, Chinese Expert and other relevant Chinese Stakeholders.

Topic 2.1.1 Division of Decision Power and Expenditure Responsibilities on Social Security between Central and Local Government

Zhao Fuchang, Ministry of Finance Research Institute

Abstract

Pension system, as the main part of social security system, is designed to provide basic living security for elderly people, as to maintain the social stability. Currently the aging problem has become more and more seriously in China, and the financial sustainability of social security is facing enormous challenges. It's time to reasonably determine the division of powers and expenditure responsibilities between the central and local governments, and enhance the financial constraint, which will helps improve the fund efficiency, as well as promote sustainability of the social security system.

Firstly, this paper reviews the historical evolution of China's social security system. With transformation of planned economy system into market economy, China's pension system experienced a transformation from "unified labor insurance system" to the "social security systems", and, in coordination with the market economy, the framework of pension system with Chinese characteristics has been basically formed, which consists of five parts, namely the minimum non-contributory pension based on public financial, contributory public pension, mandatory individual account pension, voluntary supplementary pension and personal savings insurance. In this paper it is just focus on the former three parts which is concerned with fiscal responsibilities.

Secondly, this paper summarized the China's present division of powers and expenditure responsibilities between central and local governments. The central government has the power of "what to do" such as designing and enacting law, regulation and policy and most of the power of "to what degree". And the power of deciding "to what degree", the investment, operation and management of social security fund, as well as the power of supervision are shared by the central and local governments, while the local governments is mainly responsible for the management of social pension. For the expenditure responsibilities, the central government is only in charge of providing subsidies, and the responsibility of final balance of social pension is a duty of local government.

Last but not least, this paper summarized the main problems of the division of powers and expenditure responsibilities between central and local governments，which concludes the problem of "the central order, while the local pays", the separation of powers and expenditure responsibilities, the moral risks in short term behaviors of local governments, the level of regulation is too low, implicit debts problem is still not clearly resolved and so on.

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1. Introduction

Decision power division among governments is a complicated issue for it is related to both economy and politics. And the division of decision power and expenditure responsibility in the field of social protection is one of the most important issues of the decision power division among governments in China. Following the transformation of China's economy and society in 1980s and the establishment of China's Socialist market economy with Chinese characteristics, China has reformed and established its social protection system in accordance with the new situation, in order to protect people from problems such as aging, disease, unemployment, work-related injury and risks of maternity, etc.

Today China's social protection system, including social insurance, social assistance and social welfare, is already full-covered around the country. Pension insurance, medical insurance, unemployment insurance, work-related injury insurance and maternity insurance are the fundament of China's social insurance system, and they cover the majority of the population. Furthermore, 80% of the population is covered by the pension insurance and 90% of the population are covered by medical insurance. In the social assistance system, the Minimum Living Security is the most important institution. The enactment of the Social Insurance Law, in 2010, is the symbol that marks the progress of legalization of China's social protection.

However, there are still challenges from both society and economy, such as aging population, to China's social protection system. Aged people in China are 200 millions, 14.8% of the population. It

is predicted that the problems will be even more serious by 2030 when Chinese population will reach to a peak. The percentage of aged people in Chinese population, then, will be higher than the average number of the world, and this will bring to the financial sustainability of social protection a big challenge. Today, China, under the economic new normal situation, is facing new problems of financial balance. It is worth making a rational division of decision power and expenditure responsibility between central and local governments, and improving governance efficiency and budget regulation.

This report focuses on China's pension insurance system, describing regulations and policies applied to the targeted group and giving a brief analysis to the current situation

2. Division of Decision Power and Expenditure Responsibility among Governments

The so-called decision power is the responsibility that should be taken by the Government and the public power for manage the related affairs. Power comes from corresponding responsibility. It depends fundamentally on government's function and responsibility. Government's function in different countries share some common characteristics, but they also vary for the difference of economy, politics, geography and development. It is generally accepted that government's function in the market economy environment is to provide public services. Hence, the government's power should be its responsibility and obligation for providing public services.

The decision power division in developed western countries relies on the division of public affairs. For example, in USA, the decision power of social insurance is hold by the Federal Government, while the decision power of unemployment assistance is hold by local governments. China divides different sorts of power on the basis of the factors of power. There are four sorts of power factors in Chinese government: power of decision (include whether to do and what degree to do), power of implementation, and power of supervision. Generally, the central governments possesses the power of decision (enacting law and regulation, making policy and establishing institution) while local governments hold the power of implementation (including management of daily affairs). The governments responsible for coordination take the expenditure responsibility. Lastly, governments at different levels will all be responsible for supervision.

2.1 History and Main Reforms

At the beginning of the founding, China had established a pension system which fitted the planned economic system based on the Soviet model. With transformation of planned economy system into a market economy during the early 1990s, the basis of current pension system was built and gradually developed. However, as positioned as a supporting role in the reform of state-owned enterprises for a long time, the passiveness , gradual nature of the reform itself and limited administrative level

caused slow development of pension system. It was last 10 years that pension system became a protagonist in the reform. Since the transition to a market economy after 20 years of development, the framework of pension system with Chinese characteristics has been basically formed, which consists of five parts, namely the minimum non-contributory pension based on public financial, contributory public pension, mandatory individual account pension, voluntary supplementary pension and personal savings insurance. With no doubts, it has played an important role in the China's economic reform and social stability.

2.1.1 Urban Employee Pension

2.1.1.1 Establishment of the unified China Labor Insurance System.

At the beginning of the founding of China, the old-age insurance designed for employees and the families in the form of labor insurance coordinated by state and implemented by enterprises gradually formed the urban employee pension system which is overall planned by the state, co-ordinated by the social and combined with enterprise insurance. The main features of the welfare system in China were "low-wage, high-employment, high subsidies and high welfare". Enterprises had unlimited liabilities for their employees' health, old age, sickness, death and disability. As almost all enterprises were state-owned, Chinese government was responsible for the final debt. At that time, all the decision power, implementation power and supervision are belong to the state, because each unit is a part of the state, and the financial gap of each unit will be taken by the state/central government at last. The retirement system was an important part of the Labor Insurance System. The traditional retirement system had high coverage rate and high level of pension benefit (usually 80% of the last year personal wages). Also, there were strict conditions to obtain pensions: workers must

work for 30 years; retirement age for female blue-collar workers was 50 years, for female cadres was 55 years, and 60 years for men. Relative to population life expectancy at that time, retirement age requirements were high.

In traditional retirement system based on planned economy, enterprises and individuals did not need to contribute; pensions were part of labor cost of enterprises, but at the final phase, government was responsible for retirement pension. In sum, "the state-enterprise model" social security system was established as seen as a big superiority of the socialist system. What's more, since "the enterprise"-a form of basic level social organization came into being, within such a system does not require the normal flow of labor, the workers and even their offspring could be completely subordinated to and dependent on their "enterprise", the function of old-age social security transformed into "the enterprise endowment pension". While the nature of "the enterprise endowment pension" is actually the indirect "communal-dining system endowment pension" since the goods and materials were unified allocated to enterprises in the planned economy system. The reform of state-owned enterprises' contract system did not affect personnel system, neither spawned a market allocation of labor markets and resources, so that it's impossible to put forward the question how to establish an independent social security system out of enterprises. It was until the implementation of labor contract system on some of the new employees of state-owned enterprises in 1986 that finally raised the question, although it makes the workers and enterprises formed a sort of independent relationship in a very limited degree. Yet the way to solve the problem of labor contract workers retire costs is "social overall planning", which means the government is still pay the final bill with pay-as-you-go financial system, it still didn't touch the fundamental issue of old-age social security system.

2.1.1.2 Establishment of social insurance system.

With transformation of planned economy system into a market economy, central government retreaded from traditional pension system, which could not adapt to economic development. As a consequence, lots of problems were created: 1) the majority of state-owned enterprises operated in losses and could not afford the pension system; 2) risk pool is too small; 3) labors working in private firms and self-employees were excluded; 4) labor mobility between different ownership-type firms was hampered. It was urgent to reform the Labor Insurance System.

In the history, the social protection system had been a scattered system for a long period. The power

over social protection affairs had been hold by different departments of the central government. In 1991, the reform of the State-owned Enterprise Employee Pension Insurance was conducted, and the social pooling of pension insurance fund began to be promoted in urban areas with the aim of establishing, step by step, a system unifying basic pension insurance, enterprise supplementary pension insurance and individual account. It had stipulated that the payment ratio and accumulation rate shall be determined by governments of provinces, municipalities and autonomous regions with estimation of the current situation. And then it shall be reported and approved by the State Council. It also stipulated that local governments shall set up Pension Fund Committee to manage and supervise the pension fund (according to state council file issued in 1991).Meanwhile the Ministry and labor departments under local governments were in charge of the management of Pension Insurance of Urban Employee (including the employees of state-owned enterprises outside urban area). In 1997, the Basic Urban Employee Pension system was established. It is a comprehensive system unifying social pooling and individual account with the aim of balancing social equality and efficiency. This system had been managed by the Ministry of Labor and Social Security. In this system, the ratio of the basic pension contribution by enterprise (enterprise contribution) is determined by government of provinces, municipalities and autonomous regions. And the industrial pooling of pension is also managed by local governments at different level over the territories where the enterprises are located. By then, the employees of state organ and state-hold institutes were still covered by an old system for them, which was managed by Ministry of Personnel (later reformed into Ministry of Human Resource, Labor and Social Security). And in 2015, for aim of equality, the State Organ and State-hold Institute Employee Pension System will be integrated into the Urban Employee Pension System.

Table 1 Main contents of the basic public pension system for urban employees

System Structure	Social Pooling	Individual Account
Type of System	PAYG System, DB	Funded System (empty), DC
Protection Target	All urban enterprise workers, self-employees, flexible employees	

Contributions of employees	20% of total wages (employer)	8% of personal wage (employee)
Contributions of self-employees, flexible employees	12%	8%
System Parameters	Retirement age	Male 60, female cadres 55, female workers 50	
	Contribution base	60-300% of average social wage	
	Minimum contribution period	15years	
Rate of return on individual account	One-year bank interest rate	
Monthly Pension	Basic pension = (indexation of the average monthly wage of local workers in the previous year +the insured person's average monthly contribution wage) * 1/2 * n * 1%	Individual account accumulated amount (determined by the one-year bank rate) divided by 139,170,195 relative to the insured person's retirement age
The expected replacement rate	35%	24%

Such public pension system was designed in accordance with the Third Plenary Session of the Fourteenth Central Committee, consisting of social pooling and individual account with the initial designing that the social pooling is pa-as-you-go system and the individual account is a fully funded system. But actually it was a pay-as-you-go financial system, in which the social pooling made the social insurance contribution by the pay-as-you-go form, while the individual account was not really

funded or even misappropriated, that does not fully comply "social pooling and individual accounts" requirements of the Third Plenary Session of the Fourteenth Central Committee and involves the issues of implicit or historical debts when the public pension system established. At the beginning of establishment of the system, employees involved were classified into 3 categories: people retired before the establishment were called "old age person", those had worked but not yet retired when the system established were called "middle age person", and those had just started working after the system established were called "new person". The above system did not meet the requirement of the Third Plenary Session of therefore Fourteenth Central Committee in practice, the reasons are as follows: firstly, the historical implicit debt of "old age person" and "middle age person" was not repaid; secondly, the individual accounts of "middle age person" and "new person" were repeatedly misappropriated. These two reasons made the individual account not really funded and the accumulation system ineffective.

On December 24, 2000, the State Council issued Pilot program on improving the *urban social insurance system (guofa[2000] No. 42)*, launched personal accounts funded for the pilot.

The comprehensive reform of social security in Liaoning province: Firstly, separately managed the social pooling and individual account, made the individual account actually "the solid account". Employee paid 8% of his or her wages which reduced from 11% goes into the personal account, and the contribution rate for employer is still 20% of employees' wages which all goes into the social pooling. Social pooling funds are made for the basic pension of retirees and the future retirees, while the individual account funds pay for the personal account pension. Secondly, adjust and improve the pension plan. Maintaining the basic pension standard is 20% of the provincial or municipal average monthly wages of last year, the employee who has paid for 15 years increase certain percentage of his or her basic pension annually, keep the overall level at about 30%. The social pooling funds also pay for mortuary grant-in-aid to the survivors after the pensioner died. In addition, individuals pay less than 15 years cannot get the basic pension. Thirdly, encourage enterprises to establish the enterprise annuity. The amount of enterprise's payment within 4% of the total amount of wages can be disbursed from the cost.

In order to support the pilot in Liaoning, the central government provided billions of dollars of special financial grant to cover the basic pension debts over the past few years.[Although the

financial can afford the huge costs, if implement the pilot of Liaoning in the whole country, it will set up a very difficult to maintain for a long time and a pay-as-you-go public pension system. For this consideration, many economists advocate the basic idea of the Third Plenary Session of the Fourteenth Central Committee and the compensation method proposed in 2000.]

In 2004, the pilot of the reform of social security system was extended to Jilin and Heilongjiang province, one of the main tasks is to make the individual account really and fully funded. Compared with Liaoning, the pilot project in Jilin and Heilongjiang provinces made some adjustment: One is to increase the amount of employee pays of his or her wages from 5% to 6% in 2005. The other one to change the way the pension calculated, adjust the denominator 120 to the age of the average life expectancy at birth of urban population minus retirement age when the retiree get his or her pension from the personal account. From January 1, 2006, employee paid 8% of his or her wages which reduced from 11% goes into the personal account without enterprises' payment. Now the individual account reform was extended to 8 provinces, municipalities and autonomous regions: Shanghai, Tianjin, Shandong, Henan, Shanxi, Hubei, Hunan and Xinjiang. Different with the three northeastern provinces, the individual account is starting at 3%, make which in good run with semi-dynamic subsidy.In the pilot of Liaoning, the individual account is starting at 8%, while Jilin and Heilongjiang are both 5%. Due to the different local conditions, the central government only stipulated the eight provinces of no less than 3%, and then gradually increase. The amount of personal account depends on the amount of individual contributions and individual accounts fund income, which regularly published by social insurance agencies and can be transferred and inherited.

2.1.2 Urban and Rural Residents Pension

In the planned economy period, urban residents are covered by the labor insurance system at that time, while the rural areas followed the traditional way of old-age security system that based on family and supplemented by social assistance. With transformation of planned economy system into a market economy, the traditional security model based on state-owned enterprises could not adapt to the market economy, the urban and rural pension system is urgent to establish.

Since 1986, Chinese government had run pilot program on old-age social insurance for rural residents in some areas. In 1992, Ministry of Civil Affairs issued basic plan for County-Rural Old-Age Social Insurance, which was regarded as a milestone for rural residents. Regulated by the plan,

the source of finance mainly came from individual contribution and was supplemented by collective subsidy with policy support, which was regarded as the feature of "old rural pension system". For this system, central government is the decision maker and the local government takes the responsibility to implement it. The system only unifies at the county level, so its financial capacity is very poor and the corresponding benefit is very low. In reality, however, fewer and fewer take part in the pension plan because of their poor financial capacity and low benefit level it caused. Till July 1997, the policy of "old rural pension" was stopped by state council.

With the importance of rural issues becoming increasingly highly valued, the establishment of social security in rural areas has been reconsidered by Chinese government since 2002. Cities like Baoji, Donghai, Beijing, Shanghai and Dongguan, etc. began to pilot "new rural pension system" driven by government subsidies. Under the background of population aging, economic crisis and the process of urban-rural integration, New-Rural Old-Age Social Insurance was started up nationwide in 2009. The essential difference between "old rural pension system" and "new rural pension system" is that government subsidy is made up of the primary financial source of new-rural pension system. Policy contents are presented in the following table 2.

Table 2. Contents of policy on "new-rural pension system"

System Structure		Social Pooling	Individual Account
Type of System		PAYG System, DB	Funded System, DC
Protection Target		Rural residents above 16 years old	
Contribution	Personal contribution		Five grades: 100, 200, 300, 400, 500 yuan/year (subjected to adjustment)
	Collective subsidy	Subsidy standard determined by each village committee	

Government Subsidy	Central government: West and middle regions: 100% basic pension benefit; East regions: 50% of basic pension benefit		
		Local government: no less than 30 yuan/year/person	
Rate of return on individual account	One-year bank deposit interest rate		
Monthly Pension	Basic pension = 55yuan (central government) + additional (local government)	Individual account accumulated amount divided by 139	
Conditions claiming for pension benefit	Pensioner age: above 60 (contribution by offspring) Specific contribution period		

In 2011, the Urban Citizen Pension System was also established. Similar to the Basic Urban Employee Pension System, it was a comprehensive system unifying social pooling and individual account, but mainly financed by the central government's subsidy. Meanwhile, the former system was managed by Ministry of Civil Affair and the later by Ministry of Labor and Social Security.

For quite a long period of time, urban residents without work have not had any public pension. In July 2011, public pension for urban residents was established and from then on the pension system was gradually extended nationwide. Policy contents are presented in the following table 3.

Table 3. Contents of policy on public pension system for urban residents

System Structure	Social Pooling	Individual Account
Type of System	PAYG System, DB	Funded System, DC

Protection Target		Urban residents above 16 years old without work	
Contribution	Personal contribution		Ten grades: 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000 yuan/year (subjected to adjustment)
	Government Subsidy	Central government: West and middle regions: 100% basic pension benefit; East regions: 50% of basic pension benefit	
			Local government: no less than 30 yuan/year/person
	other		Other communities or social organizations
Rate of return on individual account		One-year bank deposit interest rate	
Monthly Pension		Basic pension = 55yuan (central government) + additional (local government)	Individual account accumulated amount divided by 139
Conditions claiming for pension benefit		Pensioner age: above 60 Specific contribution period	

In February 2014, the state council issued guidance on building unified public pension for urban and rural residents, putting forward a proposal that new-rural pension system and urban-residents pension system be merged into a unified system by the end of "the twelfth five-year plan", and gradually construct a universal public pension system for all residents. Thus, these two systems were finally

unified as the Urban and Rural Citizen Pension System in 2014, managed by Ministry of Labor and Social Security. According to the guidance, specific regulation can be generalized as table 4.

Table4. Contents of policy on public pension for urban & rural residents

System Structure		Social Pooling	Individual Account
Type of System		PAYG System, DB	Funded System, DC
Protection Target		Urban & rural residents above 16 years old without public pension	
Contribution	Personal contribution		Twelve grades: 100—2000 yuan/year (subjected to adjustment)
	Government Subsidy	Central government: West and middle regions: 100% basic pension benefit; East regions: 50% of basic pension benefit	
			Local government: no less than 30 yuan/year/person (minimum contribution grade); no less than 60 yuan/year/person (contribution grade more than 500 yuan)
	Collective subsidy		Village committee and other communities or social organizations
Rate of return on individual account		One-year bank deposit interest rate	

Monthly Pension	Basic pension = 70yuan (central government) + additional (local government)	Individual account accumulated amount divided by 139
Conditions claiming for pension benefit	Pensioner age: above 60 Specific contribution period	

2.1.3 Minimum Living Security System

In the planned economy period, urban residents are covered by the labor insurance system at that time, while the rural areas followed the traditional way of old-age security system that based on family and supplemented by social assistance.With transformation of planned economy system into a market economy,the pension for unemployeeis covered by the Urban and Rural Minimum Living Security, managed by Ministry of Civil Affair.

In June 1993, Shanghai Civil Affairs Bureau issued *the Notice on Level of Urban Minimum Living Security* and first established the Urban Minimum Living Security System in China. In 1994, the tenth session of the national civil affairs proposed that the government should give assistance to people who meet the minimum conditions according to the local minimum living standard. Then some coastal cities, such as Qingdao, Xiamen, Dalian, Guangzhou, Wuxi, Haikou and the others started a pilot. By the end of 1996, 101 cities had established this system. It was until 1997 the State Council promulgated *the Notice on the Establishment of Urban Minimum Living Security System* that the system was officially established in the country. The notice stipulated the urban minimum living standard set up by the local governments, the Urban Minimum Living Security System financed by local government and listed in social assistance budget as a specific program.

By 1996 the Ministry of Civil Affairs issued *the Opinions on Accelerating the Establishment of Rural Social Security System* clearly stated "the purpose of the Rural Minimum Living Security System is to subsidize those people whose per capita income lower than the minimum living standard". Meanwhile, the document also establishes the funding principle of "security funds shared by local governments at all levels and village collective".It was until 2007 the State Council promulgated *the Notice on the Establishment of Rural Minimum Living Security System* that the system was officially established nation-widely, and actually it is the social welfare, not the social insurance. The notice

stipulated the Rural Minimum Living Security System managed and financed by local governments corresponding to their territories, and the central government would offer specific subsidy to poor areas.

The State Council issued a regulation required the Minimum Living Security System mainly funded by the local governments in 1999, which caused a policy paradox that "the less development a region is, the more people who meets the minimum conditions are, while more serious financial difficulties the region faces". So the State Council decided double increase the central financial burden of security funds every year from 2001-2003, and gradually raise the minimum living standard. In fact, according to the Social Services Development Statistics Bulletin published by the Ministry of Civil Affairs, the central government provides 70% of the financial subsidies every year which is the main source of the security funds.

In September 2012, the Ministry of Finance and Civil Affairs issued *Measures for the Management of Urban and Rural Minimum Living Security Funds*, further regulated howto raise and distribute the fund.

2.1.4 National Social Security Fund

In 2000, the National Social Security Fund was established. The financial resource of the fund are the central government's budget, the transformation of state-owned capital, the return of fund investment and other approaches approved by the State Council, which is irrelevant with contribution to the social pooling. So far it receives 20 billion from central government's budget every year, *Interim Measures for the management of social security funds raised by state-owned shares(2001)*stipulated that when the sated-owned enterprises firstly issue the shares, 10% of the amount of financing should be devoted into the fund*, and *The transfer of some state-owned shares to the National Social Security Fund in domestic securities market(2009)*also stipulated that the IPO sated-owned enterprises in the domestic securities market should transfer 10% of the actual number of shares issued to National Social Security Fund. It is specifically used to supplement and regulate social security expenditures such as the pension in the peak period of aging population, and it is managed by National Social Security Fund Council. It had been run in form of entrusted investment in securities market, direct equity investment, equity fund and oversea investment, etc., and the investment of the central government's subsidy to personal account began to be officially operated in

2006. But the right of utilizing the fund belongs to Ministry of Finance and Ministry of Labor and Social Security. Actually it's a reserve fund that different with surplus funds of provinces, mainly to deal with the problem that population aging in the future may caused.

At the end of 2014, the total fund assets reached 1.54 trillion yuan, including: Direct investment assets of 771.81 billion yuan, accounting for 50.26% of the total assets of the Fund; trust investment assets of 763.83 billion yuan, accounting for 49.74% of the total fund assets. Domestic investment assets were 1.41 trillion yuan, accounting for 91.50% of the total assets of the Fund; overseas investment assets 130.578 billion yuan, accounting for 8.50% of the total fund assets.

At the end of 2014, liabilities of the fund were78.31 billion yuan, mainly short-term debts formed in investment operations. And the total equity of the fund was 1.46 trillion yuan, including: National Social Security Fund equity 1.24 trillion yuan, of which, the cumulative financial fund was 655.27 billion yuan, the accumulated investment value was 585.53 billion yuan.

The personal account fund equity was 110.97 billion yuan, which included funds 80.582 billion yuan and 30.39 billion yuan total investment income.

As shown in the annual report of the National Social Security Fund Council, the annualized investment yield was 8.38% since the fund first established, and the cumulative amount of investment income was 561.20 billion yuan.

The main responsibilities of National Social Security Fund Council are:1) Manage the central government's budget, the transformation of state-owned capital, the transferred equity assets and funds raised by other approaches; 2) Formulate the national social security fund's investment strategy and organize the implementation; 3) Select and entrust managers and custodians to operate the National Social Security Fund, and inspect the operation; 4) Be responsible for financial management and accounting of the National Social Security Fund, periodically prepare financial statements, and draft financial report; 5) Regularly publish the assets and other financial information of the National Social Security Fund to the community; 6) Allocate funds according to the joint instruction of the Ministry of Finance, Human Resources and Social Security; 7) and other tasks assigned by the State Council.

2.2 The Current Situation of Decision Power Division

According to the Constitution of People's Republic of China, *the division of functions and powers between the central and local state organs is guided by the principle of giving full scope to the initiative and enthusiasm of the local authorities under the unified leadership of the central authorities.* Therefore, the division of power in China is, generally, that the central government makes decisions, including law, regulation, policy and institutions, while local governments take implementation, including management of daily affairs. It is possible to say that the power of social pension in China is shared by both the central government and local governments, that is, the central government is responsible for legislation, making policy and setting up institution, and local governments are in charge of the implementation. The expenditure responsibilities are divided between the central government and local governments in accordance with different items. But the balance of pension fund is finally the responsibility of local governments. Considering deciding, implementing and supervising, some scholars divide the decision power into power of "what to do" and power of "to what degree". That is to say, the central government decides what to do, while "to what degree" is considered by both the central government and local governments. The central government settles down a benchmark standard of implementation, and then local governments can choose or alter the standard for practice. This report will explain the power division of pension management.

2.2.1 Central Government's Power of Pension Management

Central government has the power of "what to do" such as designing and enacting law, regulation and policy and most of the power of "to what degree". The central government has the power to design the whole framework. The people's council has the power of designing law and regulation, and departments of government have the power of designing policy and institution. The current pension systems include Urban Employee Pension System, Urban and Rural Citizen Pension System and Social Assistance (mainly, the Urban and Rural Minimum Living Security). Urban Employee Pension System, Urban and Rural Citizen Pension System are administered by Ministry of Human Resource, Labor and Social Security, while the Social Assistance is administered by Ministry of Civil Affair. The power of designing and enacting law and regulations on social protection projects, supervision of funds and management of investments belongs to the central government. The National Social Security Fund is managed by National Social Security Fund Council. And other

social protection projects, supervision of funds and management of investments are under the control of Ministry of Finance.

The National Social Security Funds managed by National Social Security Fund Council. Social security funds can only be deposited in the bank or buy government bonds in the early days, after ten years of development, the field which social security fund can investment in has extended to 14 species, including stock market, direct investment, indirect investment, industrial investment, equity investment, etc. What's more, the yield of Social Security Fund Council has increased from the initial 2.25% to double-digit growth.

2.2.2 Decision Power of Social Pension Shared by the Central and Local Governments

On basis of the factors of power, the power of deciding the social security standard and the power of supervising social security management are shared by both the central and local governments.

2.2.2.1 The Power of Deciding "to what degree"

The central government would settle down unified, fundamental or basic security standards, while local governments can make some adjustments on basis of these standards.

Urban Employee Pension: The central government settles down policies and institution, and the local governments at provincial level and lower levels take concrete implementation on behalf of these policies and institutions. That is:

— Basic pension contribution rate. Generally, enterprises' basic pension contribution rate shall not be more than 20% of the salary that enterprises pay to an employee, including the sum in personal account. And the rate must be determined by governments of provinces, municipalities and autonomous regions. The provinces, municipalities and autonomous regions that are in need of enterprises contribution more than 20% of the salary for the pressure of overweight pension task and large amount of retirees, must report to Ministry of Human Resource, Labor and Social Security and Ministry of Finance and get approval from them.

— Individual account contribution rate is 8% of the salary determined by central government.

— Informal employee (including self employee), the contribution rate is determined by local government.

— Standard adjustment. In accordance with the change of salary and price, the State Council shall duly adjust the basic pension standard of retiree. The adjustment shall be a certain rate in accordance with annual growth rate of salary paid by enterprises in each province, municipality and autonomous regions. Local governments can propose their adjustment proposals in accordance with local situation. The proposals can be implemented after having reported and having been approved by Ministry of Human Resource, Labor and Social Security and Ministry of Finance.

Furthermore, the management of basic pension for the central organs and institutes stationed in Beijing is the responsibility of MHRLSS, while basic pension of the central organs and institutes outside Beijing is managed by the local government where the institute is stationed.

The Urban and Rural Pension: The central government settles down policies and institution, and the local governments at from provincial level to lower levels adopt concrete implementation on behalf of the policies and institution. That is:

— The level and standard of individual contribution and the standard of government subsidy to Urban and Rural Pension are determined by local government on behalf of policies and institutions settled down by the central government.

According to the State Council's Recommendation on Establishing Urban and Rural Citizen Pension System, the minimum standard of basic pension around the country must be duly adjusted in accordance with the change of the economical development and price. Local governments can duly raise the level of basic pension in accordance with local situation. And the basic pension paid to long term contributors can also be increased. The enhanced entitlement should be expended from local government. The implementation regulation will be settled down by governments at provincial level and the regulation must be reported to and approved by MHRLSS.

Minimum Living Security System: The central government settles down policies and institution, and the local governments at provincial and lower levels can take concrete implementation on behalf of these policies and institutions. To the Minimum Living Security System, local governments can

settle down their standard and regulation of implementation within the framework designed by the central government.

The following tables present the responsibilities divided to the central and local governments.

Table5. Decision Power of Social Pension Shared by the Central and Local Governments

	Decision Power Division	
	What to do	To whatdegree
Central	-law, regulation by people's congress; -Policy, institution by related departments and agencies; -subsidy by MOF -investment policy, state council	For urban employee pension: -basic pension contribution rate≤20% -individual account rate 8% For urban & rural residents pension: -twelve grades - subsidy to individual 100¥ ,≥30;100-500, 30+; 500¥↗≥60 ……
Local		For urban employee pension: -basic pension contribution rate For urban & rural residents pension: -twelve grades adjustment a little bit - actual subsidy amount Social assistance: -standard ……

Table6. pension expenditure responsibility Shared by the Central and Local Governments

		Expenditure Responsibility	
central	Generally, to meet system	Law, regulation, policy, and institution expenditure	
		Urban employee pension system	Basic pension subsidy: about 4/5
			Individual account funded: around3/4 of

		financial gap		5%
			Urban and rural pension system	Basic pension: Midwest,100%; East 50%
			Social assistance	subsidy
Local: balance responsibility	Generally, to meet institute financial gap	A little bit about local policy choose expenditure		
		Urban employee pension system	Basic: balance responsibility;	
			Individual: around 1/4 of 5%	
		Urban and rural pension system	Basic pension: Midwest, 0%; East 50%	
			Individual: ≧30¥ for choose 100 grade; 30+for choose 200 to 400; ≧60¥ for 500 up	
		Social assistance	Balance responsibility	

2.2.2.2 Investment, Operation and Management

National Social Security Fund Council has become a professional management organization for the fund investment. When the individual accounts are funded, how to increase and preserve the value will become a big issue. In the individual pension reform plan, individual accounts funds divided into central and local government to preserve and increase the value. The funds that central government subsidized are operated by the National Social Security Fund Council with the pilot provinces' entrust, and the National Social Security Fund Council promise a favorable yield. In March 2012, with the approval of the State Council, the National Social Security Fund Council entrusted by the Guangdong provincial government invested and operated Guangdong Province enterprise employees' basic pension insurance fund 100 billion yuan for two years. Nationally, it is the first time the National Social Security Fund Council entrusted by local government to operate the pension fund. As shown in the annual report of National Social Security Fund Council, at the end of 2014, the accumulated investment income was 17.34 billion yuan. After recently expired, Guangdong province has signed a three-year contract with the National Social Security Fund Council in 2015.

Individual account subsidies except from central government are operated by provinces in accordance with state regulations, and the local government is responsible for increasing and preserving the value. According to the reform, individual accounts funds and social pooling fund shall be administered separately. The social pooling fund shouldn't occupy the individual accounts. The personal accounts funds are administrated by the provincial social insurance agencies, orbited into special fiscal accounts.

In June 2015, Shandong Provincial Social Security Fund Council-the first provincial-level social security funds operating organization was officially established. Similar to the National Social Security Fund Council, its main responsibility is to manage some state-owned capital of provincial enterprises, on behalf of provincial government to operate and increase their value. The financial resource of the fund is the transformation of state-owned capital, provincial finance budget, donations, various lotteries and the other approaches justifiable.

In August 2015,the State Council issued *the Measures for the Investment Management of the Basic Pension Insurance Fund* stipulated that provinces, autonomous regions and municipalities can entrust the agency authorized by the State Council to operate the pension fund balances. The measures also specified other specific duties of the trustees and guidelines the trustees should follow. The introduction of the measures helps further regulate the investment, operation and management of the pension.

2.2.2.3 Division of the Power of Supervision

Both the central government and local governments have the power of supervision. The Social Insurance Law of People's Republic of China states: **First，** the supervision by the standing committees of people's congresses. The standing committees of people's congresses at all levels listen to and examine the specialized work report of the people's governments at their own levels on the status of the revenue and expenditure, management and investment operation and supervision and examination of the social insurance funds, organize law enforcement examination on the implementation status of this Law and exercise supervisory authority in accordance with the law. **Secondly,** the supervision by the social insurance administration departments. The social insurance administration departments of the people's governments above the county level shall strengthen the

supervision and examination of the status of the compliance with social insurance laws and regulations by employing entities and individuals. When the social insurance administration department conducts supervision and examination, the employing entity and individual under examination shall truthfully provide information relating to social insurance and shall not reject the examination or report false information or conceal information. **Thirdly,** the supervision by the finance departments and audit authorities. The finance departments and audit authorities shall supervise the status of the revenue and expenditure, management and investment operation of the social insurance funds according to their respective duties. **Fourthly,** the supervision by social insurance administration department. If a social insurance administration department discovers any problem when supervising and examining the status of the revenue and expenditure, management and investment operation of the social insurance funds, it shall put forward a rectification proposal, make the decision on the handling of the case or present the proposal on the handling of the case to the relevant administration department. The examination result of the social insurance funds shall be open to the public on a regular basis. A social insurance administration department is entitled to adopt the following measures when supervising and examining the social insurance funds: consult, record and copy data relating to the revenue and expenditure, management and investment operation of the social insurance funds and seal the data that may be transferred, concealed or lost; enquire the entity and individual related to the investigation matters and request them to explain on the issues relating to the investigation matters and provide relevant documentary evidence; prohibit and order the rectification of acts involving the concealment, transfer, embezzlement and misappropriation of social insurance funds. **Fifthly,** the supervision by supervision commission. A people's government of the coordinated region shall establish a social insurance supervision commission that comprises the representatives of the employing entities, the representatives of the personnel participating in insurance, the representatives of trade unions and experts, to keep abreast of and analyze the revenue and expenditure, management and investment operation of the social insurance funds and provide consultation opinions and recommendations on social insurance work and implement social supervision. A social insurance agency shall report to the social insurance supervision commission the status of the revenue and expenditure, management and investment operation of the social insurance funds on a regular basis. The social insurance supervision commission may engage an accounting firm to conduct annual audit and specialized audit on the status of the revenue and expenditure, management and investment operation of the social insurance funds. The audit results

shall be disclosed to the public. If the social insurance supervision commission discovers any problem in the revenue and expenditure, management and investment operation of the social insurance funds, it is entitled to put forward a rectification proposal or present to the relevant departments the proposal on handling the illegal behavior of the social insurance agency and its staff in accordance with the law. **Sixthly,** complain dealing with. Any organization or individual is entitled to report or complain about acts in violation of the social insurance laws and regulations.The social insurance administration departments, health administration departments, social insurance agencies, social insurance premium collection departments, finance departments and audit departments shall handle the reports and complaints within the scope of duties of their own departments and institutions in accordance with the law. If the report or complaint is not within the scope of duties of their own departments and institutions, a written notice shall be issued to and the case shall be transferred to the department or institution entitled to handle the case for handling. The department or institution entitled to handle the case shall handle the case in a timely manner and shall not pass the buck.

According to these statements, we can see that the central government supervises at general, while local governments supervise in details. All the concerned departments or agencies at deferent level take the supervision and examination power and responsibilities for social insurance at deferent level. Their supervision is over the process of implementation and the result of it, and there is also a commission in charge of supervision.

2.2.4 Local Governments' Power in Management of Social Pension

Local governments are responsible for the implementation of the management of social pension. That is to say:

Local governments are responsible for pooling and operating the funds. Social pension agencies of local governments must be strict on collecting the any sort of contribution stipulated in the law. Besides, local governments are expected to refining the expenditure structure so that the expenditure to social pension fund is capable of ensuring fully and duly delivery of basic pension. At the same time, the employment annuity can also be ensured so that the reform of government and state hold

institute pension system can stably proceed.

Local governments are also responsible for the management of contributor. Local governments are expected to promote socialized management of retiree and improve   services for them. Local governments shall also improve the institutional capacity of social pension agency, employ enough workers and provide necessary financial support and equipment on behalf of the reform of social pension system.   Local governments shall make efforts on work of registration of pension contributors, declaration of contribution, transfer of pension relationship, determination of pension treatment and payment, etc. Besides, on behalf of national administration procedure and information management system, local governments shall set up efficient, standardized, digitalized and professional management system of contributor data under the leadership of provincial government. At the same time, local government must strictly ensure the implementation of social pension registration and contribution declaration system and reinforce the investigation of social pension and labor security in order to increase the quantity of contributor. Local governments shall charge, on behalf of the law, he or she who rejects to contribute or contributes less than the standard sum. Local governments shall still make efforts on investigation of those who do not contribute in time. By all these approaches, the contribution of pension can be entirely collected as it is stipulated.

Local governments are still responsible for the management of funds and the investment of cash surplus. Provincial governments are in charge of coordinating the management of basic pension fund. In case that the coordination cannot be fully conducted, it is expected to adopt the provincial fund bond system to solve the problem. In this system, the fund budget is strictly managed and operated through specific financial account in Social Security Fund. That is, the revenue and the expenditure belong to two managements, so that the fund is ensured to be utilized in specific way. Local governments manage the investment of pension fund on behalf of national unified regulation, and shall make sure the value of pension is stable or is possible to increase. In the Urban Employee Pension system, capable enterprise can adopt complete accumulation of annuity fund and manage it in market way in order to ensure the retired life of its employee.

2.3 Division of Expenditure Responsibility of Pension

The division of expenditure responsibility of social pension is strong related to the division of power. Since China is a state under the governance of the central government with administration of local

governments at different levels, the power of decision is mainly possessed by the central government while local governments are in charge of implementation, and both the central and local governments share the power of supervision. When power belongs to the central government, then the corresponding expenditure responsibility also belongs to it; when power belongs to local government, then the corresponding expenditure responsibility also belongs to local government. In case that the power is shared by both the central and local governments, the corresponding expenditure responsibility is also shared by them. But the responsibility of final balance of social pension is a duty of local government. The central government in this case is only in charge of providing subsidies.

2.3.1 The Central Government's Expenditure Responsibility on Social Pension System

When the power belongs to the central government, then the expenditure responsibility also belongs to it. The power of designing and enacting law, regulation and policy of pension insurance, social welfare and fund investment all belongs to the central government, and the central government assume the expenditure responsibility. Since the pension programs are decided by the central government and shall be implemented by local governments, when the standard determined by the central government is overweight to local finance, the central government will provide certain subsidies. But other issues should be still resolved by local governments.

2.3.2 Expenditure Responsibilities shared by both the Central Government and Local Government

Now social protection system mainly includes two parts, social insurance and social welfare. Social insurance is financed by contribution from employee and employer, and also with limited fiscal subsidies. The urban employee system mainly depends on contribution while the rural and urban residents pension system mainly depends on government subsidies. The social welfare programs of them are all basically subsidized by central government, and the local government is responsible for the balance. While the social assistance and relief programs rely more on central government subsidies. But China as a centralized state, in any case the local governments faced with the financial crisis, the central government will be the final payer.

2.3.2.1 Expenditure Responsibility in Urban Employee Pension System

The funds shall be balanced in the scope of insurance in principle, if the incremental factors arise, the institutional gap will be borne by central government, such as adjusting the standard, while the local government will be responsible of financial gap caused by system. In sum, local governments are in charge of the expenditure responsibility with the central government's subsidy. Local governments shall establish a public finance system and then adjust the financial structure in order to increase the investment to social security.

— Expenditure Responsibility for "old age person" and "middle age person" divided among governments. Now it is still carried forward according to pay-as-you-go system, namely social pooling and individual accounts funds are both relying on insurance funds or financial subsidies, the specific responsibilities of central and local governments have not clearly defined.

— Expenditure Responsibility of Personal Account. To the 8% standard of Liaoning province, the central subsides 75% to the 5% of it, the local is responsible for the rest 25%, and the other 3% will be compensated by fund levied, which is same to the Jilin and Heilongjiang province. Although the sharing ratio between central and local government is still 75% to 25%, the new 8 provinces takes the way of dynamic raising and semi-dynamic subsiding to manage the individual accounts. Dynamic raising means that the amount of personal account increases as the wage increases; semi-dynamic subsiding means the central subsidized fixed lump to the original part, do not influenced by the total wages. The relevant officer in Hunan province said that to raise the individual pension accounts fund, the new part was calculated by the total wages employee contributed. The central government subsidies 0.75 percentage to every one percentage, but not exceeding 3.75 percentage; and the local subsidies 0.25 percentage to every one percentage.

— Expenditure Responsibility of Social insurance fund subsidies. To social insurance, it shall be balanced according to the nature of insurance. The current fund is mainly relying on the insurance itself, that is to say, mainly on the contribution, and the fiscal subsidy is less than 15%. Up to now, the responsibilities of both contribution collecting and management are expenditure responsibility of local government, and also the balance responsibility is taken by local government.

Table 7. Revenue and Expenditure of Public Pension Fund for Urban Employees

Year	Gross revenue	Growth rate of gross revenue	Contribution revenue	Interest & other revenue	Financial subsidies	Gross expenditure	Growth rate of gross expenditure	Cumulative balances
2001	2489	9.26%	——	——	——	2321	9.74%	1054
2002	3171.5	27.42%	2551.4	211.9	408.2	2842.9	22.49%	1608
2003	3680	16.03%	3044	106	530	3122	9.82%	2207
2004	4258	15.71%	3585	59	614	3502	12.17%	2975
2005	5093	19.61%	4312	130	651	4040	15.36%	4041
2006	6310	23.90%	5215	124	971	4897	21.21%	5489
2007	7834	24.15%	6494	183	1157	5965	21.81%	7391
2008	9740	24.33%	8016	287	1437	7390	23.89%	9931
2009	11491	17.98%	9534	311	1646	8894	20.35%	12526
2010	13420	16.79%	11110	356	1954	10555	18.68%	15365
2011	16895	25.89%	13956	667	2272	12765	20.94%	19497
2012	20001	18.38%	16467	886	2648	15562	21.91%	23941
2013	22680	13.4%	18634	1027	3019	18470	18.69%	28269

Source: Statistical Yearbook of China,MOHRSS Bulletins on Social Security Development

On responsibility of social insurance financial subsidy, the subsidy when system was established and the later adjusted formed a pattern of financial grant for the current pension fund. As shown in the Table 7. In financial subsidy over the years, the proportion of central and local is about 4: 1, and the central government has improved steadily.

Table 8. The subsidy of Public Pension Fund (100 million)

	2007	2008	2009	2010	2011	2012	2013
Subsidy	1157	1437	1646	1954	2272	2648	3019
Central	893	1127	1326	1561	1847	2170	2557
Local	264	310	320	393	425	478	462
Pecentage of central government%	77	78	81	80	81	82	85

Source: Finance Yearbook of China, MOHRSS Bulletins on Social Security Development

2.3.2.2 Expenditure responsibility in Urban and Rural Resident Pension System lies on both the central government and local governments

The central government provides full-rate subsidy to western areas and 50% subsidy to eastern areas in accordance with the Basic Pension Standard. Local governments shall provide subsidy to contributors. The subsidy to contributor at lowest level shall not be more than ￥30 per year and it shall be increased in accordance with the level of the contribution. The subsidy to contributors at level of ￥500 or even higher shall not be less than ￥60 per year. The practical standard and implementation shall be settled down by governments at provincial level. Local governments shall provide partial or full-rate pension at minimum level. At the same time, local governments shall also make efforts on media campaign in order to promote social philanthropic organizations to help contributors.

Table 9. The Expenditure Responsibilities shared by the Central Government and Local Government

		Central	Local
basic pension	Midwest	all	
	East	50%	50%
individual contribution	Lowest（100 yuan）		≥30yuan/year
	Higher (200-500 yuan）		can be appropriately increased
	Highest（>500 yuan）		≥60yuan/year

2.3.3 Expenditure Responsibility of Social Pension on Local Governments

Since the pooling of social pension is managed by provincial or government sat lower level, the responsibility of financial balance lies on shields of local governments. According to the provision of the Social Insurance Law of People's Republic of China, (**Article 66)** the social insurance funds establish budgets based on the coordination levels. The budgets of the social insurance funds are prepared separately based on the social insurance items.

— The expenditure responsibility in Urban and Rural Minimum Living Security System lies on local government on the basis of the central government's subsidy. The necessary fund for Urban Citizen Minimum Living Security System shall be in budget of local governments. It is managed in form of a specific item in social assistance expenditure. The specific fund for Urban Minimum Living Security set by the central government shall be coordinated by the central government.

3. Achievement and Challenges of Public Pension System

In China, the central government designs the laws, regulations, policies and institutions at the top for the social pension system and then local governments are in charge of the implementation. The balance of the expenditure of social insurance is duty of local governments while the central government shall provide subsidies. Being adapted to the reality that China is still a developing country and it is not rich in recourses, this institution helps to establish a comprehensive and full-covered public pension system and helps some developed areas ensuring the necessity for people's life.

But we should recognize that China's decision power division in public pension system is still facing many challenges and there are still potential to improve it.

3.1 Problem of "the central order, while the local pays"

The mismatch between power and expenditure responsibility on pension system may cause the problem of "the central order, while the local pays", which is not good for pension budget constraint and sustainability, neither do favor to the regional equity.

On the one hand, the social security system is overly generous corresponding to the economic development level. Since the one who makes policy does not assume the expenditure responsibility, and the one who assume the expenditure responsibility cannot influence the policymaking, which leads to Chinese social security system is overly generous. The collection of funds are inadequate since the management is not strict enough or the choice of last resort to solve the problems of state-owned enterprise reform. To the Urban and Rural Pension, the government pays for the majority, including central government and local governments, the non-insurance programs belong to social welfare, etc. However, rural and urban resident pension is not built as a true insurance, but as a mix of social assistance and social insurance. These are not in line with the properties and requirements of insurance, which increase the burden on the pension system. If it is a insurance, we should do it as an insurance, otherwise, we should do it as a welfare, the "mix" system makes the financial constraint not easy to work.

On the other hand, the local governments assume the expenditure responsibility, there's inequality among Areas for the limit of coordination level .In 1991, the central government's documents had stated that the aim of our public pension system is to have a coordination at provincial level. Actually,

for most of the provinces, the coordination are at county level. Therefore the provincial governments have no the power to manage the social insurance. Though in some provinces it is coordinated at provincial level, the funds cannot be use for other provinces when necessary. Therefore it prevents social insurance's function of *reciprocal help* among areas. As a result, the provinces that is lack of sufficient pension funds can only relies on the central government transfer payment while the provinces with much surplus become richer and richer in terms of social insurance. Then the difference among areas becomes larger and larger.

3.2 Challenges to the sustainability due to decision power and responsibility being separated

The design of pension system is not so scientific for that the power and expenditure responsibility are committed to different departments in the central and local governments, resulting challenges to the sustainability of public pension system.

In the current system, the nation-wide public pension system is managed by MHRLSS, MoCA and Ministry of Public Health etc, under the leadership of State Council. Therefore the management cannot be unified. The communication between different Ministries cannot be always fully conducted. At the same time the management of social insurance at local level is conducted in accordance with the policy settled down by the central government. Yet, there is still difference among areas. It lacks coherence and coordination between institutions and mechanisms. And there are also errors and even conflicts in decision making and implementation between the central government and local governments, between areas and between internal departments of government. Therefore it results big waste of government resources, and it has slow down the government's administration efficiency. Furthermore it doesn't help to enhance the rationality of power division among governments at different levels. Thus it has prevented the progress of public pension system.

3.3 There are moral risks in short term behaviors of local governments

Therefore pressure of financial sustainability on the central government becomes heavier and heavier. For the sake of the economic development of our country, the coordination level of social insurance is still low. The division of expenditure responsibility is inappropriate to the interest of governments. So it is inclined to confront problems such as inefficient management and collecting of contributions

when local governments deal with social insurance. In this case, the central government must provide subsidies to local governments. Even in the management of the funds, there are many bad loans for the sake of unregulated operations. Then the central government has also to provide subsidies to local governments. Therefore the pressure on the central government becomes indeed heavier.

3.4 The level of regulation is too low and the legislation is not updated to the reality.

3.4.1 The level of regulation is low

Let's take a look at the process of the issue of social insurance regulations and institutions of our country: In 1991, the State Council had promulgated the *Decision on the Reform of the State-owned Enterprise Employee Endowment Insurance System*. In 1994, Ministry of Finance and former Ministry of Labor had enacted the *Temporary Regulation on Reinforcing the Management of the Investments of State-owned Enterprise Employee's Social Insurance Funds*. And then in 1995, the State Council had promulgated the *Notice on Deepening the Reform of State-owned Enterprise Employee's Pension Insurance System*. In 1997, the State Council had made the *Decision on Establishing an Unified System of Basic Enterprise Employee Pension*. By 1999, MOF and Ministry of Labor and Social Security had enacted the Financial System of Social Insurance Funds. In 2005, the State Council had promulgated the *Temporary Regulation on Social Pension Premium*. It is easy to find that the regulations promulgated by the government are all named in terms as "temporary regulation", "decision", "experimental procedure", "recommendation". And these regulations are enacted in name of the State Council or the ministries. Therefore their legal value is inadequate. And it is also proved by the practice that these regulations are not fully implemented. Though the National People's Congress had enacted the Social Insurance Law of People's Republic of China, this law is only a principle framework. It doesn't define the relation between the central government and local governments in field of social insurance.

3.4.2 The level of the supervision regulations and institutions of the management of funds investment are too low, and the legislation is not updated to the reality.

As it is mentioned above, the regulations and institutions are not so legally efficient. Though the

Social Insurance Law has been enacted, one of its provision states: The social insurance funds shall engage in investment operation in accordance with the provisions of the State Council to preserve and add value under the premise of guaranteeing the safety of the funds. This is only a principle, so its legal efficiency is not enough as expected. Furthermore, when this law was being designed, there is no a strict procedure, and it changes frequently, therefore it lacks seriousness and stableness as a law should have.

3.5 Implicit debts problem is still not clearly resolved

The current public pension system follows the pay-as-you-go model, which did not meet the requirement of the Third Plenary Session of therefore Fourteenth Central Committee that "combine the social pooling with individual accounts". Firstly, the historical implicit debt of "old age person" and "middle age person" has not been repaid. Secondly, the individual accounts of "middle age person" and "new person" were repeatedly misappropriated.

The key point why individual account funds were repeatedly misappropriated is the transition cost is difficult to solve. As implemented the pay-as-you-go system in the past, governments did not set up personal accounts for the old employees and accumulated pension funds, that the individual accounts established after public pension reform are essentially empty accounts. What's more, the pension deposit administrated by government is only 30 billion yuan, and the structure is quite uneven. The proportion of the older workers in some old industrial base are relatively high, that pension payments there cannot be balanced. In this case, the way to solve the problem is to compensate for the implicit debts of the old employees (including "old age person" and "middle age person") by the state. Some economists have put forward two compensate methods when discussing the problems of social security system reform in 1993-1995, one is to "cut a piece of existing state -owned assets", the other is to issue the "indorsed bond" by the Ministry of Finance. However, due to the opposition of some government departments, the compensation failed to achieve. So there's no way but to use the social pooling levied from enterprises which borrow from the "the new man" to raise the "old age person".

   Individual account being funded is to deal with the challenge coming from the population aging. Now the challenge is still there, while the individual account being funded is still hard to finish. Actually under the current situation, even the individual account is full funded, it still is lack of the market operation and difficult to deal with the aging problem, because it still depends on the government credit and is similar with the pay as you go system. In this sense, we think it not

necessary for government to fund the individual account, and it also is unaffordable. But the aging problem is still there, it is very important for government to work out a proposal to do the insurance actuarial to settle a constraint for intergenerational balance.

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International experience on the division of power and expenditure responsibility in the social protection field

Mel Cousins, EU-China SPRP Expert

Contents:

Executive summary

This report looks at the international experience in relation to the division of power and responsibility in relation to social protection policy between the different levels of government (national, state, local). The main focus of the report is on the situation in two selected EU countries (France and Germany) and the role of the EU government vis-à-vis the Member States.

At national level, in EU Member States the division of power and responsibility between different levels of government is limited, especially for pensions. Primarily the national level is responsible for decision and expenditure and, at most, the local level has some responsibility for implementation. At EU level, power and responsibility is mainly at Member State level. However, there have been two important recent innovations which show the importance of social protection and pension and the need for co-ordination of policies at EU level even if this was not recognised in the original Treaties. The first is the sharing of information and practices by way of the OMC. The second is that pension policies have become very important under the Stability and Growth Pact leading to specific recommendations to Member States on pension reform. One could perhaps describe this as an additional power: that of financial supervision.

The EU example of the monitoring of pension policy and debts at a national level would appear to be relevant to the Chinese Ministry of Finance. In a Chinese context, this might involve MoF monitoring social insurance (including pension) expenditures and (explicit and implicit) debts at provincial/municipal level. This topic could be linked with that relating to Models and Methodologies for the Social and Economic Sustainability Analysis in Social Protection System in China (2.2.2) as this topic covers the tools necessary for MoF to be able to monitor social insurance expenditures at provincial level. The development of such tools would allow MoF to compare and contrast the performance of provincial/municipal level funds and to develop indicators and benchmarks for best practice (e.g. for level of contribution collections, levels of administrative expenditures, etc.). This would help to reduce the possibility of 'gaming' by lower level administrations and, as requested by MoF, would help to provide an empirical basis for deciding where and when central government subsidies might be necessary for social insurance funds.

Context

This report looks at the international experience in relation to the division of power and responsibility in relation to social protection policy between the different levels of government (national, state, local). Following the national report, we look at three powers and one responsibility:

- power of decision
- power of implementation,
- responsibility of expenditure, and
- power of supervision.

The main focus of the report is on the situation in two selected EU countries (France and Germany) and the role of the EU government vis-à-vis the Member States. We also annex some discussion of the situation in the USA where there is a greater level of national-state level co-operation in social protection policies.

Comparing the EU and China

In considering the European experience, it is important to bear in mind that there are many structural differences – demographic, economic and political – between China and the EU. For example, the population of the largest EU states is about the same as a large Chinese province. On the other hand, the level of economic development in the EU is significantly higher than that which has currently been achieved by China and there are significant differences in the structure of employment. Chinese statistics indicate that about 40% of the workforce is employed in primary industry (agriculture). In contrast, in most EU countries well below 10% of the workforce is engaged in agriculture (in France and Germany this is 2-3%). The EU is not, unlike China, a single nation but is rather a quasi-federal arrangement involving limited sharing of sovereignty in certain policy fields by a group of nations. As we will see, the EU itself (unlike the central Chinese government) has limited competence in relation to social protection matters and responsibility for social protection policy remains primarily a matter for the member states. However, there are important recent developments in this area with the establishment of the Open Method of Coordination (OMC) and the role of the Stability and Growth Pact.

Introduction to EU countries

EU Member States adopt different approaches to the internal division of responsibilities for social protection policies. In most European countries, social protection services started off at municipal and local level. For example, in the United Kingdom, social assistance was originally organised at the parish level (a small administrative district). However, over time, planning and administration of social protection moved towards the national level. This was particularly the case with the introduction of social insurance schemes which were generally legislated at a national level and which, in several countries including Germany, played an important role in nation and state-building (Manow, 2004).

France and Germany have been selected as examples of the approaches adopted. Both are amongst the largest Member States (populations of 66 million and 80 million respectively). France is generally seen as being a highly centralised state while Germany is a federal state with the lander having significant powers. However, as we will see, social protection policy is quite centralised in both countries although administration of social protection is more decentralised in Germany than in France.

France

There are four levels of administration in France: National, Regional, *Department (*county*)*, and communal. Each ministry has its own agency at the regional and Department levels. Each Region and Department has a *Préfet* who represents the national government and coordinates state agencies. The state system co-exists with locally elected bodies including 26 regional councils (regional level), 101 general councils (Department level) and 36,000 municipal councils (communal level). These bodies have their own administrative agencies, and reserved fields of intervention, as well as areas of jurisdiction which overlap with those of the state.

The French social protection system is divided into several branches including health, maternity, disability and death; family; old age pension; etc.[1] The main component of the social security system

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[1] http://www.cleiss.fr/docs/regimes/regime_france/an_index.html

is the general scheme which covers workers in commerce, services and industry. About 85% of the population is covered by the general scheme. There are separate schemes for the self-employed, agricultural workers, etc. and there are a range of 'complementary' schemes agreed between employers and workers or on an individual basis. The laws in relation to the basic social security schemes are adopted by the national state and implementation is by national agencies. The social partners (trade unions and employers) are directly involved in the management of the social security system. There is a separate unemployment insurance scheme. Again this is a national scheme but it is manged by the social partners and Benefits and contributions are set by the independent body called UNEDIC which is controlled equally by Trade Unions and Employer associations. These schemes are funded by social contributions which are set nationally. In addition, there are a range of 'solidarity' or social assistance payments which are discussed in more detail below.

In recent decades (1983-2004), there have been a number of moves towards decentralisation in France and this has had some impact on social protection. In particular, the French minimum income payment (revenu de solidarité active (RSA)) is the responsibility of the department. The department is also responsible for payments to people with disabilities, as well as for social assistance to children and older people. Including all types of social aid, in 2013 departments provide some form of support to about 3.5 million people. However, the responsibility for the legislation remains at a national level and the national level sets the amount of the minimum social payments and the conditions of entitlement.

Studies of the decentralisation of the minimum income payment suggest that its implementation has been 'problematic' (Eydoux, 2013; Eydoux and Tuchszirer, 2011). This is due to the limited financial capacity at departmental levels and weaknesses in terms of the definition of competences between the national and departmental level.

Germany

The Federal Republic of Germany consists of sixteen states (*Länder*) in a governance arrangement of "co-operative federalism". In practice, this means that the federal government and the governments of the sixteen *Länder* have to work together politically, as well as administratively. Thus, there is a

division of labour between the federal, the subnational *Länder*, and the local governments: County and local governments, by and large, are responsible for policy implementation, whereas decision-making is the prime tasks of the federal government acting in close co-operation with Germany´s Second Chamber, the *Bundesrat*, which constitutes the representative forum of the German *Länder*.

The social protection system in Germany consists of two pillars:

- a social insurance system tied to formal employment with benefits or services in recognition of peoples'' contributions and

- a tax-funded unemployment and social assistance system to guarantee a minimum subsistence level.

There are five different insurance schemes within the public social insurance system: public health insurance, care insurance, accident insurance, pension insurance and unemployment insurance. These are funded by compulsory social insurance contributions and about 90% of the population is covered by insurance. These schemes are legislated and manged at the federal level. The schemes are managed by public-law corporations under their own responsibility and with legal control by the federal government. Responsibility for administering various benefits lies with agencies designated by the German states (Länder). In the case of pensions, administration is carried out by regional insurance funds – originally independent and now a legally independent regional level part of the new organization of German pension insurance.

Unemployment benefit for insured employees is managed and implemented by the Federal Employment Agency (Bundesagentur für Arbeit, BA). The BA is also in charge of the active labour-market programs in Germany.

In relation to the minimum subsistence/unemployment system, a recent reform (Hartz IV) has led to changes in relation to the role of lander and municipalities. This involved a major reform of the system of social assistance and of labour market administration with an amalgamation of some benefits and services provided by the federal and municipal levels. The municipalities now pay for the majority of the costs of housing of the long term unemployed, while the cash assistance is paid by the central state. In addition, local job-centres have been created with services co-funded and co-administered by municipal assistance departments and staff from the local offices of the hierarchical system of labour market administration.

Division of responsibilities

Thus, as we can see, the division of the powers and responsibilities is limited in most EU countries. In the area of pensions, for example, the powers and responsibilities are mainly at a national level.

Powers & responsibilities in relation to pensions	France	Germany
Decision	National	National
Implementation	National	National/local
Expenditure	National	National
Supervision	National	National

This is typical of EU countries and it is only in the case of social assistance and some social services that local/regional governments tend to play a greater role.

EU power and responsibility vis-à-vis Member States

The EU has limited power and responsibility in relation to social protection (as set out in the EU Treaties) and main responsibility remains at Member State level. Thus, in principle, the EU only has competence in relation to a number of key issues:

- Free movement of workers – which involves co-ordination of national social security schemes for persons who have lived and worked in more than one EU country (Regulation 883/2004)

- Free movement of services – in certain circumstances, people who live and work in one EU country are entitled to avail of health services in another EU country (subject to certain conditions)

- Equality – there are EU laws which require equality between men and women in matters of social security (Directive 79/7). A proposal to introduce a law on equality in other areas (e.g. disability) has been under discussion for several years.

Thus, in relation to pensions, for example, there is no EU requirement that a pension be set at a particular level or structured in any particular way. This is entirely the responsibility of the Member States. EU law simply requires that there should be co-ordination of pensions between Member States in the case of migrant workers. Thus for example, a person who has worked for 60% of her working life in Germany and 40% in France will have her pension calculated in both countries on the basis of her entire working life and will then receive 60% of the appropriate German pension and 40% of the appropriate French pension. In addition, EU law requires that Member States cannot discriminate between men and women in their social protection schemes.

Open Method of Coordination

Given the limited competence in the area of social protection, the EU has introduced a non-binding system now as the Open Method of Co-ordination (OMC). The OMC is used by Member States to support the definition, implementation and evaluation of their social policies and to develop their mutual cooperation. It is based on common objectives (for pensions: adequacy, sustainability and modernisation) and indicators and forms part of the implementation of the process of coordination of social policies

This involves a sharing of experience between Member States, setting of guidelines, national reports, peer review, etc. The OMC involves 'soft' (legally non-binding) measures through which Member States' policies in areas such as pensions and social inclusion are benchmarked and compared. In the area of pensions, there have been Joint reports by Social Protection Committee/Economic Policy Committee assessing national situation and reports on specific issues, e.g. pension adequacy.

The difficulty in clearly identifying the impact of the OMC is identified by de la Porte and Pochet (2012, 345) in their review of the OMC literature. They found that the OMC had 'never been the single cause of policy reform' but was 'one factor among others in a given reform process, hence the understandable difficulty for researchers to attribute the weight of the OMC in policy change'. In the case of the pensions OMC, Natali (2014) found that OMC's influence on EU-level governance have proved 'mixed'. However, he also found that the OMC has contributed to building up institutional capacities and common knowledge that are both decisive for mutual learning and the future coordination of pension reforms (Natali, 2014).

Stability and Growth Pact

The Stability and Growth Pact (SGP) is a set of rules designed to ensure that countries in the European Union pursue sound public finances and coordinate their fiscal policies. The SPG aims both to prevent fiscal policies from heading in potentially problematic directions and to correct excessive budget deficits or excessive public debt burdens.

Under the SGP, a budgetary target, known as a Medium Term Budgetary Objective (MTO) is set for each Member State to bind EU governments to their commitments towards sound fiscal policies and coordination. These budget deficit (or surplus) targets are defined in structural terms, which means that they take into account the business cycle. In the 'corrective arm' of the SGP, the Excessive Deficit Procedure (EDP) ensures the correction of excessive budget deficits or excessive public debt levels. The EU Treaty defines an excessive budget deficit as one greater than 3 % of GDP. Public debt is considered excessive under the Treaty if it exceeds 60 % of GDP without diminishing at an adequate rate.

Countries that fail to respect the SGP's rules may ultimately face sanctions. For Member States sharing the euro currency, this can take the form of warnings and ultimately financial sanctions including fines of up to 0.2 % of GDP, if they fail to abide by either the preventive or the corrective rules, or 0.5 % of GDP, if they repeatedly fail to abide by the corrective rules. In addition, all Member States (except the United Kingdom), could see a suspension of commitments or payments from the EU's Structural and investment funds.

As part of this process, the EU issues 'country-specific reports' to the Member States. Pension liabilities are an important issue in public finances and about 50% of country reports in 2015 mention pension issues. To take the case of France as an example, in 2013 the EU Council recommended that France should take measures by the end of 2013 to bring its pension system into balance in a sustainable manner no later than 2020, for example

- by adapting indexation rules,

- by increasing the full-pension contribution period,

- by further increasing the effective retirement age,

- by aligning the retirement age or pension benefit to changes in life expectancy and

- by reviewing special schemes,

- while avoiding an increase in employers' social contributions.

The implementation of these recommendations is monitored over time. France introduced important pensions reforms in 2013. However, in the 2015 report, the EU found that the pension system would 'continue to face deficits up to 2020 and previous pension reforms will not suffice to eliminate the system's deficit'. It recommended that decisive action is needed to restore the financial health of the complementary pension system and proposed that France should take additional measures to bring the pension system into balance, in particular ensuring by March 2016 that the financial situation of complementary pension schemes is sustainable over the long term. Again, it is difficult to establish the extent to which the SPG process has an impact on pension reform but it is clearly one important influence amongst others.

Conclusion

At national level, in EU Member States the division of power and responsibility between different levels of government is limited, especially for pensions. Primarily the national level is responsible for decision and expenditure and, at most, the local level has some responsibility for implementation.

At EU level, power and responsibility is mainly at Member State level. However, there have been two important recent innovations which show the importance of social protection and pension and the need for co-ordination of policies at EU level even if this was not recognised in the original Treaties. The first is the sharing of information and practices by way of the OMC. The second is that pension policies have become very important under the Stability and Growth Pact leading to specific recommendations to Member States on pension reform. One could perhaps describe this as an additional power: that of financial supervision.

In terms of the development of this topic as part of the overall work plan of the EU-China Social Protection Reform Project, the EU example of the monitoring of pension policy and debts at a national level would appear to be very relevant to the Chinese Ministry of Finance. In a Chinese context, this might involve MoF monitoring social insurance (including pension) expenditures and (explicit and implicit) debts at provincial/municipal level. This topic could be linked with that relating to Models and Methodologies for the Social and Economic Sustainability Analysis in Social

Protection System in China (2.2.2) as this topic covers the tools necessary for MoF to be able to monitor social insurance expenditures at provincial level. The development of such tools would allow MoF to compare and contrast the performance of provincial/municipal level funds and to develop indicators and benchmarks for best practice (e.g. for level of contribution collections, levels of administrative expenditures, etc.). This would help to reduce the possibility of 'gaming' by lower level administrations and, as requested by MoF, would help to provide an empirical basis for deciding where and when central government subsidies might be necessary for social insurance funds.

Annex: Experience in the USA

It is perhaps interesting to compare with the situation in the USA (population 320 million). The USA is a federal system and responsibility for social protection policies is shared between the federal government and the state level. In some cases, (such as old age pension and disability insurance), the systems are almost entirely federal. The laws setting out all the details of these schemes are adopted by the federal government and funding is provided by federal taxes (although there is some element of state involvement in administration of schemes). In other areas (such as workers' compensation, i.e. benefits for injuries at work), the responsibility is entirely at state level. The laws in relation to workers compensation are adopted at state level and the schemes are funded by the states.[2] However, there are also a number of interesting examples of federal-state co-operation in the field of social protection, e.g. unemployment insurance (UI), social assistance (TANF) and Medicaid (the provision of health care to low income persons).

In the case of unemployment insurance, the basic rules are set by federal law (Whittaker and Isaacs, 2014). Federal laws and regulations provide broad guidelines on UC benefit coverage, eligibility, and benefit determination, the specifics of regular UC benefits are determined by each state. UI is administered by the states and states have considerable autonomy in relation to conditions such as the rate of social contributions, rate of benefit, qualification conditions and duration of benefits. This

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[2] This is largely for historic reasons as the schemes of workers compensation were established before the establishment of a national social security system in 1935.

results in essentially 53 different programs. Thus there are significant variations in the level of benefits (e.g. the minimum level of UI benefits varies from $10 per week in Louisiana to $148 in Washington), contributions (from a minimum of 5.4% to 12.27% in Massachusetts), and the duration of UI in different states.

Maximum Duration of Unemployment Insurance
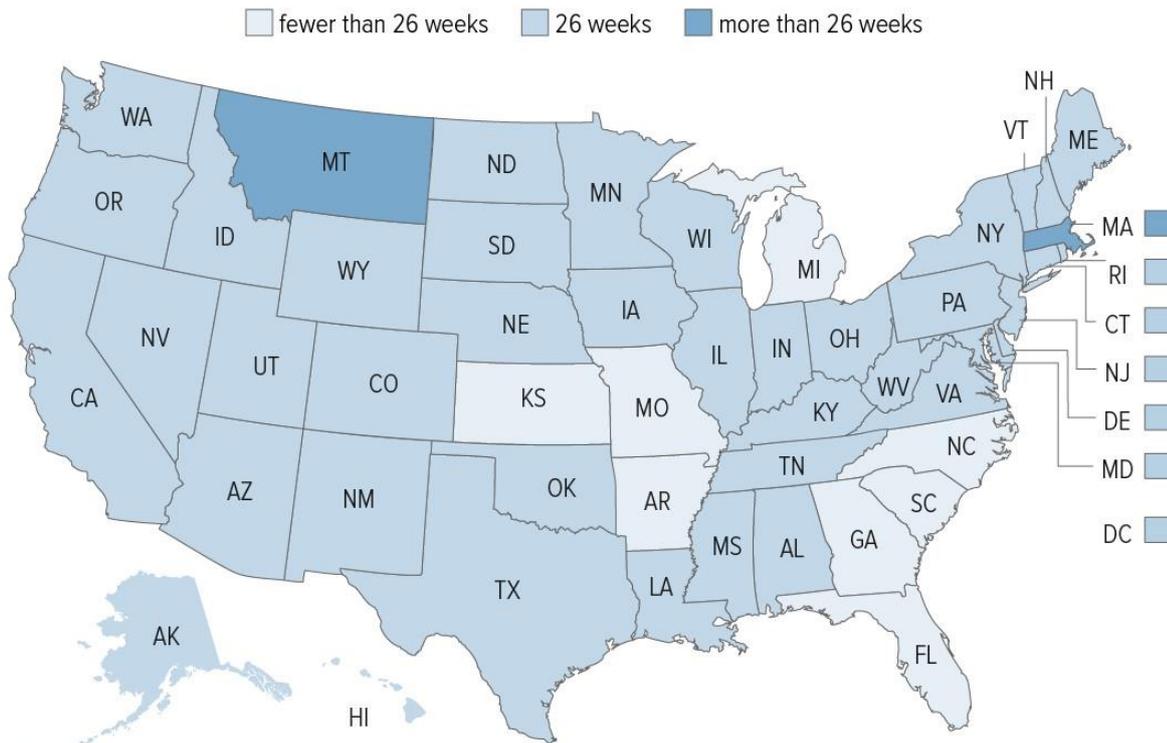
Note: Weeks shown in map are for regular state benefits; no additional weeks of federal benefits are available in any state. The Virgin Islands and Puerto Rico both have 26 weeks of regular unemployment insurance (UI).
Source: Congressional Research Service.

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UI is funded by a combination of federal and state employment taxes (roughly 10% federal-90% state). The federal tax pays for both federal and state administrative costs, the federal share of the EB program, loans to insolvent state UC accounts, and state employment services.

Temporary Assistance for Needy Families (TANF) is a program that provides cash assistance and supportive services to assist families with children (Falk, 2013). It is a form of minimum social assistance (Dibao). Federal law sets out the objectives of the system and imposes certain requirements on the states which wish to participate. TANF funds must be used for families in

financial need and who have a qualified child. Federal law also applies 'work requirements' so that states must ensure that 50% of all families and 90% of two-parent families must be 'engaged in work'. TANF also has a time limitation and funds cannot be used to provide assistance to a family for more than 60 months (subject to some exceptions). Otherwise states are free to set eligibility rules and to set the appropriate amount of benefit which varies greatly from one state to another (see below).

TANF Maximum Monthly Benefits for a Single Parent Caring for Two Children, by State, July 2012
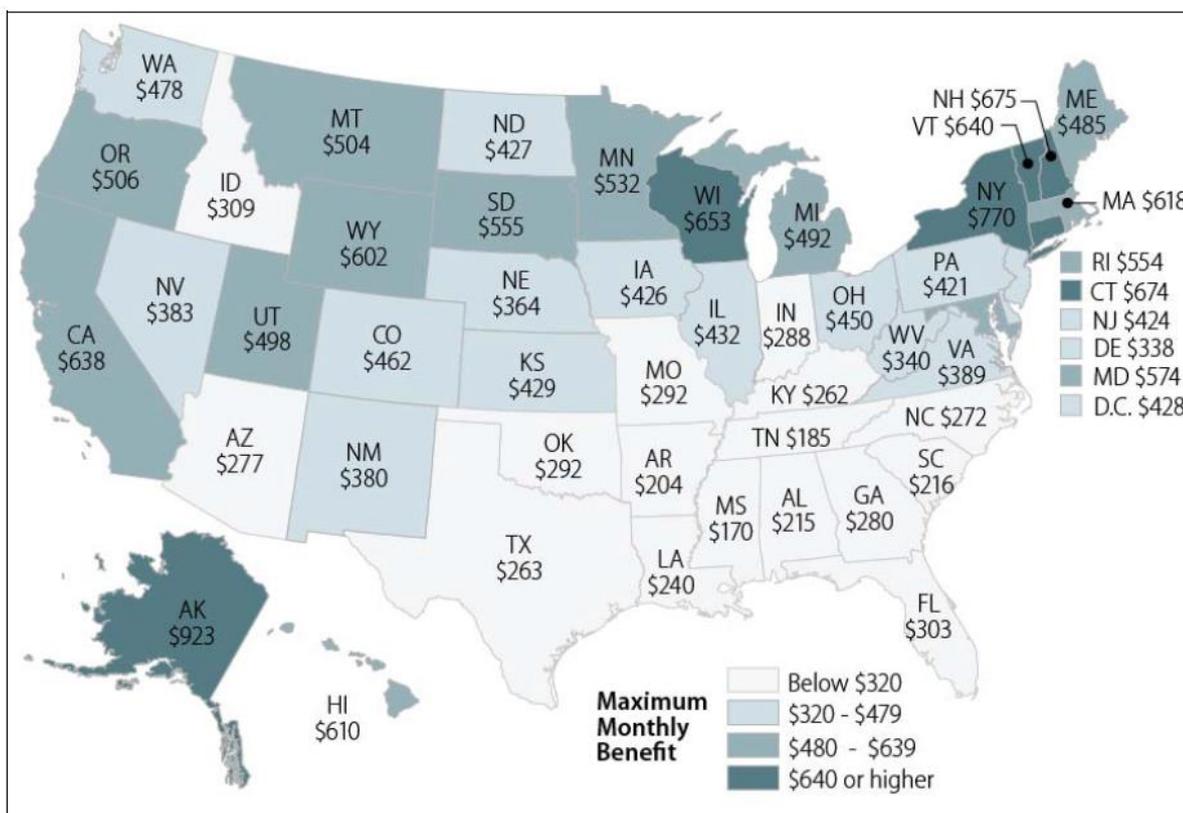
In theory TANF participation is voluntary though in practice all states do participate. TANF is co-funded by the federal government and the states. Federal funding is provided by way of block grants. In the case of non-compliance by the states with the federal rules, a certain amount of the block grant may be withheld.

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Topic 2.1.2 Social security coverage on atypical employment: methodologies and tools of analysis and management

Zhou Xiao, Institute for International Labor and Social Security, Ministry of Human Resources and Social Security, P. R. China

Contents

Abstract

The research report systematically elaborates the status quo of social security of informal employment in China, including background, research method, definition, group characteristics, industry characteristics and employment status. Through the literature review of published national and local social insurance policy, the research centers on the analysis on social security of informal employment coverage rate, status quo and problems. Also through field research and employee interview, the research introduces the informal employees and government experience on addressing informal employment in some provinces. From multiple perspectives, the research describes and analyzes current problems of social security of informal employment in China, so as to accurately reflect the status quo and policy measure of social security of informal employment in China.

With the diversification and development of economy in Chinese market, the employment form and structure in China has experienced unprecedented changes. In 2013, among the 0.382 billion employed people in cities and towns in China, both the number and percentage of people employed by state-owned units and collective-owned units have declined dramatically, with the number dropping from 0.142 billion in 1996 to 69.31 million in 2013, and the percentage plummeting from 71.6% in 1996 to 21.3% in 2013. In contrast, the proportions of employment in other ownership units and employment in urban private enterprises and individuals are 34.4% and 44.3%[3] respectively. From this, it is not difficult to conclude that an obvious change and yearly trend of labor market in China is the huge growth of informal employment, including self-employed individuals and temporary workers in standard ownership units. However, there is no all-rounded research and protection on this huge group of informal employees' social insurance, labor protection, or even official statistics, so it is difficult to correctly assess the situation of social security of informal employment. The Chinese government has implemented the No. 38 Decree of State Council that informal employees should join their pension, and in recent years, there are many new implementation rules and exploration on joining other social insurance in some places, which shows that the government has attached more importance to the construction and improvement of social

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[3]China Labour Statistical Yearbook ,China Statistics Press.

security of informal employment. But, the current social security of informal employment should be further improved.

I Research Background and Research Method

Since reform and opening up, China economy has realized the change from planned economy to market economy. With the change of economic development mode, there emerges an obvious change in labor market: the increase of informal employment. The ever-burgeoning development has become an indispensable part of labor market.

The development of informal employment is closely related to basic population background in our country. According to the statistics, in 2013, the working-age population in our country was 0.92 billion, and in the following years, the increase of working-age population in cities and towns would be as high as 16 million[4]. At the same time, in consideration of problems of structural unemployment and frictional unemployment brought by economic downturns and change of industrial structure, it is predicted that there should be more than 25 million newly created jobs in cities and towns yearly, so the employment imbalance between supply and demand still exists. Informal employment can be one of the major solutions to the imbalance between employment supply and demand for a certain period in the future.

The research is the 2.1.2 project within the framework of EU-China Social Protection Reform Project that requires the study on the coverage of social security of informal employment in China. For the completion of the project, the author, based on the domestic relevant literature, researched the definition, development process and situation of informal employment, as well as analyzed the current policy of informal employees' way of joining, paying and receiving pension and medical insurance. Through statistic comparison of relevant employees' various social insurances in recent years and the application of the result of big data analytics on employment through Alibaba.com, the

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[4]Labor security blue book, *the China Labor and Social Security Report (*2014), published by Social Sciences Academic Press (China)

research reflects current coverage of social security of informal employment in China from multiple perspectives and analyzes causes. At the same time, through methods of field research and interview of typical informal employees, the research reflects informal employees' joining, subjective cognizance, objective practice of social security, analyzes employees' joining behaviors and causes, and then introduces some local governments' exploration and innovation on the design of social security of informal employment. Here following is the research report.

II General Information of Informal Employment in China

1. Definition on Informal Employment

1.1 Definition on Informal Employment in Other Countries

Up to now, there are two statistical concepts about informal employment adopted and defined by international organizations: employment in the informal sector and informal employment. The concept of employment in the informal sector at the earliest showed in the report titled *Employment, Income and Equality: Income and Employment Report in Kenya* published by International Labor Organization (ILO) after it invested the employment situation in Kenya in 1972. On the 15th International Conference of Labor Statisticians held in January 1993, the statistical definition of informal sector had been officially adopted. According to the book of ILO titled *1991 Report to the Commissioner: The Plight of informal Sector*, the informal sector refers to unorganized, unstructured and small scaled production and service units with low income and low contribution. There are mainly three types:

The first type is small or micro enterprises. Regarded as the extension of formal sectors, enterprises of this type are usually very vigorous, and connect with formal sectors by contracting or subcontracting business.

The second type is family enterprises whose most tasks are usually taken by family members (mainly unpaid women).

The third type is individual service, including household services and vendors. In terms of population, most people of informal sectors are in the third type; in terms of skills, employment of this type is the lowest class in the informal sector.

Compared to employment of informal sector, informal employment is a concept with broader sense. As the name suggests, informal employment refers to all forms of employments that are different from traditional mainstream employments built upon industrialization and modernization system, in terms of working hours, payments, workplaces, social insurance and labor relation. Informal employment can be classified into three types: the first type is the employee of informal sector. The second type is various kinds of employees of formal enterprises whose working condition, salary, insurance, welfare and job stability are different from those of regular employees, including temporary workers, seasonal workers, contractual workers and hourly workers. The third type is new employment form brought by science and technology advancement, emerging industry development, further reform of modern enterprise organization management and business mode, such as sellers on Taobao, engineers of computer remote technology etc. In addition, it also includes freelancers, such as all kinds of intermediary service providers, authors, freelance writers and translators.

Concept of Informal Employment in China

According to the above definition, the concept of informal employment is similar but not the same as flexible employment in China. Flexible   employment refers to all kinds of employment which are different from traditional employment in some respects like work time, work place, work relation, remuneration, social insurance and welfare in China. Flexible employee is defined as those who work as individual labors or work freelance with their age between 16 and 59, and leave their archives at Archive Depositing Centers of all levels.[5] And flexible employment has three characters: firstly, unlike traditional employment, informal employment is a dynamic process, employment alternating with unemployment. Secondly, jobs engaged in in formal employment is flexible in all

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[5] But flexible employee is no including the self-employed individual with business license and private enterprises employee who has formal labor contract.

aspects, like woke time, work responsibility and work location, no matter what kind of employer is. Thirdly, criterion for informal employment in practice: individual labors insured in the social insurance scheme as informal employment, mostly justified by individual labors themselves. Social insurance agency verifies the qualification when informal employment labors applying for social insurance subsidy.

II. Analysis on Policy on Social Security of Flexible Employment in China

In China, policy on social security of flexible employment mainly covers basic pension and medical insurance, but there is no uniformed policy on unemployment insurance, work-related injury insurance and maternity insurance for flexible employment. With the constant modification and improvement of policy on social security, some provinces started to explore the method to provide unemployment insurance, work-related injury insurance and maternity insurance for flexible employees.

1. Policy on Basic Pension of Flexible Employees

1.1 Policy Framework

In 2000, according to *About the Print and Distribute of Notice on Pilot Program of Improving Social Security System in Cities and Towns* issued by State Council, flexible employees and privately or individually owned business should participate in basic pension, and specific methods should be formulated by provincial governments.

In 2005, *About Resolution on Improving Enterprise Employees' Basic Pension System* (short for *No. 38 State Council Document*) stipulates that contribution base should be the preceding year average

income of local in-service employees, and the contribution rate should be 20%, among which 8% is saved in individual accounts and paid according to employee basic pension calculation and providing method after retirement.

The Social Insurance Law enacted in July 2011 clearly stipulates that privately or individually owned business without employees, part-time employees without joining basic pension with enterprises, and other flexible employees can participate in social insurance, by paying basic pensionindividually. The once compulsory participation is adjusted to volunteer participation according to the situation of flexible employees.

In 2014, According to *About Suggestions on Further Promoting Reform on Household Registration System* issued by State Council, the restriction on agriculture and non-agriculture as well as territory has been abolished, so the pension covers not only flexible employees in cities, but also local and immigrant flexible employees who are once agriculture workers.

1.2 Coverage of Pension

According to the requirement of pension on flexible employees' identify, there are mainly four types of pensions for flexible employees: first, completely available, all flexible employees can join, such as in Shanxi province, Jilin province, Sichuan province; second, flexible employees who are once agriculture workers cannot join as flexible employees in local, such as Hunan province, Guizhou province, Gansu province; third, the participation is restricted by household registration, which means the pension is only available to local people, and unavailable to flexible employees who are once agriculture workers and whose household registration is in other places, such as in Fujian province, Zhejiang province, Jiangsu province, and some places in Guangdong province; fourth, the participation is restricted according to employment, which means the pension is available to flexible employees who are once agriculture workers and who are employed now, or once in long term, or in specific industries, such as Shanghai and Tianjin.

1.3. Contribution Base

In general, pension contribution base of flexible employees has linear relation with average income and positive correlation with local economic development. In eastern developed regions, due to the high average income, the contribution base in eastern developed regions is higher than that in middle and western regions in general.

(1) The contribution bases are different in different regions. No. 38 State Council Document stipulates that contribution base of flexible employees should be the preceding year average income of local in-service employees, but in implementation, owing to the different situations of economy and social security in different places, provinces have adjusted the contribution base accordingly and provide flexible employees with deferent contribution levels, with 40% as the floor and 300% as the cap, and for most provinces, it is 60%-100%. The setting and grading of levels are different, and in some provinces, there is only one level which is 100%, average income. In some provinces, there are more choices on level, such as two, three, five, six or seven levels. In some other provinces, flexible employees are able to choose the contribution base and amount according to their situations, such as in Jiangsu province and Guizhou province. It can be found that provinces that are adjacent and have similar economic condition are inclined to have similar policies. For example, Sichuan province, Shaanxi province and Shanxi province all adopt the level of 40%-100%, while Beijing and Hebei province adopt the level of 40%-100%.

(2) Different standards on Average Income for Contribution Base

In implementation of the policy, there are different standards on average income. In most of provinces, average income refers to employees' monthly contribution in cities and towns in preceding year; second, individual workers' monthly contribution in cities and towns in preceding year, such as in Zhejiang province; third, private sector in-service employees' average income, such as in Sichuan province, Hebei province, and Fujian province; fourth, enterprise in-service employees'

average income in cities and towns, such as Sinkiang; fifth, flexible employees can choose their contribution base and rate, such as in Jiangsu province and Guizhou province.

1.4 Contribution Rate

As for the setting of contribution rate, in most provinces, the pension contribution rate for flexible employees is 20%. But, in some developed cities in eastern region, the rate is comparatively higher, like Shanghai where the rate is 28%. As most of the flexible employees in China independent service providers, their pension contributions are all afforded by themselves, among which 8% is saved in individual account.

2. Policy on Flexible Employees' Medical insurance

In 2003, to lead the implementation of flexible employees' medical insurance, Ministry of Labor and Social Security has issued *Instruction on Flexible Employee Joining Medical Insurance in Cities and Towns*. It clearly stipulates that flexible employees can join and pay for medical insurance individually. The contribution rate refers to regulations of basic medical insurance. The contribution level is in line with the insurance benefits. The contribution base can be set according to local employees' average income. At the same time, the medical insurance contribution of flexible employees is managed together with local basic medical insurance funds, and is regulated by normal basic medical insurance system. In addition, there is specific regulation on flexible employees' joining of medical insurance in 16 provinces, including Shanghai, Jiangxi, Hunan, Chongqing, Heilongjiang.

In 2009, *About the Print and Distribute of Notice on Recent Key Implementation Plan on Medical and Health System Reform* issued by State Council (short for *No.12 State Council Document*) has further clarified that flexible employees and migrant workers participate in medical insurance of urban employees. The government provides subsidies for participants who are in line with the Employment Promotion Lay but have difficulties in paying the medical insurance of urban employees. Flexible employees can choose to join in medical insurance of urban employees or medical insurance of urban residents voluntarily.

2.1 Qualifications for Medical Insurance

In determining the qualifications for medical insurance of those flexible employees, the governments in different provinces specify seven general kinds of employees who are qualified, including the first, those who are self employed and earn their income honestly; the second, individual industrial and commercial households who have no employees; the third, part-time employees who are not insured in their work places; the fourth, those who are insured through the social security agencies; the fifth, urban individually-owned business entrepreneurs and their employees; the sixth, urban unemployed people; the seventh, those who keep their personal files in some formal entrusted organizations. Anyone who is one of them is eligible to join medical insurance.

But it is noteworthy that different provinces have different specifications on whether unemployed people should be covered in the medical insurance. In some provinces such as Shanghai, Hunan province, it is explicitly specified that unemployed people should not be covered by the flexible employeemedical insurance, while in others such as Chongqing and Jilinprovince, unemployed people are covered by flexible employee medical insurance.

2.2 Procedures ForJoining Medical Insurance

At present,in most provinces or cities flexible employees can apply for basic medical insurance through the following four approaches: the first, apply to the local Labor and Social Security Department personally; the second, entrust the community administrations to apply; the third,entrust the Labor and Social Security Agencies to apply; the fourth, apply to insurance agencies which deal with medical insurance.By and large, the provinces in eastern regions have higher and more flexible management level than those in western do, in terms of formalities and required documents.

Concerning the procedures of contribution, those flexible employees are encouraged to go directly to the local taxation bureaus to make their contributions in order to avoid too many of them clustering

in the halls of social security bureaus.Then, the local taxation bureaus pay those premiums and other relating fees to the medical insurance departments monthly.

2.3 Contribution Base

There are four standards to determine the contribution base of medical insurance for flexible employees. In most provinces, it is determined by the average income in an overall-planned area; the second, by the preceding year's average income of workers; the third, by the floating proportion of the preceding year's average income of workers, generally within 60%-300%; the fourth, by the rate of the contribution amount of medical insurance paid by the urban and rural residents to that of the amount paid by the flexible employees.

2.4 Contribution Rate

In most provinces the contribution rate of the basic medical insurance for those flexible employees is below 10% apart from a higher rate in a few minority of provinces(e.g. 13% in Shanghai, 20% in Tibet and Yunnan province). For example, the rate is 2% in Sichuan province and Shaanxi, 4.2% in Qinghai province, 5% in Chongqing and Xinjiang, 5%-7% in Hainan province, 5.4% in Gansu province, 5.5% in Hebei province, 7% in Beijing and 8% in Tianjin. A certain percentage of those contributions go to the basic medical insurance pooling fund, and the remainder to the cooperative funds for large-sum medical bills. Flexible employees don't maintain an individual account for basic medical insurance.

2.5 Provisions on the Waiting Period for Receiving Medical Insurance

There is a waiting period for those flexible employees to receive basic medical insurance who join the medical insurance for the first time or who pay discontinuously. During the waiting period, the insurance those flexible employees can get from the basic medical insurance pooling fund is as follows: no insurance can be received for those who pay successively but no longer than six

months(between 0 and 6 months); 30% of their expenditures on hospitalization and outpatient service on account of some special chronic diseases can be refunded from the pooling fund and the cooperative funds for those who pay successively for longer than 6 months but less than 1 year(7-12 months); 60% of the same expenditures can be refunded from the pooling fund and the cooperative funds for those who pay successively for over 1 year but less than 2 years(13-24 months); those who pay successively for two full years can get the same sum of refunds since the 25th month that the urban workers receive from the pooling fund and the cooperative funds.

The original intention of setting such a waiting period was to prevent some flexible employees from paying the basic medical insurance after becoming ill. But the period has become shorter and shorter with flexible employees' heightened awareness of joining medical insurance and the improvement of social security. Initially, the period was set for at least 1 year in some provinces but now it has been shortened to 3 months.

3. Policies on Three Other Types of Insurance for Flexible Employees

In the past ten years, flexible employees also gradually participate in social insurance besides basic pension insurance and medical insurance, but there is no national formal regulation for flexible employees to participate in these types of social insurance. Basically, related regions just explore the relevant issues by themselves according to their own economic and social development. On the whole, by comparing the number of participants and the enthusiasm in participation, unemployment insurance ranks the first, followed by work-related injury insurance and maternity insurance.

When flexible employees participate in the unemployment insurance, the basic contribution is based on contribution standard of basic pension, with contribution rate 1.2% (in Beijing), 2% (in Shanghai), and 3% (in Hunan province). We do not have many flexible employees participating in work-related injury insurance, and the provisions differ greatly in various regions. For example, in Nantong City in Jiangsu Province, everyone should pay 10 yuan for industrial injury insurance per month, but in

Shanghai, for part time employees, employers pay 0.5% of the industrial injury insurance. Pilot program has been carried out in some areas for flexible employees to participate in maternity insurance.[6]For example, in Suzhou City of Jiangsu Province, *Measures for Flexible Employees Joining Maternity Insurance* stipulates that the maternity insurance for flexible employees who participate in employee medical insurance is transferred from the medical insurance fund monthly at 0.4 percent of medical insurance contribution base over the same period by the social security agency. In this way, the flexible employees can really enjoy the maternity insurance.

4. Policy on Social Insurance Subsidy for Flexible employees

In China, social security subsidies for flexible employees help the difficult employment groups pay social insurance when they are in lower income in the flexible employment, while the coverage of social security in flexible employment and employment quality is improved. From the sources of funding, a variety of flexible employment subsidies are from special funds for employment. Thus, according to their own financial situation, the introduction of standards for social insurance subsidy varies greatly.

All provinces and cities have provisions that flexible employees in difficulties can apply for subsidies in basic pension insurance and basic medical insurance. Some provinces and cities also provide unemployment insurance subsidies, but without subsidies in work-related injury insurance and maternity insurance.

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[6]Yin Weimin, *maintain women employment and social security rights, China Labor Guarantee newspaper, Oct 19th,2015*

4.1 Targets of subsidy

Subsidies for flexible employee social security are targeted for the disadvantaged groups in flexible employment, mainly including: "4050"[7] personnel, laid-off workers of state-owned enterprises, personnel needing being resettled as a result of state-owned enterprises closure and bankruptcy, laid-off workers in urban collective enterprises, the unemployed people in urban low-income families "and" zero employment families. How to confirm the disadvantaged groups in flexible employment is the responsibility of local human resource and social security department. When applying for subsidies, flexible employee needs to provide materials as required.

4.2 Subsidy Standards

National subsidy standards for social security are only stipulated in principle, that is, the amount of subsidy is not more than 66% of the actual contribution, and the maximum of contribution base is not more than 100%. But the proportion of specific subsidies is different. For example, Guangdong provincial government directly pays 50% of the premium in the pension and medical insurance. Xinjiang provides 2/3 subsidies of the overall fee in accordance with their actual contribution of basic pension insurance, basic medical insurance and unemployment insurance. Due to the different contribution base in various regions, there is a great difference in the actual amount of subsidies. The subsidy standard is even different in the same province. For example, in 2014, in Jinan city, everybody can get a subsidy of 418 yuan per month, while in Qingdao they can only get 300yuan per month. Whatever their subsidy standard is, the amount of subsidy is basically increasing with the increase of income in society every year.

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[7] 4050means the people in labor age with women in over 40 years old and men over 50 years old, and they are eager to work but are not competitive in labor market due to their lower education and singular skills and so on. Most of them are laid-off workers from the previous national enterprise, who made great contribution for the reform, but become difficult job-finders as they become old, so the country implement special preference policy to support them.

Case study: Standards on social security subsidies of flexible employees with employment difficulties in Changsha Hunan

Changsha gives a specific division about the standard in social security subsidies of flexible employees according to the difference in age and type of insurance they participated in. The standard of social insurance subsidies is :

The staff who is in "4050" above will get subsidy of 12% of their basic medical insurance contribution, and those whose contribution in basic pension insurance is below 6% will get full subsidies, and those whose contribution reaches or exceeds 6% will get subsidy 6% of their contribution.

People who are in below 4050 will obtain subsidy 8% of their basic pension insurance contribution and 3% of their basic medical insurance contribution.

Data source: Changsha government website

（http://www.changsha.gov.cn/ggfw/jyfw_5566/zzcy_5596/bmxx_5599/201110/t20111017_203027. html）

4.3 Subsidy Period

Social security subsidies in flexible employment have a time limit. Because, we give subsidies to people with difficulties in employment and encourage them to participate in the social insurance, but social security subsidies are not an inclusive policies. It is just a supporting policy for a handful of people who have difficulty finding jobs. Therefore, in order to prevent keeping lazy people, a time limit is set for subsidies in flexible employment. If the people still cannot get employed when the subsidy period is due, in principle, they could not enjoy the benefit of social insurance subsidy, which forces these difficult job-finders to improve themselves and seek for better employment. The subsidy limit has different levels according to different targets:

(1) The maximum is not more than 3 years;

(2) The social insurance subsidy in flexible employment may be extended to the statutory retirement age for those who are qualified to get subsidies , but whose period is not more than five years from the day he gets subsidy to the day he gets retired in law.

(3) Those who enjoy the benefits from the social insurance subsidy policy from January 1st, 2009 to December 31st, 2010 but still fail to achieve a stable employment of flexible employment when the full period is due, will be extended the period to at most no more than 1 year.

4.4 Case study: social insurance contribution of flexible employees in Beijing.

According to the regulation of social insurance contribution for flexible employees, This paper takes Beijing as an example to calculate the amount of monthly contribution for basic old-age insurance, basic medic insurance and unemployment insurance (average monthly wage7086 Yuan in 2015):

Contribution Amount=Monthly average wage ×Contribution Base×Contribution Rate

For example: Contribution Amount1417.2=7086×100%×20% （when contribution base=100% of monthly average wage）

	基本养老保险 Basic Old-age Insurance			基本医疗保险 Basic Medical Insurance	失业保险 Unemployment Insurance		
缴费基数 Contribution Base	40%	60%	100%	70%	40%	60%	100%
实际缴费金额 Actual Contribution	566.9	850.3	1417.2	347.2	34.01	51.02	85.03
灵活就业保险补贴 Social Insurance Subsidy	396.84	-	-	297.6	28.34	-	-

4.5Exploration on social security subsidy policy for flexible employment

In terms of employment conditions in China, besides difficult employment group in flexible employment, in recent years, the number of university students' in flexible employment is increasing.

Thus, some regions begin to explore how to guarantee the social security in flexible employment. For example, in Shanghai, the government provides subsidy for those who graduate in and after 2014 from University with Shanghai citizenship, whose first employment is flexible within the first two years and is registered in flexible employment and pays the social insurance according to the provisions. The subsidy standard: take 60% of the average income of the previous year as the contribution base, and then calculate the social insurance premiums of which 50% is paid by the government. And the period is limited in no more than 2 years.

In addition, due to the late introduction of the provision in the contribution of flexible employees in basic social insurance, many older workers don't reach the time limit when they come to the retirement age. Therefore, many areas introduced detailed rules for the implementation of making a supplementary contribution. For example, in Zhejiang province, people are allowed to pay the social insurance to the statutory retirement age. For the older flexible employees, if the accumulated contribution period is shorter than 15 years, they can pay back the rest basic pension insurance contribution in lump sum and then receive a monthly pension when they come to the retirement age. For the long-term flexible employees, they can pay back the pension insurance counting from 2005. The pay-back standard is based on social average salary increases plus maintenance costs. This policy eliminates the concern whether the flexible employees participating in the social insurance in the midway can be guaranteed social security or not and encourages more flexible employees to join in the social security system.

5. The restriction mechanism to improve the coverage of social security in flexible employees

The government not only encourages flexible employees to participate in various types of basic social insurance, but also employs certain restraint mechanism even punitive provisions to prevent the flexible employees from stopping paying social insurance and separating themselves from national social security system again.

For example, those flexible employees who have participated in the medical insurance but stop in the midway, and don't pay it to a month overdue,will be suspended to enjoy the basic medical insurance; if they don't pay it to two months overdue, their basic medical insurance cannot be restored until they pay back the basic medical insurance as well as the interest; if they don't pay it to 3 months overdue, it is regarded as suspension, and if they require to continue to participate in basic medical insurance, the waiting period for medical insurance benefit will be recounted, during which period they cannot enjoy the benefit or complete benefit of basic medical insurance. In addition, those employees in difficulties who suspend the insurance in the midway also get suspended in receiving the social insurance subsidies. Meanwhile, in the basic pension insurance system, only 8% of social insurance paid previously can be included in the personal account. If the social insurance is suspended in the middle, except the 8% personal account, 12% insurance expenses paid cannot be returned.

III. Coverage Status and Problems of China Social Insurance on the Flexible Employment

Currently, China is building the social security system covering both urban and rural areas, among which the universal health care has been implemented basically. Up until the end of 2013, 322 million urban workers have been insured in the national basic pension insurance, 498 million urban and rural residents insured in the social old-age insurance. 141 million old people who are insured in the basic pension insurance for urban and rural residents have got the basic pension. Employment injury insurance covers 199 million workers and unemployment insurance and maternity insurance covers 164 million workers respectively.[8]Although China's social security system is being improved, the social insurance on flexible employment, both in coverage and policies and systems improvement, is backward relatively.

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[8]Labor security blue book, the China Labor and Social Security Report (2014), published by Social Sciences Academic Press (China)

1. Survey on Coverage Status of Social Insurance

The scale of flexible employees should be considered primarily when China's social insurance on flexible employment is studied. However, due to the lack of accurate official data on the flexible employees, the statistical yearbook, along with other analysts' estimation, was used on the estimation of China's flexible employees in 2013.

According to the statistical data from the China Labor Statistical Yearbook in 2014, the number of employees in China cities and towns is 382 million, among which, based on the employment status, the self-employed workers and the unpaid familial workers account for 23.7 percent and 3.1 percent respectively. That's to say, 102 million employees are flexible. While in 2013, China has 120 million flexible employees at least if 10.52 million informal employees (non-employed workers or other employees) are taken into account. It accounts for 31.4 percent of the national employment in cities and towns.[9]

1.1 Coverage Status of Basic Pension Insurance

On the flexible employees' pension insurance, this article thinks it should be studies with two phases, before and after 2006. Before 2006, no consolidated regulation on the flexible employees' insurance and official data on the number of the employees insured could be found. The items, such as the insurance rate, radix, were regulated voluntarily by the local authorities. However, in 2005, with the issue of the State Council's No.38 document in which the insurance policy on the flexible employees was confirmed, the individual business and flexible employees are paid high attention to being the emphasis of pension insurance. The policy not only enhanced the insurance rate, but adjusted the way of statistic data.

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[9] The estimation only includes the data from yearbook, excluding the flexi2014ble employees in the small and micro businesses and the flexible employees by network.

1.1.1 Coverage Status of National Basic Pension Insurance

Phase 1 (from 1999 up until 2006): with the development of laid-off workers' re-employment, large-scale informal employment was counted. In addition to the enterprise staff, other staff (mainly referring to the flexible employees)'s statistic data was counted in the number of the employees who were insured in the basic pension insurance. Hence, in this phase, this article reflected the flexible employees' general insurance status with other employees' insurance status. According to the data from table 1, the insured number of other employees (mainly including the flexible employees) was increased widely from 1999 up until 2006 and the increasing rate of each year reached 10 percent almost. While the increasing rate of enterprise staff's insurance rate at the same period is 5 percent or so. Based on the increasing number and rate, although the insured number of enterprise staff is 37.59 million with only 42.4 percent increasing, other staff's insured rate kept 135.4 percent increasing with 8.703 million new insured numbers from 1999 up until 2006.Based on the total number, 15.129 million other staff has been insured in the national basic pension insurance up until 2006.Namely, the insured number of the flexible employment assumed a high-speed increasing.

Table 1: Number Changes on the Basic Pension Insurance (Unit：Ten Thousand，%）

Year	Insured Number and Percentage					
	Staff Number	Increasing Rate	Enterprise Staff	Increasing Rate	Other Staff	Increasing Rate
1997	8670.9	-	8670.9	-	0.0	-
1998	8475.8	-2.3	8475.8	-2.3	0.0	-
1999	9501.8	12.1	8859.2	4.5	642.6	-
2000	10447.5	10.0	9469.9	6.9	977.6	52.1
2001	10801.9	3.4	9733.0	2.8	1068.9	9.3
2002	11128.8	3.0	9929.4	2.0	1199.4	12.2

2003	11646.5	4.7	10324.5	4.0	1322.0	10.2
2004	12250.3	5.2	10903.9	5.6	1346.4	1.8
2005	13120.4	7.1	11710.6	7.4	1409.8	4.7
2006	14130.9	7.7	12618.0	7.7	1512.9	7.3

Source of Data：China Labor Statistical Yearbook in 2014

Diagram 1: Accumulative Increasing Status on the Insured Number of Basic Pension Insurance
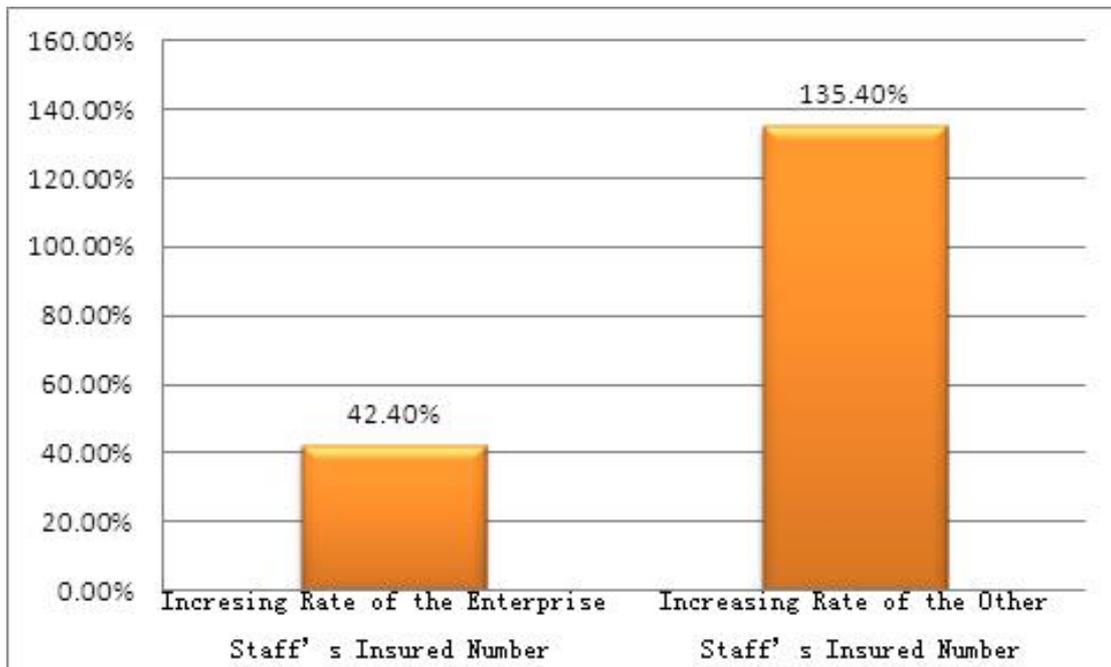
From 1999, although the flexible employment's insured number is increasing every year, the coverage is still small relatively compared with the large-scale flexible employment. According to Table 2 and Diagram 2, the total insured rate of the pension insurance for cities and towns employment kept 45 percent or so in this phase and was increased to 47.69 percent in 2006. The

insured rate of the non-enterprise employment dominated by the flexible employment kept 10 percent or so which is only 11.86 in 2006.It reflected that before 2006, although the pension insurance for flexible employment occurred, it was paid enough attention by neither the individuals insured nor the government.

Table 2: Non-Enterprise Employment's Insured Rate on Pension Insurance（Unit：Ten Thousand People，%）

Year	Total Employment Number in Cities and Towns	Insured Number of Pension Insuranceof Employment in Cities and Towns	Insured Rate of Employment in Cities and Towns	Non-Enterprise Employment Number	Insured Number of Non-Enterprise Employment	Insured Rate of Non-Enterprise Employment
2000	23151	10448	45.13	10290	978	9.5
2001	24123	10802	44.78	11290	1069	9.47
2002	25159	11129	44.23	11912	1199	10.07
2003	26230	11647	44.4	12285	1322	10.76
2004	27293	12250	44.88	12545	1346	10.73
2005	28389	13120	46.22	12648	1410	11.15
2006	29630	14131	47.69	12752	1513	11.86

Diagram 2: Coverage Status of Pension Insurance from 1999 Up Until 2006(%)
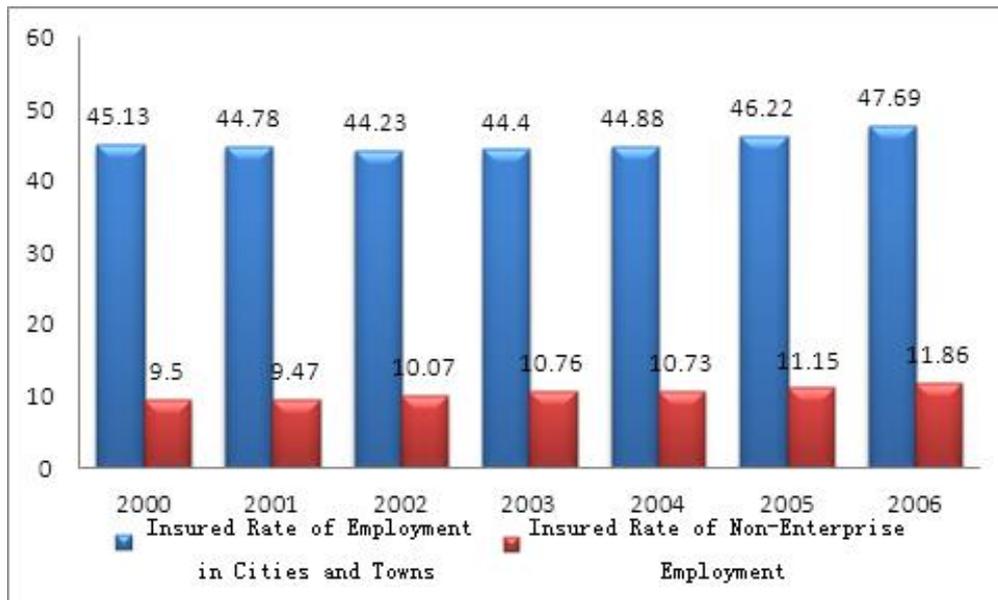
Phase 2(since 2006): the State Council's No.38 Document regulated that the basic pension insurance base for the individual businesses and flexible employees in cities and towns is the on-post staff's average wages in the previous year and the insurance percentage is 20 percent among which, 8 percent credits into the personal account. It starts the new area of pension insurance of informal employment. The statistic data indicates a large increasing of the insured people that comparing with that in 2006, the insured people in 2009, up to 45.45 million, tripled. This increasing is partly due to the issue of new policy which unifies the local insurance base and percentage. The government' propaganda and implementation of the insurance policy also brings more and more flexible employees into the basic pension insurance. For another, it's also due to the continuously improved statistic system that since 2006, especially after 2009, China built new final accounts system of social security fund and updated the statistical caliber[10]to have the insurance statistics of flexible employment more accurate.

Since 2009, the insured people of basic pension insurance for informal employment are increasing every year. Up until the end of 2014, the insured people have reached 78.24 million, which,

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[10] The new policies in the State Council's No.38 Document came into effect since 2006 and each province in China started to implement new policies. At the same time, new statistic system on flexible employees began to be built. Up until 2009, national consolidated basic pension insurance data on flexible employment was formed. Hence, the data in phase 2 was selected and arranged since 2009.

compared with that in 2009, kept 11.5 percent increasing with 32.79 million new insured people. The proportion of the insured informal employee in the current total insured employees increased to 22.9 percent from 19.3 percent in 2009 (refer to Diagram 3). The informal employees who are insured in the basic pension insurance occurred a high-speed increasing in the past six years and have been a principal insured group on the basic pension insurance in China cities and towns. (refer to Diagram 4)

Table 3: Current Insurance of Other Staff[11]

Year	Insured People (Ten Thousand People)	Percentage in the Total Insured People
2009	4545	19.3%
2013	7258	22.5%
2014	7824	22.9%

Source of data: the Annual Report of China Social Security Development in 2014[12]

Diagram 3: Current Insured Increasing of Other Staff

[11] Other staff refers to the people who are personally insured in the basic pension insurance for the workers in cities and towns, such as individual businesses and flexible employees and so on. According to the statistic concept of "other staff", this article regards it as the statistic index of informal employees in the cities and towns in China.

[12]The Annual Report of China Social Security Development in 2014 was issued by the Social Insurance Administration of the Ministry of Human Resources and Social Security of China in June 2015.
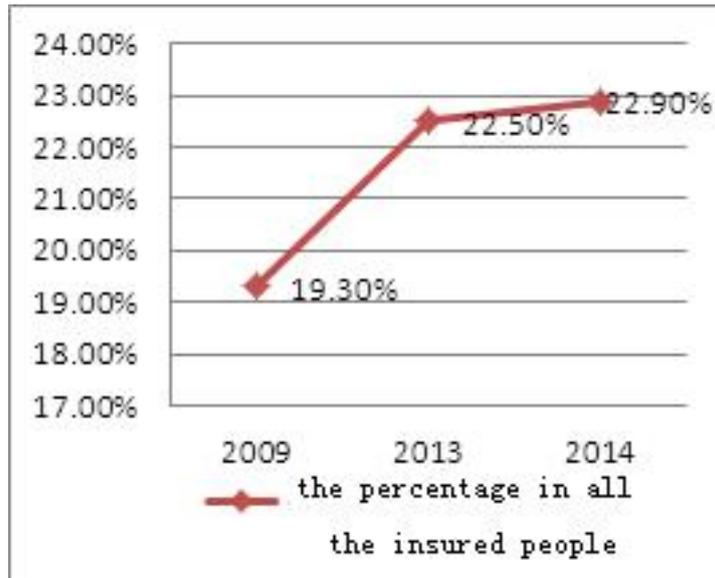
Diagram 4: Insured Staff Composition in Cities and Towns
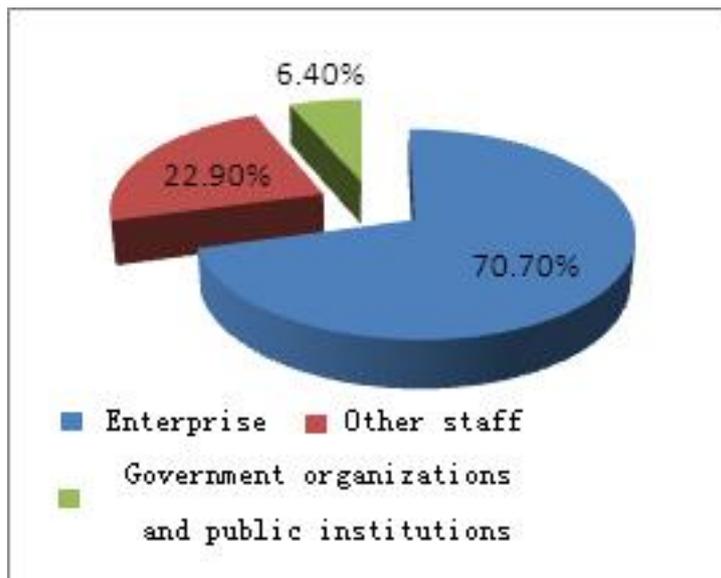
The implementation of flexible employment policy enlarged the insurance coverage of flexible employees, individual businesses and other informal employees obviously. The insured rate increased from 11.9 percent in 2006 up to 33.6 percent in 2014. Meanwhile, the insurance coverage increases with the improvement and implementation of the basic pension insurance policy which encourages informal employees to be insured. The comparison between Diagram2 and Diagram5 indicates great increasing of the insured rate for the informal employees in the two phases before and after 2006.The large gap between the insured rate in the first phase and the rate for the employees in cities and towns shows that the insurance coverage of the informal employees in cities and towns seriously lowered the coverage level of the whole coverage rate of all the employees. The second phase data states the insured rate of informal employees increased more quickly than that of all the employees in cities and towns. Up until 2014, the rate of joining basic pension insurance of informal employees increased to 67.2 percent.

Table 4: Basic Pension Insurance Coverage on Informal Employees Since 2009

Year	Estimated Scale of Informal Employees (Ten Thousand People)	Insured Number of Informal Employees (Ten Thousand People)	Insured Rate of Informal Employees (%)	Insured Number in Cities and Towns (Ten Thousand People)	Insured Rate of Employees in Cities and Towns (%)
2009	13508.5	4545	33.6	23550.0	75.7
2013	11300.02	7258	64.2	32218.0	84.3
2014	11648.41	7824	67.2	34124.0	86.8

Diagram 5: Current Pension Insurance Coverage Rate（%）
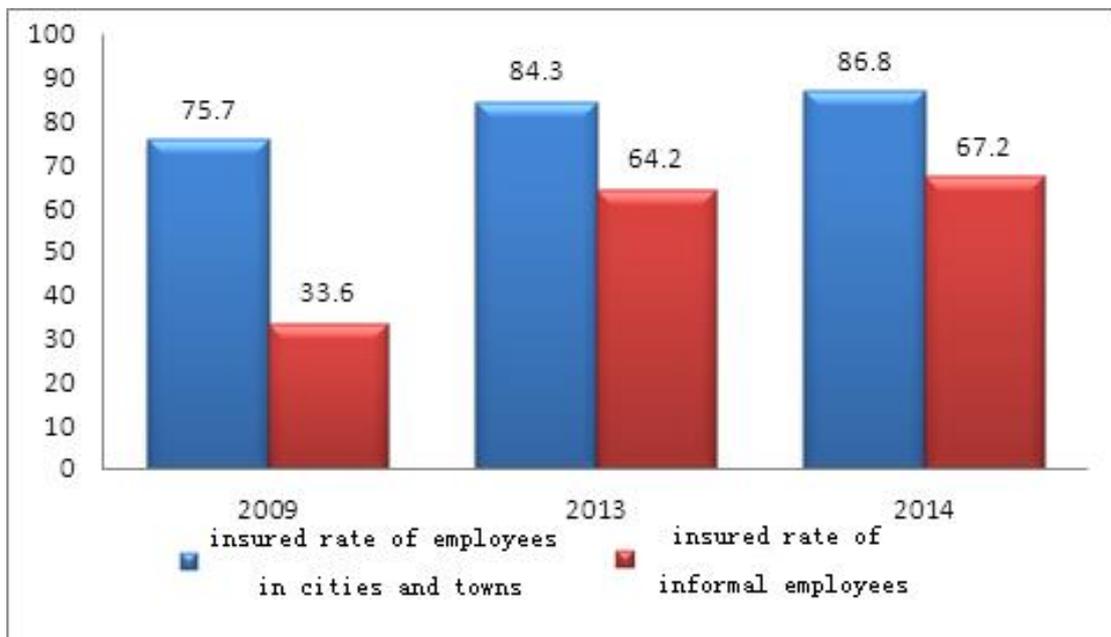
The author noticed that the new statistic system in 2009 includes statistic index of actually paid persons and found that there's a large gap between actually paid persons and insured persons. It indicates that some people have registered to join the insurance without the pension insurance premium paid. According to the research and analysis, this fact is mainly due to the low income level of the flexible employees and the cross-region difficulties to transfer and renew the pension insurance.

Diagram 6: Percentage of the Tolled Personnel in Enterprise Contribution in the Total Insured People from 2009 up until 2014
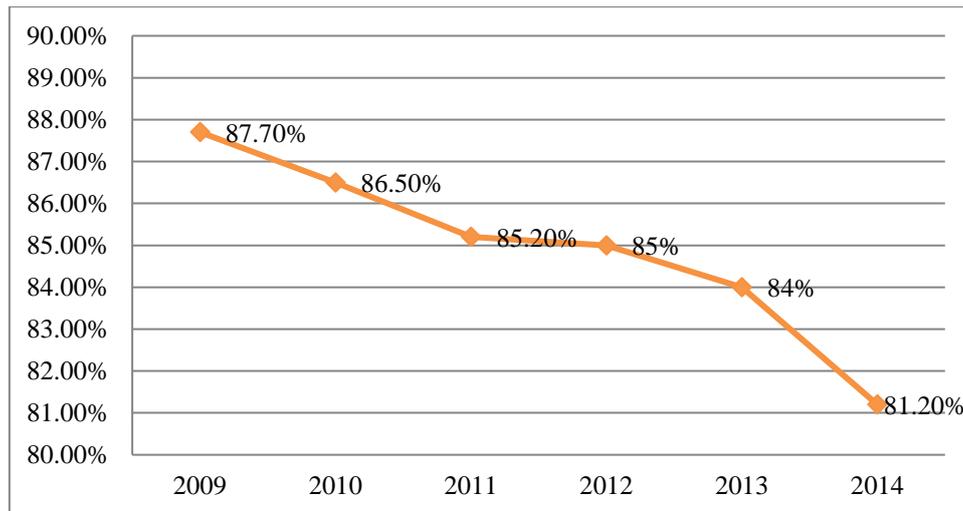
Source of data: the Annual Report of China Social Security Development in 2014

According to Diagram 6, tolled personnel in enterprise account for 81.2 percent in the insured staff. It's 2.8 percent point less than that in 2013 and 6.5 percent point less than that in 2009. Typical survey indicates that the decreasing was mainly due to the contribution breaking off by some people who were in difficulties, such as the low and unstable income of some individuals and flexible employees. Above all in 2013 and 2014, the structural slowing down of Chinese economy resulted in the decreasing of the informal employment in the marginal section and the low enthusiasm to join the insurance.

At last, on the basic pension insurance coverage for informal employment, the author deems it should be defined into generalized coverage rate and narrow coverage rate. The narrow coverage rate refers to the rate reflected by informal employees added in the pension insurance system for the employees in cities and towns. The generalized coverage rate, with more extensive scope, includes amounts of migrant workers, in addition to laid-off workers and unemployed workers.[13] The current basic pension insurance system in China mainly includes the basic pension insurance system for employees and the basic pension insurance system for the urban and rural residents. On the basis of

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[13] Currently, numbers of informal employees in cities are migrant workers to cities, especially those senile and less-schooling migrant workers, such as baby-sitters, building workers, waiters or waitresses and so on.

author's labor interviews, many migrant workers in cities joined the pension insurance for the urban and rural residents in their hometown instead of joining the insurance for employees in cities and towns. Similarly, in cities and towns, many flexible employees were insured in the insurance for residents in their own communities instead of being insured in the insurance for employees as most of them only have part-time time. Therefore, the generalized coverage rate should be the general coverage for the informal employees who join both the two insurance systems.

1.1.2 Pension Coverage of Various Regions

After 2006, although the job schedule to conduct the flexible employees to join the basic pension insurance differed among provinces, in 2009, all the provinces in China finished the system construction and policy implementation. The top six provinces or cities with the largest insured number increasing are Tibet Autonomous region, Guangdong Province, Ningxia Autonomous Region, Zhejiang Province, Shanghai City and Xinjiang Production and Construction Corps, with Hebei Province, Henan Province, Guizhou Province and Jiangxi Province on their heels. This policy's effectiveness is embodied in the large insured number increasing in western regions of China, such as Tibet Autonomous Region, Ningxia Province, Xinjiang Autonomous Region and Guizhou Province and eastern regions of China, such as Guangdong Province, Shanghai City and Zhejiang.The total insured people in western regions are less than that in eastern regions though. Among all the regions, Zhejiang Province has the most flexible employees insured in the basic pension insurance. The number has been up to 5,904,000.

1.2. Coverage of Basic Medical Insurance

Up until the end of 2014, 95 percent, with 1.3 billion people, is kept for the coverage rate of basic medical insurance for employees and the residents in cities and towns. The State Council's No. 12 Document in 2009 confirmed the voluntary to join the employee's medical insurance or the resident's medical insurance in cities and towns. Hence, the coverage rate of the basic medical insurance for flexible employees is as high as that of the basic pension insurance and it nearly

achieved that all the citizens are insured in the medical insurance. This article mainly studied the coverage rate for flexible employees from two different basic medical insurance.

1.2.1 Employee's Basic Medical Insurance in Cities and Towns

Up until the end of 2014, the insured number of national employee's medical insurance was 282,960,000, with 8,530,000 people and 3.1 percent increasing. It has 63,590,000 people and 5.2 percent annual growth rate increasing compared with that in 2009. The insured informal employees[14] up until the end of 2014, 31,470,000 people, accounted for 11.1 percent in the total insured employees. However in 2009, 22,850,000 insured informal employees were insured with 6.6 percent annual growth rate.

Based on the insured number, compared with the insured number of basic pension insurance, less informal employees are insured in the employee's basic medical insurance or the resident's basic medical insurance in cities and towns as the flexible employees are permitted to join the medical insurance voluntarily (refer to Table 5).For instance in 2014, 31,470,000 people were insured in the employee's medical insurance, 78,240,000 people in the employee's pension insurance. That's to say, among the informal employees in 2014,more than half of the employees who were insured in the employee's pension insurance were insured in the resident's medical insurance or not insured in the medical insurance.

According to the trend from 2009 up until 2014, the number gap of the informal employees who join these two insurances is expanding every year, which is due to, based on the author's opinion, the surplus labors from countryside. These labors are apt to join the lower-paid resident's medical insurance in cities and towns as there is slim gap between the employee's medical insurance and the

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[14] The statistical data of "Other staff" is used here. Other staff's statistical caliber is same as that of basic pension insurance.

resident's medical insurance in the social benefits but large gap in the contribution. The employee's medical insurance is paid by the income ratio, while the resident's medical insurance is paid only by the national average level of CNY 120.Different from the medical insurance, the labors tend to the employee's pension insurance as the employee's pension insurance has more social benefits than the resident's pension insurance. On the behalf of informal employees, the government should avoid the expansion of this gap.

Table 5: Comparison between the Employee's Medical Insurance and the Employee's Pension Insurance in Cities and Towns for Informal Employees

Year	Estimated Scale of Informal Employees (Ten Thousand People)	Number of Insured in Medical Insurance (Ten Thousand People)	Number of Insured in Basic Pension Insurance	Insured Rate in Employee's Pension Insurance in Cities and Towns (%)	Insured Rate in Employee's Medical Insurance in Cities and Towns (%)
2009	13508.5	2285	4545	33.6	16.9
2013	11300.02	2984	7258	64.2	26.4
2014	11648.41	3147	7824	67.2	27

Source of data: the Annual Report of China Social Security Development in 2014

Diagram 7: **Insured People Gap between the Two Insurances（population: 10 thousand）**
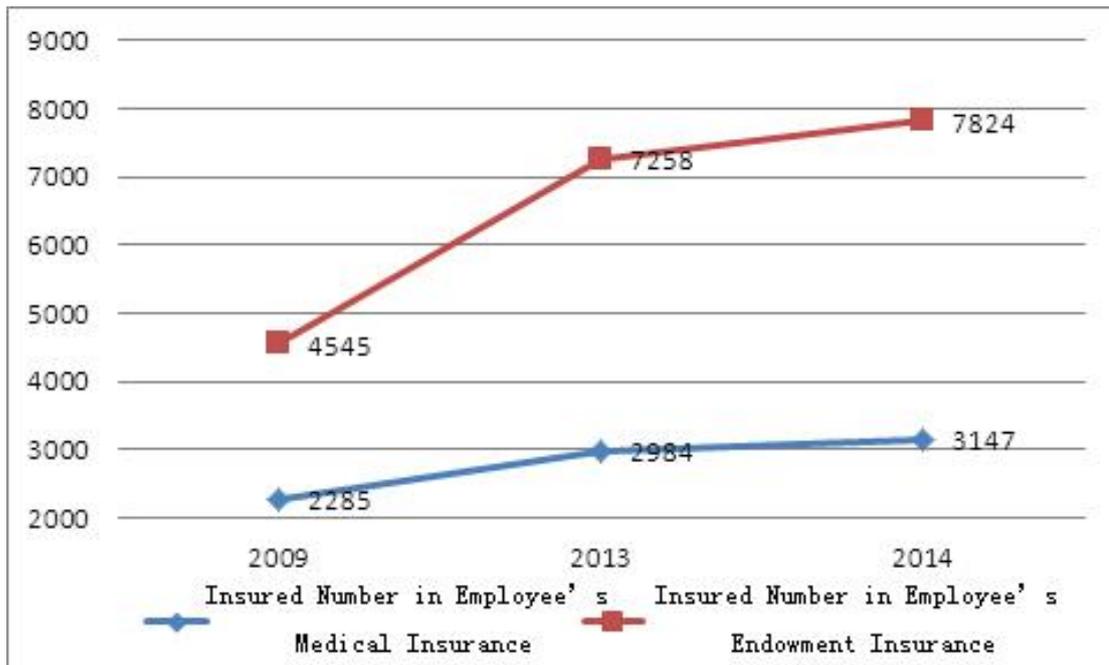
1.2.2 Resident's Basic Medical Insurance in Cities and Towns

Most informal employees are insured in two insurances, resident' medical insurance in cities and towns and the new rural cooperation medical insurance (short for new rural insurance), which have the similar nature, contribution and social benefits. Hence in 2013, it was reported the two insurance would be consolidated into resident's basic medical insurance in cities and towns. Nowadays, the per-capita government subsidies of the two insurances were increased to CNY 380, resident's per-capita contribution in cities and towns to CNY 120 at least, per-capita contribution of new rural insurance to CNY 120 or so. The outpatient expenditure contribution of resident's medical insurance in cities and towns and the new rural insurance policy reached 50 percent and the hospitalization costs contribution reached 75 percent or so.

It's a pity that in the statistics of resident's medical insurance in cities and towns, except the statistical data of adults insured, no data of informal employees insured was found. Up until the end

of 2014, there are 181,810,000 adults[15] insured in the resident's medical insurance in cities and towns, which accounts for 57.8 percent in the total insured people in the resident's medical insurance. The adult statistics indicates numbers of informal employees insured, which means more than half of the adults engaging in flexible jobs. The informal employees insured in the resident's medical insurance, more than 90,905,000 people, are triple than that in employee's medical insurance.

1.2.3 Medical Insurance Coverage in Various Regions

Numbers of insured informal employees differ from regions to regions, among which, the top six provinces in China with the most insured people are Hubei Province, Jilin Province, Anhui Province, Heilongjiang Province, Jiangxi Province and Jiangsu Province. Jilin Province and Heilongjiang Province, one third of the six top provinces, belong to the northeast of China. The author believes that more informal employees are insured in the employee's medial insurance mainly because as the old industrial base, the northeast of China, including Heilongjiang Province, Jilin Province and Liaoning Province, has more flexible employees re-employed and more effective policy propaganda and implementation.

The author compares and analyses the informal employee's status in the resident's insurance in cities and towns by adult's data to join the insurance. The adult's insured proportion indicates that it is the students and preschoolers or the adults that form the majority of the local personnel structure to join the resident's insurance. It also reflects the local informal employee's proportion to join the resident's insurance in cities and towns. For example, the adult's insured proportion is less than 15 percent in Beijing and Shanghai, which means most of the informal employees are insured in employee's medical insurance in the two cities[16]. Besides, more informal employees have higher-quality level to join the insurance and get better health treatment.

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[15] Adults refer to the aged and the residents in cities and towns without jobs or with low-income jobs, excluding students and preschoolers.

[16] This result was figured out on the premise of more than 95 percent insured rate in national medical insurance. There could be differences in insurance categories.

Table 6: Informal Employee's Situation to Join the Resident's Basic Medical Insurance in Cities and Towns in Various Regions in 2014

Regions	Insured Number (Ten Thousand People)	Insured Number for Adults (Ten Thousand People)	Percentage (%)
Beijing City	173	23	13.3
Shanghai City	258	37	14.3
Guangxi Autonomous Region	585	190	32.5
Liaoning Province	738	287	38.9
Xinjiang Autonomous Region	285	114	40
Henan Province	1158	473	40.8
Hebei Province	753	308	40.9
Hubei Province	1035	427	41.3
Anhui Province	1017	427	42
Inner Mongolia Autonomous Region	527	225	42.7
Sichuan Province	1247	560	44.9
Shanxi Province	444	200	45

Shandong Province	2128	1001	47
Shaanxi Province	672	324	48.2
Tibet Autonomous Region	26	13	50
Jiangxi Province	915	472	51.6
Hunan Province	1493	788	52.8
Fujian Province	556	294	52.9
Jilin Province	804	430	53.5
Xinjiang Production and Construction Corps	102	55	53.9
Jiangsu Province	1436	797	55.5
Hainan Province	195	109	55.9
Guizhou Province	332	191	57.5
Tianjin City	514	304	59.1
Heilongjiang Province	712	425	59.7
Gansu Province	328	196	59.8
Qinghai Province	97	58	59.8
Yunnan Province	673	441	65.5
Ningxia Autonomous Region	462	317	68.6
Guangdong Province	6157	4473	72.6
Zhejiang Province	2948	2144	72.7
Chongqing City	2681	2079	77.5

1.3. the Coverage Status of Other Social Security

Now, informal employees do not take an active part in the social security except medical care and pension, being from the personal perspective or the political one. Politically, China, as a developing country faced with a great number of employees and the status quo of the construction of the social security system, have the more urgent job to provide basic social security service, namely the pension and medical care, with broader coverage and higher quality. Therefore, the country politically tend to encourage enterprises and citizens to be involvedin other kinds of security and does not employ much restriction and subsidy for those kinds. This is in accordance with the current situation of the status quo of Chinese social security system. And for individual employees, the majority of them have the lower and stable income level, and are thus not able to afford the social insurance fees after covering the daily expenses of themselves and the family. They usually choose to join the most needed and basic social security and the activeness of them for that of work-related injury and unemployment naturally decreases.

As statistics do not specifically count the informal employees' participation in work-related injury and unemployment insurance, the author can but from the participation of individual enterprise owners and migrant workers reflect the involvement of the informal employees in social security. From chart 7, individual enterprise owners and migrant workers, who mostly are informal employees, witness a stable annual increase in their participation of insurance. The proportion of the migrant workers' applying rate to the total one has reached 35.7% in terms of work-related injury and 23.9% in terms of unemployment. It is safe to say that informal employees have been becoming a major group of the participants.

Table 7 Number of participants in the work-related injury and unemployment insurance (ten thousand people)

year	Work-related injury insurance	Unemployment insurance

	Migrant workers	Individual enterprise owners	Migrant workers
2009	5587	51	1642
2013	7263	117	3740
2014	7369	140	4071

Source: The Statistic Bulletin of the Development of Human Resources and Social Security, 2009, 2013, 2014

As for maternity insurance, the specific data of informal employees indicate that so far as the end of 2014, participants of informal employees have reached 6.33 million, with the proportion of 3.7% to the total of the participants, an increase of 3.22 million compared with 2009 and an average growth rate of 15.3%.

Generally, though the number of participants is increasing with a fast speed, but for the vast number of informal employees in cities, the coverage of insurance is still relative small, whether it is the maternity insurance specifically designed for them, or the work-related injury and unemployment insurance.

2. Research on the Social Security of Informal Employees in Emerging Industries

In the past ten years, great changes have taken place in the industrial structure in China, especially the profound changes in the form of enterprise organization and employment mode resulted from the development of information industry and the wide penetration of other industries; some emerging industries like various intermediary service industries including logistics and information service develop rapidly, causing significant changes in employment mode and concept. More and more people are not satisfied with the traditional way of employment, and are more inclined to choose flexible employment forms such as periodic employment and flexible employment so that they can

gain more leisure time, enrich and improve themselves, realize their own value and get material and spiritual enjoyment in a higher level. The employment group of high quality and flexibility has gradually expanded and has become a way that cannot be ignored in the employment and entrepreneurship among the university students and other senior talented people. For example, a web design engineer who can do web design and maintenance for a number of Taobao shops through the network has flexible working hours, and the income is calculated according to the workload. Therefore, the author believes the people in this field fits in the category of informal employees. But according to the research done by Alibaba in 2012, those business builders and employees of the online emerging industries are not included in the employment statistics of the country, which makes a number of them to be unable to enjoy the preferential policies for physical startups and related public service. It especially influences their involvement in the social security, and it also is the highest concern of personal interests for the employers and employees online.

This subject, referring to the survey result of Alibaba on near 5,000 online shops across the country in 2014, analyzes and interpret the social security coverage of the informal E-commerce employment. The online shops are divided into the groups of private ones and enterprise owned [17]. The participation of social security of the owners and employees are counted respectively as follows:

2.1The participation of social security of the owners[18]

(1) over 40% of the owners do not join any social security

In the shops surveyed, 41.8% of the owners do not have participation in social security, and the rate of the private owners is 42%, the enterprise owners 32.7%. This reflects that in the emerging

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[17]The private shop means individualswork full-time or part-time, run their own shop; the enterprise owned online shop means relying on the Internet to provide a platform for companies, enterprises or individuals to runan online shop.

[18] All the shop statistical data used are from *the report of employment of internet-based business and social security statistics in 2014,* China Association for Employment Promotion, the institute of Alibaba (China) Co., LTD

industries like E-commerce, the coverage of social security among informal employment is quite small, with more than 40% of them do not have the basic pension and medical care. Meanwhile, the enterprise owned online shops are restrained and guided by the online enterprises, and the private shop owners are of more arbitrariness, which leads to the 10% differentiation of their involvement in social security.

(2) the focus on the short-term applicability when joining social security

Among the shop owners who join the social security, 20% of them join the basic medical care for towns and cities labor, 18.4% the basic pension, and 16.6% the work-related injury. The rates of those three are the top, followed by the insurance of unemployment, new rural cooperative medical care, citizen pension, and citizen medical insurance. It can be seen from the participation of owners that their need mainly focuses on the short-term applicability of the insurance, namely the aspect that requires insurance compensation the most during the current period of insurance and employment. Therefore, the participant in medical is the most, with a sum of 58.8%, and the second is pension. Considering the unexpectedness of the job, people who join the work-related injury is also relatively more, and those for unemployment and maternity insurance are relatively less.

Diagram 8 The Coverage of Types of Insurance for Online Shop Owners, 2013(%)

Other
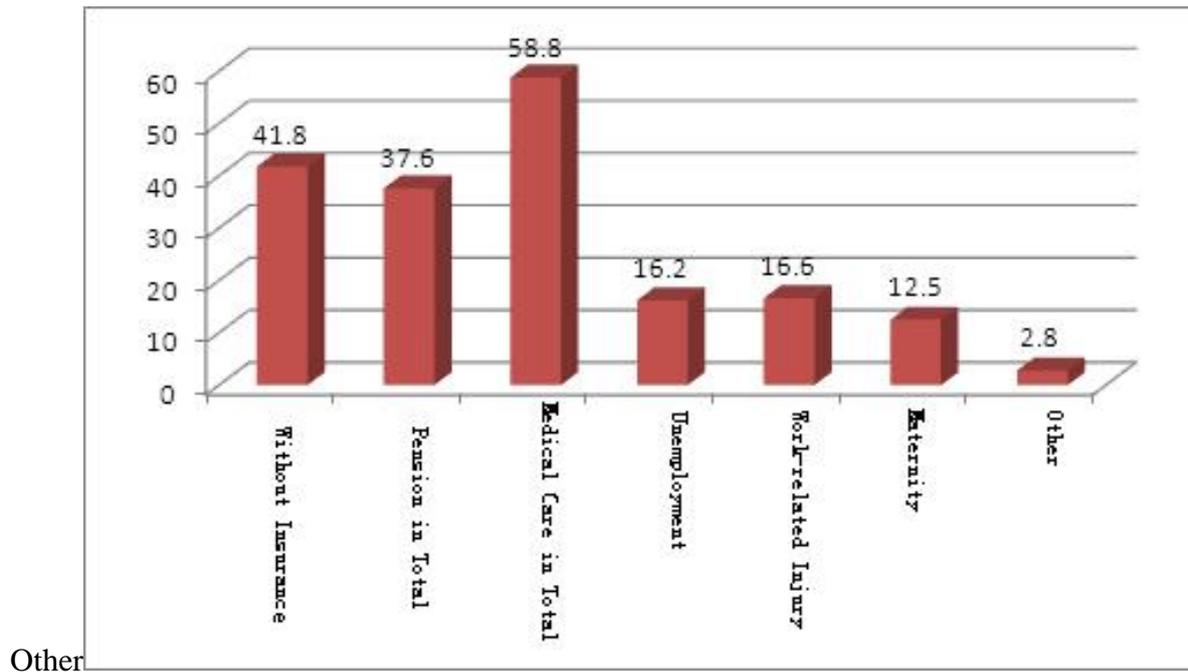
And from the perspective of types of pension, the pension for towns and cities labor and that for citizens have close rates of 49% and 51% respectively. It shows that in the online employment like E-commerce, there are still more than half of the owners preferring the pension for towns and cities citizens, which is of lower fees and lower compensation. This will lead them to be unable to afford better life after retirement with the less compensation. And it is similar with the types of medical care.

Diagram 9 The Participation of Online Shop Owners in Pension
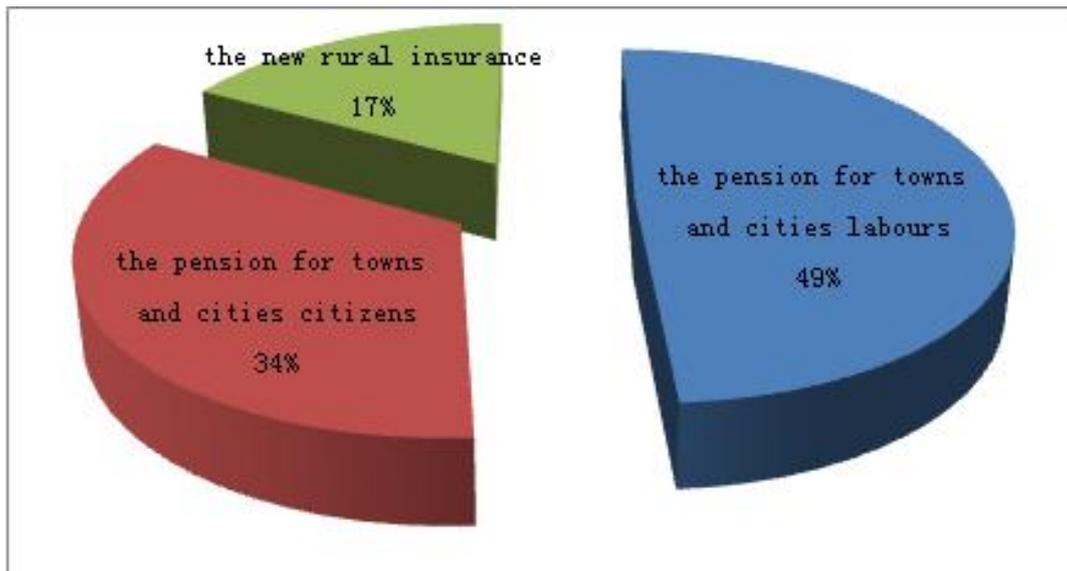
Diagram 10 The Participation of Online Shop Owners in Medical Care
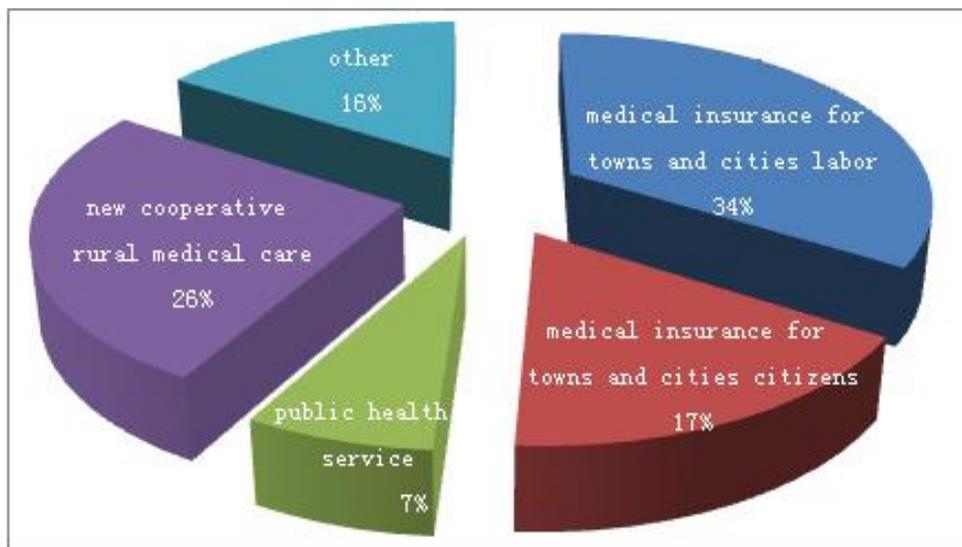
According to the survey, online shop owners do not join social security mainly because of reasons like "not understand", "too expensive fees", "nonlocal identity", and "too complicated application".

2.2 The survey on the participation of online shop employees in social security[19]

Overall, more than 70% of the employees do not have social security. Less than 30% of them involve themselves in social security, and 75.6% among the employees of private online shops do not have any social insurance with the participation rate of lower than 10% in all types of insurance. Even in enterprise owned shops, there are 52.4% of the employees who do not have social security. Among those who have, the most participated insurance is the pension for towns and cities labor (27.2%), and the second most is work-related injury (24.5%). Comprehensive statistics show that, like online shop owners, those who participate in social security mainly are participants of basic pension and basic medical care, and few of them are participants of other insurance. This reflects that the social security coverage of the informal employment is very small.

Diagram 11 The coverage rate of types of insurance among online employees, 2013

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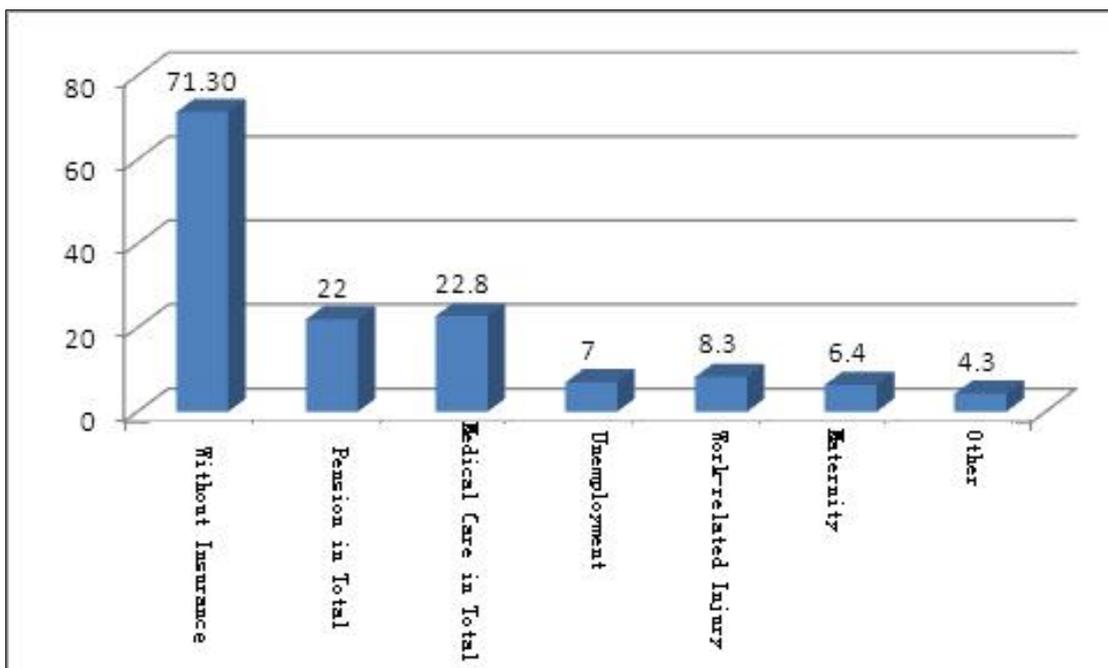
[19]All the shop statistical data used are from *the report of employment of internet-based business and social security statistics in 2014,* China Association for Employment Promotion, the institute of Alibaba (China) Co., LTD

Besides, being it the private shops or the enterprise owned ones, among the employees who join the medical care, the participation in the new cooperative rural medical care receives a higher rate than other types of medical care. It indicates that there is a large number of migrant workers in the informal employees online, and their participation of social security is overall lower.

2.3 Too low level of income to afford the social security fees is the main reason for the inability for participation

The survey shows that among the private shops researched, the average tractions in early 2013 is 255, and the average revenue is 7,831 yuan, with the average volume for each transaction is 34 yuan. The scale volume of trades are small for private shops, with the trades of small amount and meager profits being the major component. Seen from the group data, 69.7% of the private online shops have monthly number of transaction lower than 50, and 36.1% have only below 10. From their monthly revenue, 68.1% receive lower than 3,000 yuan, 16.4% receive from 3,000 to 10,000, and 15.5% receive more than 10,000. Setting the average monthly social security fees for per person as 500 yuan and the basic life expense as 1,000, near 60% of the private shops fail to afford the social security fess. [20]

IV. Conclusion

The subject, through the research on the social security policies and social security coverage, reaches the conclusion as follows:

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[20]All the shop statistical data used are from *the report of employment of internet-based business and social security statistics in 2014,* China Association for Employment Promotion, the institute of Alibaba (China) Co., LTD

1. The systematic coverage of basic pension and medical care have been realized, and the policies for other insurance are still in the phase of exploration and experiment.

From around 2000, informal social security issues have drawn the attention of policy makers. After the exploration, experiment and perfection for more than a decade, the basic pension and medical care policy system designed for informal employment has been built and the systematic coverage has been realized. In other words, as long as individuals are willing to, they can join pension or medical care as informal employees, and there are tailored insurance subsidy policies for informal employees who have financial difficulty.

As for unemployment, work-related injury and maternity insurance policies, there are not nationwide policies yet, but in recent years, with the completeness and improvement of social security, some provinces and cities have started exploring have to tackle the problems of work-related injury, unemployment and childbirth of informal employees, and trial measures and drafts have been enforced as well.

2. Insurance rates for basic pension and medical care have increased drastically, but with the lower level of compensation.

Since the enforcement of the new policies in 2006, the insurance rate of basic pension for informal employees has grown remarkably every year, and with the overall planning of the towns and village pension and village labor's joining the new rural insurance, insurance rates have taken a qualitative leap. But because the country does not impose compulsory policies on what types of pension informal employees should choose but encourage them to choose by themselves, most informal employees, because of the limit of their own economic conditions and the shortsightedness on pension, choose to join the towns and cities labor pension and the new rural insurance with the lower

level of compensation and 15 years' contribution. This undoubtedly expand their living condition with low income to their life after retirement. So it is with the insurance of basic medical care.

3. Informal employees are still the marginal and rarely concerned group of social security in the new economic form.

Most of the current employees in the new economic form are still informal ones. Those people, because of their low and unstable income, and not being included in the traditional statistics of employment, are not able to enjoy insurance policies with subsidies, which interferes with their activeness for social security.

According to the survey of Alibaba, 87.1% of the online shops are certificated by the E-commerce platform, but only 6.1% have registered for their business license and been certificated by local human resource and social security department. The employers and employees from the 81% uncertificated cannot be viewed employed and thus cannot enjoy the subsidy policies for informal employment, which makes it hard for them to cover the social security fees by themselves. Those informal employees are invisible and marginal for our current social security policies.

4. The subsidy policies for social security for informal employment have remarkable effects, but with the narrow coverage.

The subsidy policies for social security for informal employment are the most beneficial for promoting the participation of informal employees. The subsidy standard, 50% of the real insurance fees, to a great extent lowers the cost of insurance for informal employees and betters their activeness. Therefore, since the enforcement of the policy, lots of areas have reached good results.

But because the subsidy funds are from the government budgets and the local specific funds, the first purpose of subsidies is to reduce unemployment. So in many areas, when applying this subsidy, people are required to turn in the relative certificates stamped by human resource and social security department, with the position and address marked with details. This inevitably becomes the hindrance for people who randomly take part-time jobs or are employed online to apply for the subsidy, and makes it harder for those who really need it to receive such help and support.

5. The social security base and rates are still relative high for informal employment, and the transition and continuity between systems still lack flexibility.

The higher insurance rates can lead to higher compensation level of social security, but as for the current economic level of China, informal employees are not able to cover the relatively higher insurance fess. The current rates have excluded some of them from social security. Besides, because of the flexibility of informal employment, those employees may at any time transfer their quality of employment, from informal to standard. It is also possible that they change their physical space of employment, from place A to place B. And their will of participation may change as well because the right to choose on their will is greater for informal employees. Those all result in the complicatedness of the reinsurance and continuity of social security. As for now, the measures of China for such problems is still lacking satisfying flexibility, and thus informal employees are not able to continue and have to cease their insurance.

Case study: Record of interview with laborer

Place: Haidian District, Beijing

Time: August, 2015

Interviewee: Ms. Feng

Profession: Household service provider

I am a peasant from Yanqing, and own some land in the hometown. I now have transfer the possession of the land to a relative charge him some profits of the land annually. I joined the new rural insurance before. After 55, I can get the compensation of 300 yuan every monthly. I now work as a housekeeper in Beijing, and have registered in 95081, which recommend jobs for me. For each job, I sign contract with the employer and 95081 charges the employer for 980 and me 10% of my income. Neither 95081 nor the employer cover my social security; only an accident insurance is provided in case I broke things in the house of the employer.

I have never heard about the social security for informal employment, and have no idea about how and where to join.

I will not choose to join even though you have explained to me the policies. On the one hand, I have the 300 yuan every month from my new rural insurance and on the other hand, it will be too much if I have to spend 20% of my only 3,000 monthly salaries. Many of my coworkers whose situations are very like me do not join either. They are not aware and will not join even if they know. We do not want extra expenses working so far from home.

Social Security Coverage on Atypical Employment:

methodologies and tools of analysis and management

Mel Cousins, EU-China SPRP Expert

Contents

Executive summary

This report provides details on EU best practices in extending social security coverage to informal or 'atypical' employment. It focus on the approach to atypical employment in EU countries; affordability issues; subsidies for atypical workers; 'New economy' workers; estimating coverage of atypical workers; and administrative issues.

There are two issues which will make it more difficult to achieve mandatory coverage of atypical workers in China. The first is the fragmentation and complexity of social insurance schemes in China. There is a very high level of complexity in the Chinese system and a wide range of variation in the approaches adopted to flexible workers in different provinces and cities. This will make it more difficult to ensure effective inclusion of all workers. The second issue is that there are many administrative challenges to the inclusion of atypical workers. Contributions tend to be low and there is often a high turn-over of such workers. It is important that there should be effective compliance with social insurance contribution collections, particularly in relation to 'typical workers'. If this is not being achieved it may be unrealistic to expect that it will be administratively possible to include atypical workers on a mandatory basis.

This report highlights relevant good practices in EU countries which could assist the Chinese authorities in extending social insurance to atypical workers in an effective and efficient manner. The EU experience shows that there are many challenges in this area. In terms of future work, one option would be to look at a concrete situation in a specific city or region, i.e. to look at the issues facing the inclusion of the main forms of flexible work in a particular city and how EU best practice can support this. This might tend to lead to the most concrete outcomes. Such an approach might involve a national report on the specific challenges in the region, followed by site visits and an EU report on relevant best practices which could be discussed at a workshop.

Introduction

This report provides details on EU best practices in extending social security coverage to informal employment (topic 2.1.2). Although the term 'informal employment' is widely used, it does not have a clear legal meaning. It is sometimes used to refer to work which does not comply with the formal (legal) rules, i.e. employment which is not in compliance with labour and social protection legislation. It can also be used to refer to all forms of non-standard employment which, in China, could include the large numbers of rural workers engaged in agriculture.

However, the national report on this topic (Zhou, 2015) has focused on 'flexible' employment (in Chinese). The equivalent in an EU context would be atypical workers. Atypical employment is understood to include part-time work, marginal employment (mini-jobs), fixed-term contract work, temporary work and (new) forms of self-employment (sometimes described as 'dependent self-employment') (see Schulze Buschoff and Protsch, 2008; Eichhorst et al, 2013). Therefore this report focuses on EU best practices in extending social security coverage to these types of atypical work. Of course, there is often and overall between the different forms of atypical work, e.g. part-time workers may also be temporary, dependent self-employed workers may also work part-time, etc.

In discussions with the national expert, it was agreed that it would be most useful to focus on a number of specific topics. These are:

- Approach to atypical employment in EU countries

- Affordability issues

- Subsidies for atypical workers

- 'New economy' workers

- Estimating coverage of atypical workers

- Administrative issues.

As part of this study the author reviewed a number of other studies concerning the extension of social insurance cover in China (ILO, 1997; ILO, 2006; Zhu, 2009; ISSA, 2013; Giles et al., 2013) and general studies on the extension of social insurance coverage in the EU and developing countries (Schulze Buschoff and Protsch, 2008; Van Ginneken, 2009; Merrien, 2009). There are also clear links between the issues concerning extending coverage for atypical workers and cover for migrant workers as many migrant workers may also fall within the category of atypical (flexible) workers.

Comparing the EU and China

EU countries are very different to China in that a much smaller percentage of the workforce is engaged in agriculture. In most EU countries there are now less than 10% of the population engaged in agriculture and in many the proportion is below 5%. As a result, most EU countries have a general scheme which covers all workers or have relatively small differences between general and self-employed schemes. In contrast, there is a very large difference between the Chinese urban schemes and schemes for rural workers and/or for all residents. In Europe, over time the schemes for urban workers have been extended to become general schemes for all workers.

In China, there are nearly 200 million workers who are not covered by social security.[21] Studies indicate that people not covered by social security are mainly migrant workers, domestic helpers, self-employed people in cities and towns, disabled people, young rural residents, and people engaged in cyber economy, etc. Most of those who are not covered in cities work in the private sector and micro businesses.

However, like China, EU countries also faced by rise in atypical work – up to one-third of all jobs can be classified as atypical (Schulze Buschoff and Protsch, 2008).[22] It is interesting to note from the national report (Zhou, 2015) that in China's cities and towns about one-third of all workers are also classified as 'flexible'. Thus EU countries have also taken steps to include atypical workers in their social insurance schemes. However, it must be remembered that there is a great variety in EU Countries with 28 different national systems.

Approach

A number of EU countries have taken steps in recent decades to extend social insurance to atypical workers in different ways. For example, in Italy (1995) social insurance was extended to atypical workers (*collaboratori coordinati e continuative* or *co.co.co*). These can be described as 'dependent self-employed' workers. In order to be insured, the workers must be self-employed (*collaboratori*), they must be integrated into the business (*coordinati*) and their work must be ongoing and not just once-off (*continuative*). This groups were initially insured at a lower contribution rate, although this has risen over time for some workers. The insurance against

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[21] See the *Research Report on the Development of China's Old-age Insurance for the 13th Five Year Plan period* prepared by Component 1.

[22] Indeed, in the Netherlands, up to 50% of employment is part-time.

sickness, maternity, accidents at work and family benefits similar to employees (although benefits are usually less generous).

In Ireland (1991), all part-time employees earning €38 per week (about 270 ¥ or c. 4 hours work at minimum wage) are insured for social insurance benefits.[23] They are entailed to the standard rate of pension benefit (subject to the same rules as other workers).[24] However, low paid workers would generally receive reduced rates of short-term benefits (unemployment and sickness) in order to avoid creating a disincentive to work for such workers.

Many EU countries provide for some form of pension credits or credited contributions to person who have been insured but who are unable to continue their insurance for some reasons (e.g. unemployment, illness, etc.). This can be of particular benefit to part-time workers although it is not confined to such workers. For example, in the UK workers who are temporarily out of work can get 'credited' contributions, i.e. they are granted contributions by the social security authorities which help to qualify for pension.

As can be seen, these different approaches assist different forms of atypical workers in obtaining or continuing social insurance coverage.

Affordability of insurance

EU experience shows that atypical workers tend to be low paid – often due to the part-time and/or temporary nature of the work. They are generally not, as a group, able to pay the full (actuarial) cost of social insurance without support. The same issue appears to arise in China where flexible workers also have major difficulties in paying social insurance contributions. In many EU countries, social insurance contributions are based on a percentage of actual income (rather than as in China on the basis of a minimum set as a percentage of the average wage). Therefore the cost of social insurance is low for low paid workers. In addition, some EU countries have reduced contribution for low paid workers, e.g. UK workers who earn between lower earnings limit (LEL) and 140% of LEL are insured but pay no employee contribution. Similar exemptions apply in a number of other EU countries.

Benefits for atypical workers vary from one country to another. Where benefits are earnings related, atypical workers tend to receive lower benefits. However, in many countries, they still receive a good return on the social contributions which are paid in comparison to higher paid workers. Ireland is a country where low paid workers receive a particularly good return as long-term pensions are paid on a flat rate basis. Actuarial studies

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[23] Previously workers who worked for less than 18 hours per week were generally excluded.

[24] Unlike many other EU countries, Ireland has a flat-rate pension system which is not related to wages.

of the Irish pension system show that social pooling results in very good return for low paid workers with pensions for persons on minimum wage equal to over 4 times the value of their contributions. This the benefits for atypical workers are funded, in part, by cross-subsidisation.

Subsidies for atypical workers

As we have discussed, social pooling often involves an indirect subsidy for atypical workers from 'typical' workers and, insofar as social insurance expenditure is funded by the State, from general taxation. There are also general subsidies for atypical workers by way of exemption from social insurance contributions and 'credited' contributions.

In addition, some countries provide specific subsidies to specific groups, e.g. unemployed people taking up work whereby they are exempted from contributions for a certain period. These type of subsidies can assist atypical workers although they are not specifically targeted at such workers. However, there are often difficulties of targeting such specific subsidies, e.g. a high level of 'deadweight'. Deadweight involves the extent to which people would have taken up employment in any case without the use of the subsidy. Therefore, unless there is a strong case for a particular type of subsidy, it may be preferable to focus on general reductions on social insurance costs rather than targeted subsidies. However, this, of course, depends on the specific context and the ability of the social insurance agency to target subsidies effectively.

New economy workers

We refer here to workers in 'on-line' businesses such as those discussed in the national report. It is clear that these workers occupy a range of different employment statuses. Some are employers, some self-employed and others are employees. Many are what might be categorised as 'dependent self-employed' workers, i.e. work relationships where the worker is formally self-employed yet the conditions of work are similar to those of employees (Eichhorst et al, 2013). As discussed in the national report, there has been a growth in the numbers of such workers in China involved in particularly in on-line businesses and, as the report has shown, many of those workers are not covered by social insurance (Zhou, 2015). In EU countries also, there has been a growth in the dependent self-employment in a range of areas.

Most EU countries still distinguish between employee and the self-employed in terms of social insurance cover, e.g. in most countries there is no (or only limited) unemployment insurance cover for self-employed persons.

According to a recent study on behalf of the European Parliament, Italy is one of the only countries to specifically include some 'dependent self-employed' at levels of coverage similar to employees (as discussed above) (see Eichhorst et al, 2013).[25] In other countries, such workers were generally covered by social insurance but as self-employed workers with lower levels of coverage. The table below provides an overview of the scope of social protection cover for dependent self-employed workers in the seven EU Member States covered by the study.

Social protection	Austria	Denmark	France	Germany	Italy	Slovakia	United Kingdom
Sickness & Maternity	Own rules	Universal	Self-employed	Self-employed	Own rules	Self-employed	(semi-) Universal/self-employed
Long-term care	Universal	Universal	Self-employed	Self-employed	Universal	Universal	Self-employed
Invalidity	(semi-) Universal	Universal	Self-employed	Self-employed	Self-employed	Self-employed	(semi) Universal
Old age	(semi-) Universal	Self-employed	Self-employed/ employee	Self-employed	Own rules	Self-employed	Self-employed
Survivors	(semi-) Universal	Self-employed	Self-employed/ employee	Self-employed	Own rules	Self-employed	Self-employed
Accidents at work	(semi-) Universal	Self-employed	Self-employed/ employee	Self-employed	Employees	Self-employed	Self-employed
Family benefits	Universal	Universal	Universal	Universal	Employees	Universal	Universal
Unemployment	Self-employed	Self-employed	Self-employed	Self-employed	Own rules	Self-employed (voluntary)	Self-employed

The study proposed that such dependent self-employed should be insured whether by their integration (or at least major categories of such workers) into existing social protection schemes for dependent employees, or by the creation of an intermediate category of dependent self-employment with specific rules governing their social protection (as in the Italian case).

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[25] Thus study looked at dependent self-employment in a number of EU countries in a wide range of sectors including IT, creative industries, transport, etc.

Measuring coverage

In this section, we look at issues concerning measurement of coverage for atypical workers. In general there are two approaches:

1. the % of the working population with potential entitlement to benefit

2. the number of actual beneficiaries of such benefits or services.

The first measure looks at those who are insured under the social insurance scheme or (more accurately) those who have a sufficient contribution record to qualify for benefits. The second looks at the extent to which atypical workers are actually qualifying for benefits such as health care. In most cases, it will be necessary to carry out specific studies or to revise data collection in order to collect accurate data for atypical workers.

It is also important also to look at quality of coverage. This is particularly the case in China where there is a significant difference between the level of coverage provide din different schemes. Thus, the proposal in the national report that there should be two levels of measure (one of a minimum level of coverage and a second of optimum coverage), seems to be a very good idea.

Administrative issues

It is clearly desirable from a social policy point of view and in terms of employment rights that social protection should be extended to atypical workers. This also helps to avoid distortions in the labour market and unfair competition where businesses opt to use uninsured (and low cost) atypical workers rather than regular employees. However, it is clear from the experience in EU countries and indeed in other developing countries that the extension of coverage must be administratively feasible.

As we have seen, atypical workers are usually unable to cover the costs of adequate social protection due to their low incomes and cross-subsidisation of the costs will be required. It is also necessary that rules concerning social insurance should be simple and easy to understand for both employers and employees. The administrative requirements should also be simple and easy to comply with. Finally, good publicity and communications are required both to explain to people why they should avail on social insurance coverage and how they can do so.

In this context, the role of voluntary insurance has to be considered. In the case of voluntary insurance, workers are encouraged to be insured but – unlike the case of mandatory insurance – this is not a legal requirement. On the one hand, it is clear that it is very difficult to achieve high levels of adequate coverage on a voluntary basis due to the costs involved and the fact that many workers are myopic (short-sighted) in terms

of social protection issues. On the other hand, EU experience would indicate that voluntary insurance may be the only realistic option on a transitional basis at a certain stage of economic development where it is not feasible to achieve mandatory coverage. One option which has been developed in some developed countries is to require that workers opt-out rather than opt-in to social insurance cover, i.e. the default position is that workers are automatically insured but they are allowed to opt-out if they wish to do so. This has been found to increase the level of insurance coverage. If it was felt that insurance should be voluntary, it might be relevant to consider this type of option in China.

Conclusion

In the Chinese case, there are two issues which will make it more difficult to achieve mandatory coverage of atypical workers. The first is the fragmentation and complexity of social insurance schemes in China. As shown in the national report, there is a very high level of complexity in the Chinese system and a wide range of variation in the approaches adopted to flexible workers in different provinces and cities. This will make it more difficult to ensure effective inclusion of all workers.

The second issue is that there are many administrative challenges to the inclusion of atypical workers. Contributions tend to be low and there is often a high turn-over of such workers. It is important that there should be effective compliance with social insurance contribution collections (on this see Enoff and McKinnon, 2011), particularly in relation to 'typical workers'.[26] If this is not being achieved it may be unrealistic to expect that it will be administratively possible to include atypical workers on a mandatory basis.

As this initial report has shown, there are relevant good practices in EU countries which could assist the Chinese authorities in extending social insurance to atypical workers in an effective and efficient manner. The EU experience shows that there are many challenges in this area. In terms of future work, one option would be to look at a concrete situation in a specific city or region, i.e. to look at the issues facing the inclusion of the main forms of flexible work in a particular city and how EU best practice can support this. This might tend to lead to the most concrete outcomes. Such an approach might involve a national report on the specific challenges in the region, followed by site visits and an EU report on relevant best practices which could be discussed at a workshop.

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[26] A number of studies have highlighted issues concerning the effectiveness of the current collection of social insurance contributions in China. See, for example, Gao and Rickne, 2014.

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Social Protection of Atypical Employment in the EU: The Case of Italy

Marta Fana, EU-China SPRP Expert

Contents

Abstract

Labor market flexibilization is largely based on mainstream theories identifying labor market `rigidities' - namely, strong trade unions, generous social benefits, high minimum wages, powerful insiders, or firing restrictions - as the main causes behind persistent unemployment, inefficient factors allocation, mismatching between labor demand and supply and, in more general terms, weak competitiveness performance. Empirical evidence seem to contradict and confute these theories underlying the null relationship between labor market protection and unemployment as well as the negative link between flexibilization and productivity. At the policy level, many countries followed a liberalization process. For example, Italy has chosen labor market liberalization as one of the key policies to foster employment, productivity and competitiveness. The reform process started in mid-Nineties followed two main approaches: liberalize fixed term contracts and create contractual arrangements without full subordination. Moreover, the flexibilization process has not been accompanied by an integrated system of social protection, which could guarantee atypical worker an adequate welfare during no employment periods. Atypical contract also created a downgrade of workers' bargaining power followed by the rise of working poor. In structural terms, the use of atypical contracts as a cost competitiveness strategy reduced firms' incentives towards capital investments especially in high technological sectors. This major drawback due to labor market flexibilization contributed to the worsening of Italian industrial structure that has accelerated after the 2008 crisis.

Theory and evidence behind labour market flexibilization

The debate over labour market flexibility characterized the academic, institutional and political debate in Europe over the last three decades. The claimed starting point relied on structural changes, related to technological changes and transformation in the global competition, occurring in Western countries. With these transformation in mind, the idea supporting more flexibility in the labor market originates from two main theoretical arguments, both based on neoclassical economic theory. First, competition increases efficiency and raise incomes. Second, markets well-functioning should not be

hindered by government interventions. However, in order to reach these goals, both firms and workers must adapt to the economic context, therefore allowing price adjustments, which in the case of labor market, translates- according to this theory- to wage flexibility. Flexible labour markets sustain employment through efficient factors allocation and reduce unemployment increasing the demand for labour once its cost (wages and compensations) decreases. In the end, according to the neoclassical theory, labor market flexibility (coupled with lower unionization levels) would allow a wage moderation process benefiting profitability. The orthodox vision has been put in question, not only theoretically but also empirically. In particular, labor market flexibility could be considered as a shift in the bargaining power between labor and capital in favor of the latter (Castel 2000). This shift in power is associated to a decrease in the wage share in national income and an increase in its complement, the profit share, thus modifying the so called functional distribution of income. In the next two sections, we will consider in more detail arguments in favor of labour market flexibility and evidence contrasting such claims, revealing how labor market flexiblization is mainly driven by ideologically statements, in favor of capital and against workers' rights, rather than confirmed empirical evidence.

A said, according to the neoclassical interpretation of the economy, removing or softening market `rigidities`, i.e. trade unions power, high minimum wages, generous social benefits, high firing costs/protections, allows efficient factors allocation. In particular, strong firing protections i) prevent labor market matching (Abraham and Taylor (1993); Bentolila and Saint-Paul (1994) and Boeri and Garibaldi (2007)), ii) negatively affect productivity by reducing firms' willingness to introduce labour saving innovations (Bassanini and Ernst (2002) and Scarpetta and Tressel (2004)). Generous unemployment benefits are expected to work as a disincentive to find and take a job (OECD 1994) and increase in workers' bargaining power which fosters wages growth leading to a contraction of labour demand (Holmlund, 1998). Furthermore, collective bargaining prevents from price (wage) adjustments (across space, contractual arrangements) in favor of productivity (Ichino 2012).

As concerns employability, Boeri and Garibaldi (2007) find a positive effect of flexibility at the margin on the employment rate in Italy. However, Howell (2004), Baker (2005) e Avdagic (2013) found that correlations between labor market flexibility and employment are quite fragile and based on a set of limits in the empirical literature trying to support a positive and statistically significant association. Moreover, Armingeon and Baccaro (2012) and Avdagic (2015) do not find and a

statistically significant relationship between employment protection and unemployment, while Noelke (2011) and Oesch (2010) do not find any evidence at all regarding the link between employment protection and negative employment performance for low-skilled and young workers. Blanchard and Landier (2002), Cahuc and Postel Vinay (2001) and Dolado et al. (2002) show that the introduction of fixed-term contracts increased unemployment because the prevailing effect was to increase the turnover in temporary jobs. As concerns the link between flexibility and labour productivity, Boeri and Garibaldi (2007), Kleinekcht and Lucidi (2011), Battisti and Vallanti (2013)) find a negative relationship at least for the Italian case. Furthermore, Pini (2015), Dosi et al. (2016) show that more flexibility leads to high economic instability, especially within weak structural economic environment (as the post 2008 period).

The idea that liberalization and flexibility in the labour market support the economic system is challenged by other evidence on the impact on innovation and inequality. On the one hand, Glyn et al. (2003); Howell et al. (2007); Lucidi and Kleinknecht (2009); Kleinknecht et al. (2014) find no evidence of correlation between labour market liberalisation and innovation while, in many cases, the opposite is detected. This seems straightforward noticing that temporary contracts are associated with a low investments in human capital and specific skills, a fundamental ingredient to boost the incentive for capital investments in new technologies and innovations.

Finally, labor market fexibility is seen as major causes of increasing inequality, which in turns hampers economic gowth (Oecd 2015, IMF 2015, 2016).

Atypical contractual arrangements: some definitions.

In a broad sense, atypical work arrangements are *not*: "full-time dependent employment with a contract of indefinite duration, or what is generally considered the "standard" work arrangement" (Oecd 2015).

The most used forms in Europe can be summarized as follow[27].

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[27] The definitions presented are taken from Eurofound (2015), *New forms of employment*, Publications Office of the European Union, Luxembourg. http://www.eurofound.europa.eu/it/publications/report/2015/working-conditions-labour-market/new-forms-of-employment

Fixed-term contracts are regulated by Directive 1999/70/EC transposed by all 27 EU Member States. These contracts entails a dependent work relationship of the worker with respect to the firm. The European Directive asked countries to regulate at least one of the following criteria for that type of contractual arrangements:

- provide reasons justifying the renewal of such contracts or relationships, and/or

- specify maximum total duration of successive fixed-term employment contracts or relationships, and/or

- indicate the number of renewals allowed for fixed-term contracts or relationships.

As one can read, the Directive does not state the conditions upon which fixed-term contracts can be used in derogation of standard open-ended ones.

Part-time falls within the category of dependent work relations and is related to working time arrangements. In particular, a part-time could be referred both to a fixed-term and a permanent contract. As for fixed-term, also part-time has been frameworked at the European level by Directive 1997/81/EC (supplemented by Directive 98/23/EC).

Occasional and/or accessory work is a type of work where the employment is not stable and continuous, and the employer is not obliged to regularly provide workers with work, but has the flexibility of calling them in on demand.

Within casual work we find:
- **On-call OR zero hours working.** In particular, on-call contracts are, by agreement, fixed-term contracts that come into effect when the employee decides to accept the work offered. The employee is paid for hours worked and can refuse work without any consequences. A new labour agreement is formed at the start of every new working period that is agreed. Conversely, zero-hours contracts can be for a fixed term or permanent, but there is no guarantee of a minimum amount of working hours.

- **Intermittent work** involves an employer approaching workers on a regular or irregular basis to conduct a specific task, often related to an individual project or seasonally occurring jobs. The employment is characterized by a fixed-term period, which either involves fulfilling a task or completing a specific number of days' work.

- **Voucher-based work** is a form of employment where an employer acquires a voucher from a third party (generally a governmental authority or a entitled private one) to be used as payment for a work performance from a worker, rather than cash. Often the services provided are specific tasks or fixed-term assignments and consequently are related to casual and portfolio work

Job sharing refers to employment relationships in which one employer hires several workers to jointly fill a single full-time position. It is a form of part-time work, whose purpose is to ensure that the shared job is permanently staffed. The job sharers are a group formed by the employer rather than a self-constituted employee group.

Crowd employment is an employment form that uses an online platform to enable organizations or individuals to access an indefinite and unknown group of other organizations or individuals to solve specific problems or to provide specific services or products in exchange for payment. Also known as crowd sourcing or crowd work, it is a new form of organizing the outsourcing of tasks, which would normally be delegated to a single employee, to a large pool of 'virtual workers'.

Other forms of atypical work could be defined as **parasubodinate** since they are formally nondependent/autonomous relationships, while de facto economically dependent on a single employer.

Figures below highlight the spread of atypical work, by type, in OECD countries in 2013 (Fig.1), as well as the incidence of atypical jobs by age group, that is the portion of each age group employment that falls under non standard jobs (Fig.2).

Figure 1: Non-standard forms of employment as a percentage of total employment (2013)
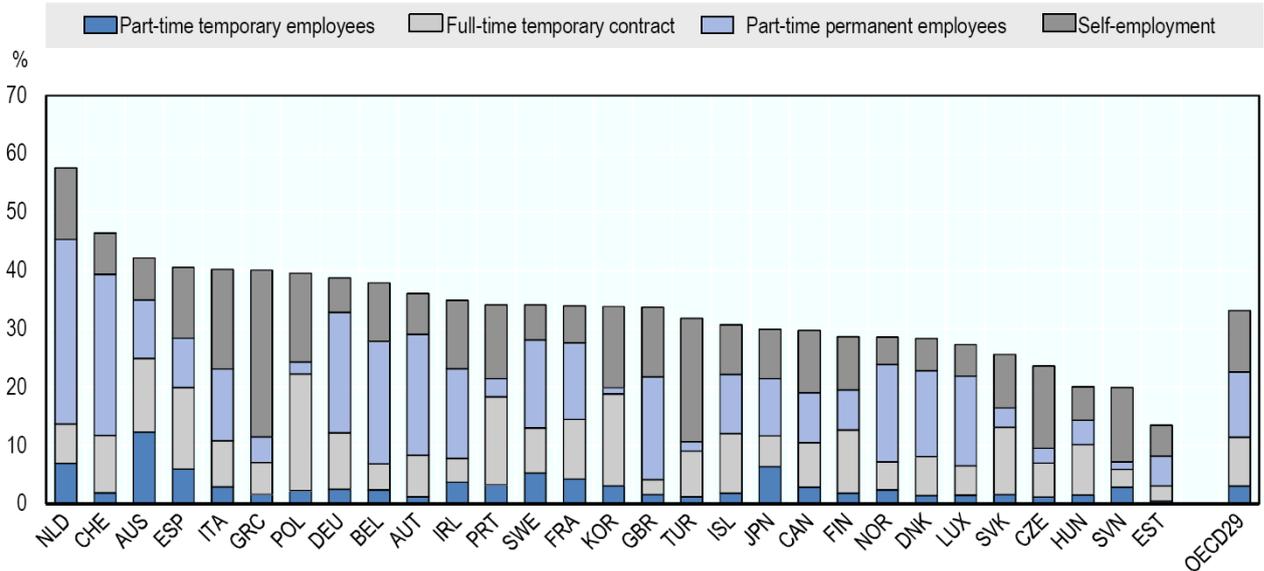
Source: OECD (2015)

Figure 2: Incidence of non-standard employment by age group, 2013
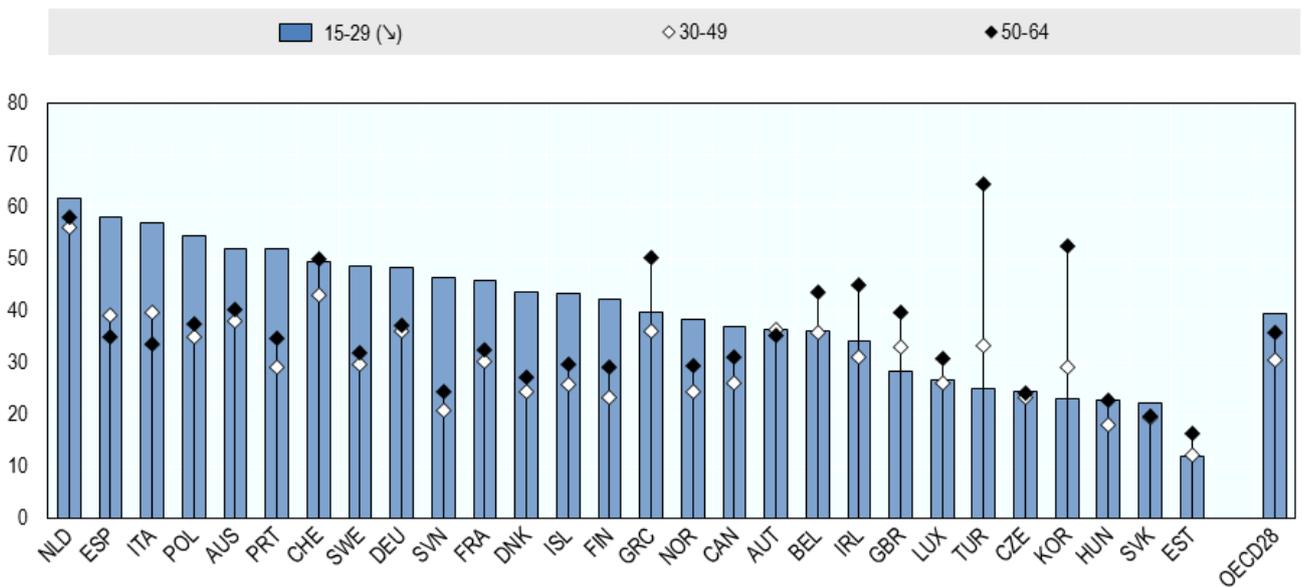
Source: OECD (2015). *Note:* Sample restricted to paid and self-employed (own account) workers aged 15-64, excluding employers, student workers and apprentices.

The social protection of atypical workers: the *flexicurity.*

The economic and political debate around labor market flexibility went hand in hand with the idea according to which new contractual arrangements should be accompanied with an integrated system of social protections. Especially at the political level, those supporting flexibility of the labour market were aware of the potential discrimination that workers with unstable jobs would have suffered, due to more frequent unemployment spells- both because of the fixed-term relation and unforeseen job destruction. At the same time, atypical contracts have been tailored to foster participation of more vulnerable groups, like women, young people and immigrants. Therefore, social protection should not be based only on income support, i.e. passive labour market policies, but also on all provisions able to reintegrate workers into new jobs, helping them finding new opportunities as well as the training needed to best fill them. This second strand of policies goes under the name of active labour market policies.

Following this reasoning, European institutions recommended Member States to adopt an integrated system combining flexibility and security, the so called flexycurity system, defined as

"a comprehensive approach to labour market policy, which combines sufficient flexibility in contractual arrangements – to allow firms and employees to cope with change – with the provision of security for workers to stay in their jobs or be able to find a new one quickly, with the assurance of an adequate income in between jobs." (European Commission 2007)

However, it is important to highlight that recommendations for a comprehensive security system was not compulsory as the Directives defining fixed-term contracts and part-time jobs. This misalignment resulted in widely different approaches adopted by Member States, where some of them, including Italy, did not yet set, as we will see in next sections, the security part. As Fig. 3 shows, the composition of social protection schemes vary considerably across countries. In order to have a more precise picture, we report in Table 1 the different fund allocation by functions in terms of GDP share across countries. Looking at unemployment expense, France passed from 2 to 2.1% of GDP between 2000 and 2011, while Italy, double from 0.4 up to 0.8% during the same period, although the

unemployment rate in Italy has been always higher than the French one. As one might note then, the Italian system even with a huge increase in relative terms, still lags well behind his neighbor. Similar conclusion and comparisons could be undertaken for the other functions listed in the table. However, even in countries, as France and Germany, in which flexycurity is well defined and financed by the State, a discrimination between standard and non-standard workers exists and remains persistent after tax and benefits.

Figure 3: Allocation of social protection benefits across functions (2011)
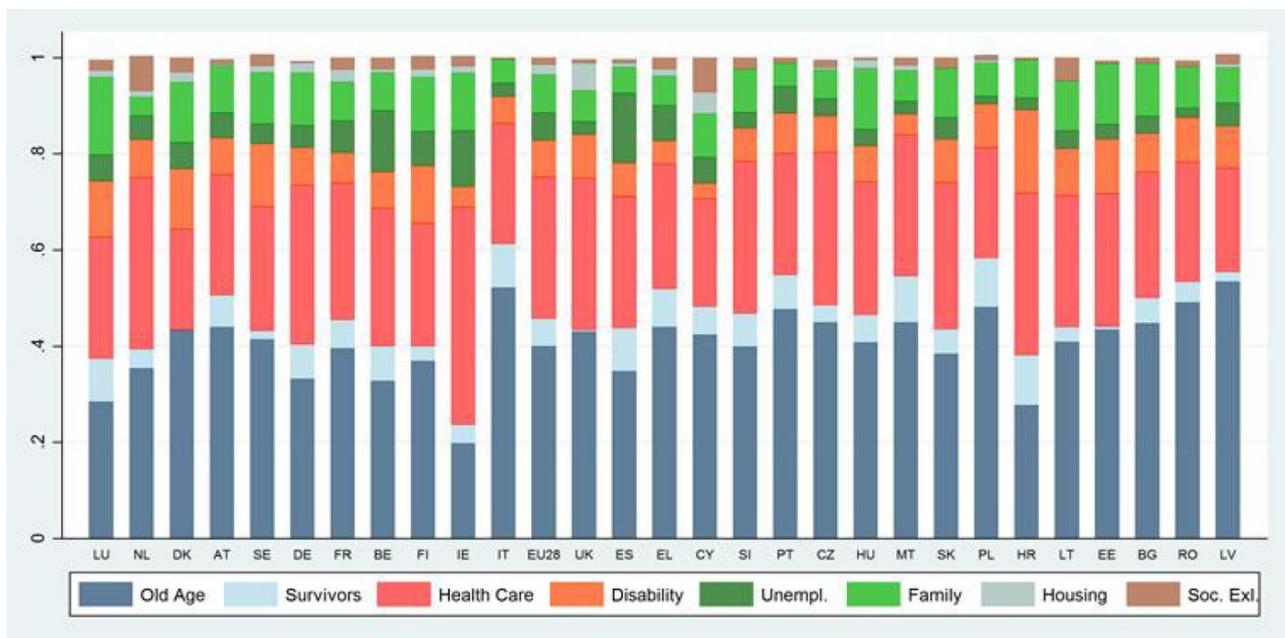
Source: European Commission (2015) taken from Eurostat ESSPROS. Sorted by total social protection spending in PPS per inhabitant.

Table 1: Trend in Social protection benefits by function, %GDP, in 2000, 2007 and 2011

MS	All functions			Family/children			Unemployment			Housing		
	2000	2007	2011	2000	2007	2011	2000	2007	2011	2000	2007	2011
EU-28			27.8			2.2			1.6			0.6
EU-27		25.0	27.8		2.0	2.2		1.3	1.6		0.5	0.6
EU-25	25.4	25.2	28.0	2.1	2.0	2.2	1.5	1.3	1.6	0.6	0.5	0.6
BE	24.2	25.5	29.0	2.1	2.1	2.3	2.9	3.3	3.7	0.0	0.1	0.2
BG		13.7	17.2		1.2	1.9		0.3	0.6		0.0	0.0
CZ	18.2	17.5	19.8	1.5	1.6	1.2	0.6	0.6	0.7	0.1	0.1	0.1
DK	28.1	29.3	32.8	3.7	4.0	4.1	3.0	1.2	1.8	0.7	0.7	0.7
DE	28.7	26.8	28.3	3.3	2.8	3.1	2.1	1.5	1.3	0.3	0.7	0.6
EE	13.6	12.0	15.9	1.6	1.4	2.0	0.2	0.1	0.5	0.1	0.0	0.0
IE	12.7	17.1	28.3	1.8	2.6	3.4	1.3	1.4	3.3	0.3	0.4	0.4
EL	22.7	24.1	28.9	1.7	1.5	1.8	1.4	1.1	2.1	0.7	0.5	0.4
ES	19.5	20.3	25.6	1.0	1.3	1.4	2.0	2.1	3.7	0.2	0.2	0.2
FR	27.7	29.3	31.9	2.5	2.6	2.6	2.0	1.9	2.1	0.9	0.8	0.8
HR			20.2			1.6			0.5			0.0
IT	23.7	25.4	28.4	1.0	1.2	1.4	0.4	0.4	0.8	0.0	0.0	0.0

Source: European Commission (2015)

Atypical work, income inequality and in work poverty

The last report on inequality by the Organization for Economic Cooperation and Development (OECD) claims that:

Median annual earnings for part-timers are less than half those of standard workers and even 70% lower for part-time temporary workers, reflecting a lower take-home pay due to fewer working hours. Earnings for temporary workers and for own-account self-

employed workers – who have similar weekly hours as standard workers – are still some 40% lower.

If until now explanations like skill based technological change, asymmetric information, lower experience of new entrants drove the main argumentation to justify differences in wages and earning between standard and atypical workers, it has been found that these are not able to explain such a gap. In particular, Oecd estimations found that a wage penalty for temporary workers persists even once controlling for observable individual, family and work characteristics. In particular, there exists variation in wage penalty across countries: from almost zero in Australia to 19% in Greece.

Evidence from OECD (2011) has shown the impact of non-standard work on the level of overall earnings inequality: adding the earnings of part-time workers to the distribution of full-time employees increased earnings inequality by almost 20%, and adding self-employed workers increased inequality by a further 5%. In addition, policy reforms such as weaker employment protection for temporary contracts have tended to increase employment opportunities but were associated with wider wage inequality.

OECD (2011)

Figure 4: Earnings ratio between standard and non-standard workers (standard workers = 1), 2012
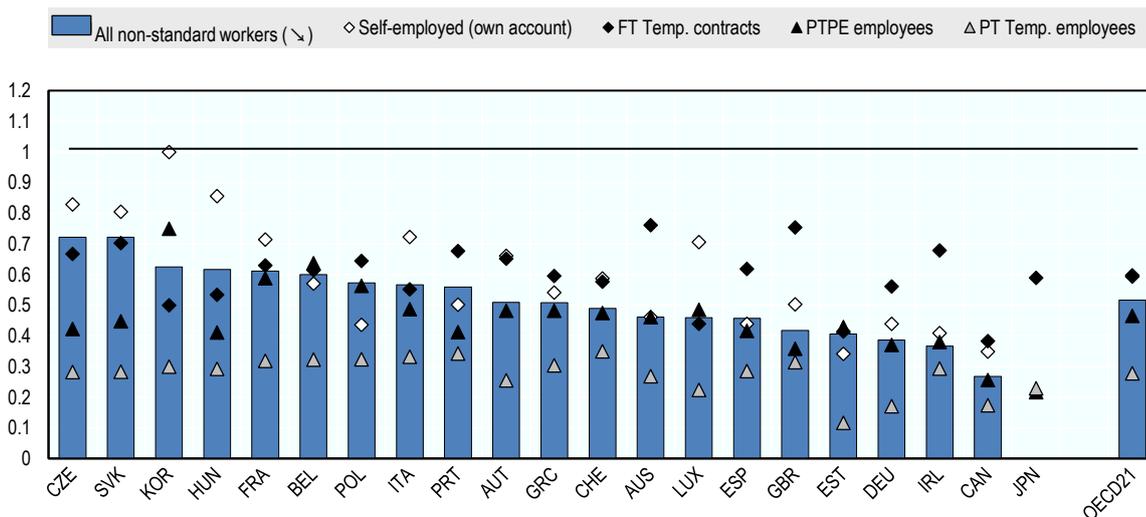
Source: OECD (2015)

Knowing that atypical workers belong to the bottom of the income distribution, one policy question is whether those individuals/households remain or not in their position once we consider the whole household equivalent income. According to OECD (2015) estimates, households with two non standard workers are likely to remain at the bottom (the lowest 20%) of the income distribution. This share decreases for mixed household, in which a non standard workers live with a standard income earner: only 12% . At the same time, it seems that not only upward mobility is difficult to occur under atypical work, but in general the opposite applies. In fact, due to the instability of these types of jobs, non-standard worker households have a higher probability to move towards the bottom of the income distribution than other working households.

Furthermore it is important to highlight that not only income inequality but also in-work poverty characterizes atypical workers. In particular, in 2013, 22% of households characterized only by non standard workers are considered poor, where the poverty threshold is given by the relative poverty line measured as the 50% of the median equivalized household disposable income. If market income is uneven distributed across workers type, it is worth noticing the effect of tax and benefits in reducing inequality and more generally in work poverty. This is important as it could be considered a measure of the likelihood of the flexicurity system. The cross country evaluation highlights quite different patterns among which, a rather common is, the eligibility for unemployment benefits. For example, this is often the case of self-employed and those atypical workers that we defined as non subordinate who although working and contributing (in terms of working weeks) are sometimes excluded by law from the benefit. At the same time, even if benefits for part-time and fixed-term workers are formally the same as for standard workers, this is not true in practice. Considering the Italian case,(see next section), unemployment benefits have been reformed by the latest labour market reform, according to which eligibility, as well as its duration, depends on the level (with a minimum of 13 weeks in the last two years for eligibility) of worked weeks during the last two years, threshold that has been reduced so to extend the benefit to a larger share of the working population. However, temporary workers suffer more frequent unemployment spells and the contractual arrangements are not always subordinate once, where subordination is one of the major conditionality for unemployment benefit. In practice, this means that atypical workers, which are

more vulnerable, are also those with the lower probability to gain access to government benefits during non working periods.

The Italian case

Reform chronicle

In Italy, the labour market liberalization process started in mid-Nineties, whit a set of legislative changes whose goal was to introduce more flexible contractual arrangements with respect to the standard open ended contract, strictly regulated by the The Workers' Charter Statuto dei Lavoratori, Law 30 of 1970. In particular, the deregulation process occurred, until the most recent reform approved in 2015, the *Jobs Act* (see below), at the margin, meaning that they abolished many of the legal constraints to hire workers on fixed-term contracts and defined various types of atypical labour arrangements without modifying the employment protection for permanent workers. In this way, the process lead to the creation of a two tier system: in which atypical contracts coexist with the standard open ended one.

It is worth remembering that just before the beginning of the fexibilization process, a Protocol on wage bargaining was approved in 1993, establishing that the renewal of national collective contracts had to refer to the programmed inflation rate rather than to the expected inflation rate. In this way, the legislator aimed to wage moderation and reduce high inflation. According to Tronti (2007), even if the Protocol achieved the goal of inflation reduction, it was at the same time the major cause of the decrease in wage share in the functional distribution of national income in favor of its counterpart, capital income (the profit share).

Then, the first big step in the process of labour market liberalization took place in 1997 with the so-called `Treu Package' (Law 196/1997). This law provided a new contractual framework introducing apprenticeship schemes and creating also private temporary work agencies aimed at facilitating entry of young people in the labour market and facilitating the matching between supply and demand. Similarly, the Treu Package relaxed constrains in the use of part-time employment and temporary contracts. Together with the goal of a faster school to work transition for young people, the latter provisions were intended to solve another structural weakness of the Italian labour market: the low

employment and participation rate of women. However, the intentions of the reform go well beyond its first step. There is clear evidence that not only reducing hiring and firing costs for firms but also relaxing the subordination relationship were already accounted by the legislator. In fact, few years before, in 1995, within the social security reform, a special pension fund for "parasubordinate" workers, i.e. free-lance workers who are formally self-employed, but in practice economically dependent on a single employer, was introduced. Still, the main subject was the fixed term contract for which the True Package approved a reduction of the drastic sanctions in case of violation of the fixed term contracts' discipline and removed the automatic transformations of fixed term contracts into open-ended ones. The year after, in 1998, was the time of the Labor Agreement for Civil Sevice which increases the flexibility of working time, labour mobility, and the right to implement performance related pay. At the very beginning of the 2000s, Italy adopted two further labour market reforms in accordance with European Directives. The first concerns part time work, while the second, again fixed-term contracts. It is by means of this latter intervention, Decree 368/2001, that the constraints on using fixed-term arrangements were largely removed. In particular, Decree 368/2001 removed the rigid inventory of admissibility clauses for hiring on a temporary basis with a vague rule, according to which fixed-term contracts can be established for "technical, productive, organizational or substitution" reasons. Finally, in 2003, the flexibilization process was completed by the introduction of atypical contracts to regulate parasubordinate workers. A set of contractual arrangements was then introduced: job sharing, occasional work, staff leasing and the "job on call". Still, after a period of break in the legislative production, new liberalizations occurred since the economic Crisis of 2008. Indeed, in 2012, the so called Fornero Law was approved and implemented. The reform modifies the safeguards of employment against unfair dismissals, aiming at increase the use of compensation awards rather than the workers' reinstatement, especially in the case of unlawful dismissal. As concerns fixed-term contracts of less than one year, the low abolishes the obligation to include into the contract the reason why it has been stipulated. Moreover, the Fornero Law increases the ratio between apprentices and qualified worker up to 3:2. This reform profoundly modified the use of occasional work in the form of voucher extending their use from domestic and agricultural sector to all economic sectors, without any limits in terms of ratio between contractualized workers and those paid by vouchers, which in Italy do no constitute a work contract but only a payment system for a hourly work performance. The only limit was (and actually is) the maximum income each worker can receive by single employer per fiscal year.

Finally, in 2015, the Italian Government approved the so called, Jobs Act, which definitively changed the Italian industrial relations reforming not only atypical contracts but also the standard open ended one. As concerns this latter, the Jobs Act introduced a new contract type, "contract with progressive protection", for new hires on a permanent basis, removing any form of obligation for workers' reinstatement in case of firms invalidly firing them. At the same time, the use of temporary contracts is facilitated since previous quantitative   restrictions[28] on their adoption have been abolished. In particular, the reform abolished the worker's right to be hired on a permanent basis if the firm exceeds the limit in terms of the proportion of fixed-term contracts over total amount of contracts, previously set at 20%. Moreover, in such a case, under the new law, the worker has no more the right to receive a compensation for the "discrimination" undue.

Finally, The Jobs Act increases the maximum amount of revenues, from 5,000 until 7,000 euros, that could be received annually in vouchers by each worker. The new provision strikes with the original goal of the so called occasional and accessory work since the risk of being used for dependent work and not accessory one, especially once they are allowed in all economic sectors, but in agriculture with some limits, as stated by the Fornero Law.

As we will see in the following sections, these risks seem to be realized in practice.

Stylized facts

In this section, we will present a set of stylized facts, depicting how the Italian labor market responded to the liberalization process. First, the share of temporary workers on total employment increased over time but in particular for young people: between 1998 and 2015, the share of temporary workers on total employment for the 15-24 cohort increased from 20.4% up to 59.6%. However, as Fig.6 shows, while in general the share of temporary contracts increased both for males and females, the dynamics of part-time jobs characterized mainly women, for whom this share more than doubled in a decade.

Figure   5:   Share   of   temporary   employment   on   total   employment by age groups

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[28] were allowed up to a maximum of 20% temporary over the total amount of contracts
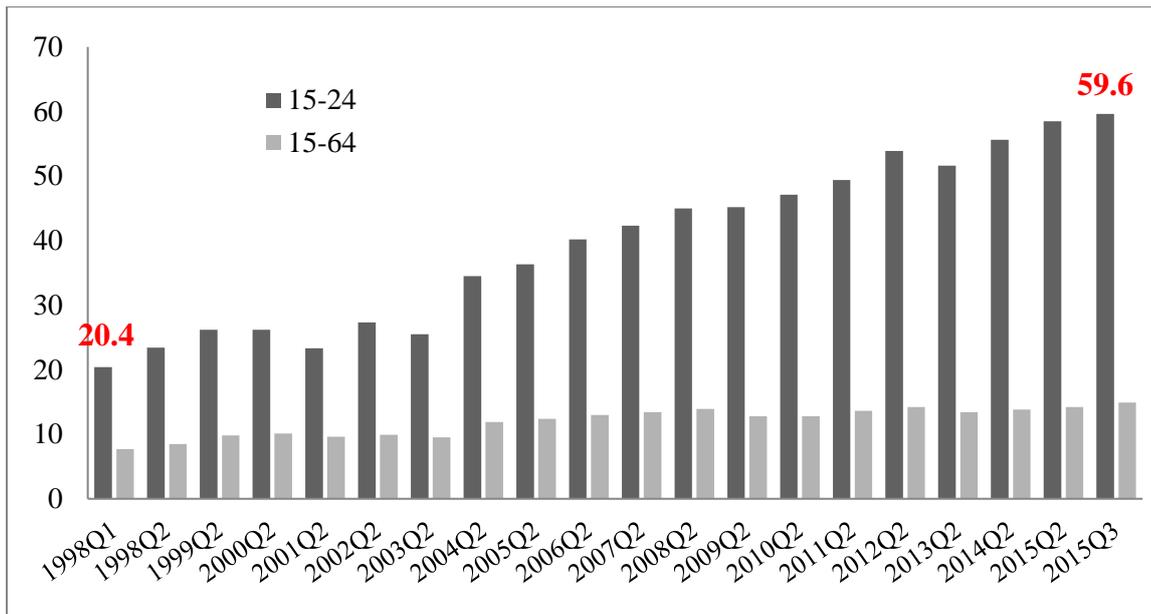
Source: Fana et al. (2016). The vertical axis measures the share of temporary workers on total employment, both for the whole population and the youngest cohort (15-24 years old). The horizontal axis measures years, considering for each of them the first and second quarter.

Figure 6: Part-time employment and temporary contracts by sex
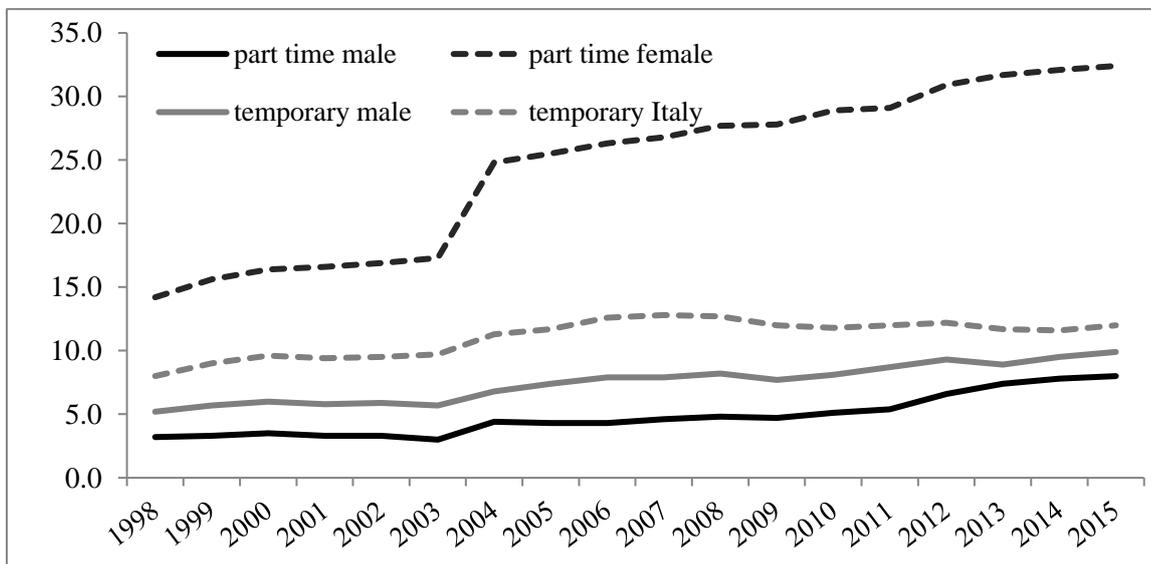
Source: Fana et al. (2016). The vertical axis measures the share of temporary and part-time workers on total employment, both for the whole population and the youngest cohort (15-24 years old). The horizontal axis measures years.

Moreover, among temporary contracts, those lasting less than 12 months display the highest diffusion rate. Fig.7 shows this evidence: in particular, the vertical axis measures the share of temporary contracts by duration in each point in time, while the horizontal axis measures the time annually (using the second semester as reference point for each year). As one might note from the figure, it is just after the Biagi Law in 2003 that low duration contracts gained most of the difference, as share in total temporary contracts, with respect to all others. In economic terms, this evidence highlights that temporary contracts are more often characterized by job instability.

As mentioned in section 2, atypical workers could be both subordinate or formally autonomous with respect to the employer (or client) the work for. In Italy, the dynamics of the diffusion of such contracts, measured by the number of workers under these arrangements (Fig.8), follows the progressive liberalization process they have been involved in. In particular, Fig.8 shows that, during the pre crisis period (1998-2007), the absolute number of parasubordinate workers doubled, while the downturn of the economy implied a decrease, which however is not comparable in magnitude to the increase experiences during the previous decade.

Figure 7: Duration of temporary contracts (%)
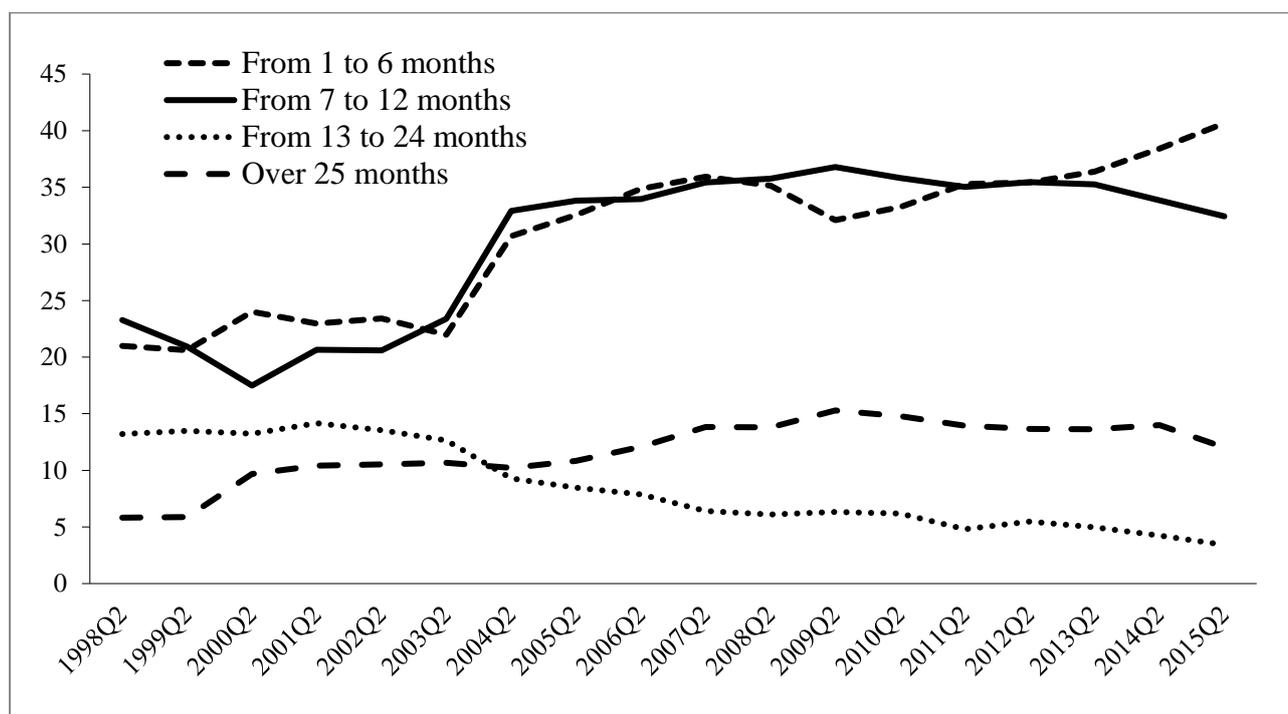
Source: Fana et al. (2016)

Figure 8: the dynamics of *parasubordinate* workers
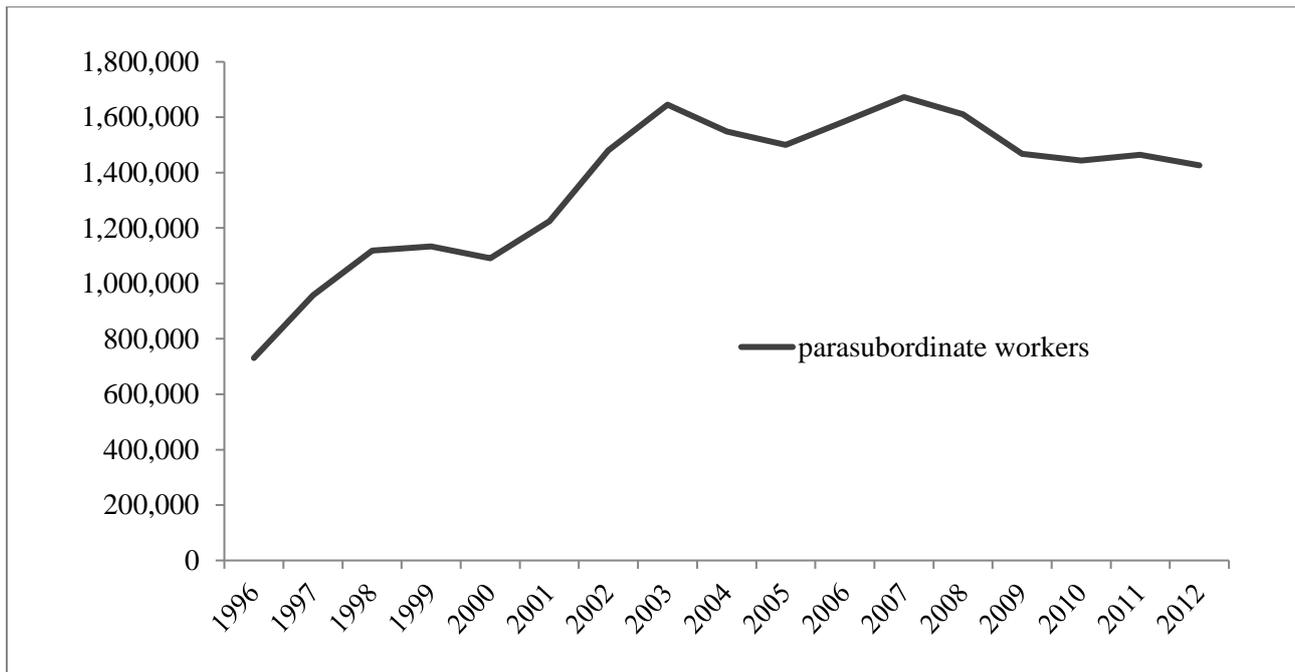
Source: Author's elaboration

Beside the proliferation of atypical contracts, both subordinate and parasubordinate work relationshisps, the most unprotected and liberalized form of work relation has gained field in the last decade in Italy. It is the case of vouchers, which, as already said, belong to the occasional type and, for the case of Italy, do not imply a contract between the two parts but they are used just as a form of payment for a work performance. Fig.9 highlights the temporal dynamics of vouchers sold and workers involved in this type of work, divided by gender. First, the number of voucher sold passed from 535,985 in 2008 to 115,700,000 in 2015. Since 2013, the growth rate becomes faster as response to the full liberalization occurred with the Fornero law in 2012. Still, Fig.9 (left axis) displays the number of workers involved by occasional work under vouchers. The progression is coherent to the number of vouchers sold during the same time range, but the distribution by gender has been reversed over time. The share of women working under voucher has progressively increased until it surpassed the 50% in 2014 (starting from 21% in 2008 when vouchers were allowed only in the domestic and agricultural sectors). Finally, from the composition of occasional work by age groups (Fig.10) emerges that the share of young people with occasional jobs constantly increases, while the opposite holds for the older cohorts (55-64 years old and over 65). It is therefore evident that the most unstable and precarious work arrangements engage the most vulnerable groups: women and the youngest, therefore creating a vicious circle of economic and working instability.

Figure 9: Occasional work: vouchers sold and workers involved
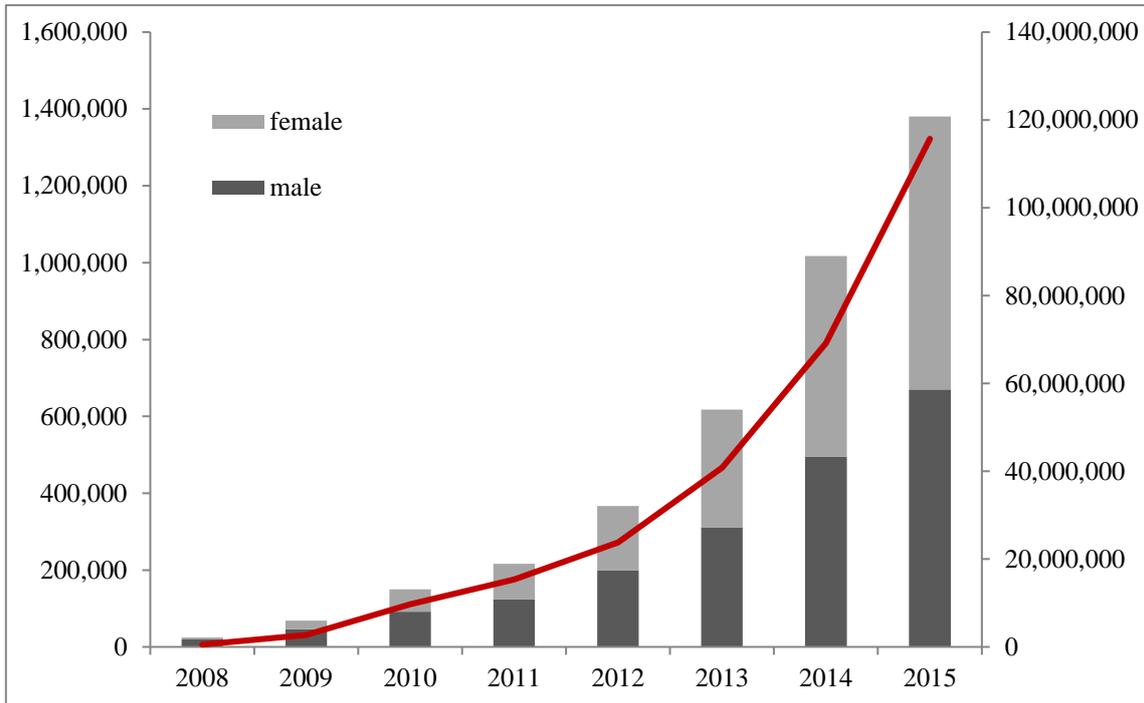
Source: Author's elaboration

Figure 10: Workers with vouchers by age group over time
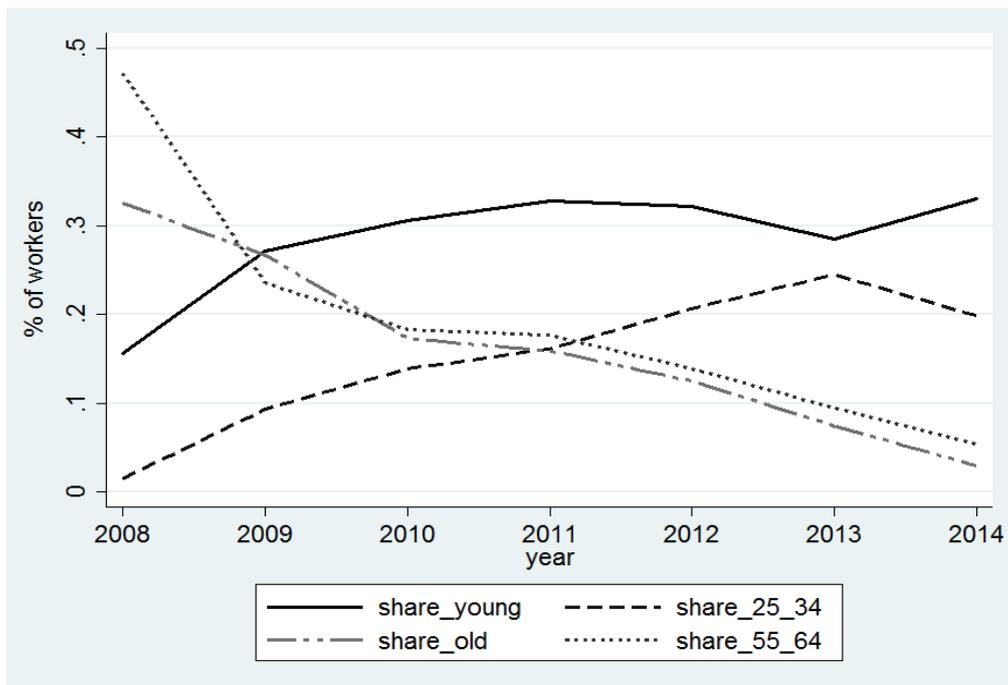
Source: Fana et al. (2016)

Another issue, related to atypical jobs, is the persistence of such conditions. More flexible contracts have been introduced, among all other reasons, to allow for shorter searching time at entry. However, since atypical contracts entail lower rights and wages, it is important to understand whether these unfavorable conditions last or (and) starting the career as atypical worker would imply a precarious trap. Although the economic literature on this specific topic does not fully agree, a major finding seems to be confirmed: if on the one hand, a positive transition from atypical to permanent contractual arrangements exists, it seems to be decreasing in the degree of contractual flexibility at entry. In practice the more the contract at entry is flexible (meaning less protected and shorter) the lower the probability of getting a standard contract after few years. The Italian case makes no exception: on average, only the 45% of individuals entering the labour market with a fixed term contract get a permanent job after ten years (Fig.11; dark blue series). The situation gets worse if the starting contracts is even more atypical: after the same time span only the 20% of atypical workers enjoy a full time permanent contract.

Figure 11: Transitions 2000-2011 by sex and initial contract
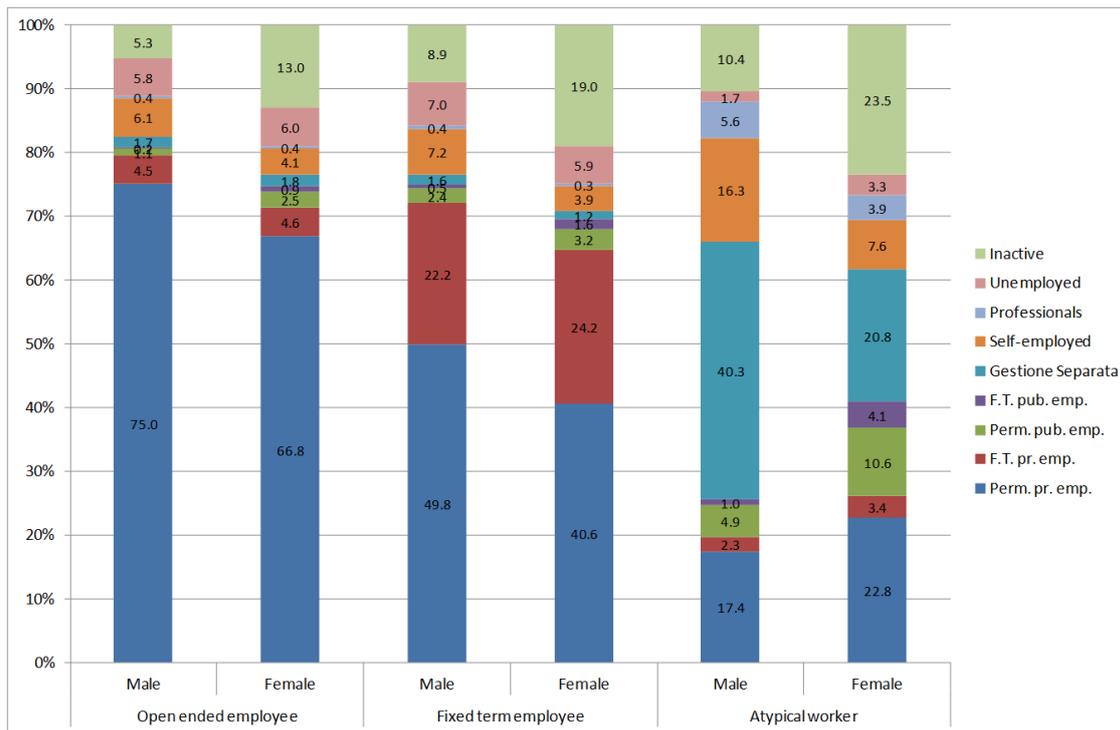
Source: Raitano (2015)

Conclusion

In this paper we review he main theory behind the liberalization of the labour market occurred in OECD and in particular European countries in the last three decades. The main idea supporting labour market flexibilizaton follows the the neoclassical interpretation of the economy, according to which removing or softening market `rigidities`, i.e. trade unions power, high minimum wages, generous social benefits, high firing costs/protections, allows efficient factors allocation. However, these arguments in favor of labour market flexiblization are mainly driven by ideologically assumptions, in favor of capital and against workers' rights, rather than confirmed empirical evidence. Wage moderation and lower workers' social protection answer to a shift in the balance of power between labour and capital, leading to a decrease in the wage share in national income in favor of profits. Following those ideas, many European countries progressively adopted the liberal agenda i) softening hiring and firing costs, ii) introducing new type of contractual arrangements mainly based on temporary duration and weak workers' rights, both within the employment relationship and as concerns social protection, i.e. eligibility to unemployment benefits, economic

support, general and specific training, iii) decentralizing collective bargaining (by law and as a practical response due to the fragmentation of the labor market).

Unsurprisingly, the share of atypical workers have increased in all of those countries, but the shape of such an increase is quite heterogeneous across age cohorts and gender. Within the working population, the group who mostly experienced and is still experiencing atypical job relations is made by young people, between 15 and 24 years old. Women follow as they are the overrepresented group in part-time jobs. If from the (mainstream) theoretical standpoint, one of the ideas behind labor market flexibilization was to increase participation and shorter searching time of these two groups, we have seen that in practice those groups entered in a vicious circle of instability and low protection. Atypical jobs are often, and always more, characterized by really short duration, therefore increasing the frequency of unemployment spells. At the same time the striking evidence against labor market flexibilization at the aggregate level is its relation with the increase in income inequality. In this context, we analyzed the Italian case, since, together with Spain, is the European country in which the most relevant reform process occurred. After, having summarized the reform chronicle, we presented evidence on the social and economic outcomes related to labor market flexibilization, showing that highly atypical jobs will be exploited by firms producing a vicious trap of precariousness, a related risk of poverty, especially in a context lacking a proper social protection system. Finally, mainstream theories, according to which inequality in labor income mainly depend on different skills between typical and atypical workers driven by technological changes, seem to be confuted by empirical evidence. In fact, the wage gap between typical and atypical workers exists even after controlling for individual heterogeneity and aggregate factors. Most importantly, inequality hampers economic growth, as recognized even by liberal institutions like the IMF and OECD: inequality reduces aggregate demand, especially in private consumption, therefore the economic activity as a whole. Furthermore, flexibilization induces inequality that produces a underinvestment in innovation by firms, who will base their competition strategy on labor cost rather than capital. In the medium and long run this strategy will bring to lower growth rate associated with an unbalanced endowment of resources (both as flow, i.e. income, and stock, i.e. wealth).

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Topic 2.2.1 On the Construction of Multi - Pillar Pension System in China*

Li Zhen, Professor and Director, Institute of Social Security, Renmin University of China

Zhao Qing, Social Security Department, Renmin University of China

* The original name of the project is "Notional Personal Account Reform in the Basic Pension Insurance System" but it was adjusted to be "On the Construction of Multipillar Pension System in China"as the following reasons. Firstly, there is no actual Notional Defined Contribution (NDC) personal account within the China's Pension System although NDC was proposed by some minister in the past three years, it has never been put into practice. Secondly, NDC cannot be found in the "Thirteenth-Five Five-Year Plan" so that we can reasonably infer that the Notional personal account would never be put into effect in the predictable future in China. Lastly, we think a macro perspective using multi-pillar design for China's pension system is essential to identify the problems of each pillar at present stage and we still give sufficient academic discussion on the pros and cons of the NDC by intensive literature review and comments.

Abstract

With great transformation of China's society and economy, China's pension system has transformed from traditional retirement system based on planned economy to modern public pension system based on market economy, protecting the old-age's basic living standard in case of retirement. The public pension systems has established and gradually covered from employed population to unemployed population, from urban areas to rural areas.

This report first examines public pension system for urban employees based on a brief history review and analysis on current situation. Although the public pension for urban employees has been playing an increasingly important role in providing basic protection for over 80 million urban retirees in China, it faces challenges like coverage with loopholes, inadequacy of pension benefit, unsustainability under ageing society. This is mainly related to structural and parametric problems in the design of the pension system as well as moral hazard problems in management. Compared with first pillar pension system, voluntary second pillar is really underdeveloped regarding to coverage and pension fund.

Secondly, the report reviews the development of pension policy for urban and rural residents. Despite a short history, public pension for urban and rural residents has rapidly extended social security coverage to people who could not take part in the traditional public pension system for employees, which has largely improved equity of pension system. However, the pension system depends heavily on financial subsidy, which may probably induce sustainability issue in the long run. Moreover, pension benefit is inadequate for the over 137 million pensioners.

Considering current unbalanced structure of pension system, proposal to establish multi-layer, multi-tier or multi-pillar pension system has reached an agreement. However, researchers have different opinions on how to reform current pension system to a multi-layer or multi-pillar pension system, especially for the most controversial part on "first-pillar" public pension reform. The feasibility of Notional Defined Contribution account in China is discussed then. Lastly, on the diagnosis of the problems embedded in current multi-layer pension system, we propose to establish the dual-basic urban employees' pension system; to call-off the existing public pension system for urban & rural residents, and establish a new "zero-pillar" Pension System; and to establish, strengthen and encourage the national voluntary personal saving accounts (the Third-pillar).

Contents

The characteristics and problems of the current pension system in China

With great transformation of China's society and economy, China's pension system has transformed from traditional retirement system based on planned economy to modern public pension system based on market economy, protecting the old-age's basic living standard in case of retirement. The public pension systems has established and gradually covered from employed population to unemployed population, from urban areas to rural areas. Pension system for urban employees is a multi-level structure: the first level, "public pension system for urban employees" is a combination of social pooling and individual account, in which the individual account was designed to be fully funded, however actually most provinces do not have real pension fund, which rises the problem of so called "empty accounts"; the second level is voluntary occupational pension scheme and the third level is personal saving or commercial life insurances, which are both underdeveloped. For urban and rural residents, they only have one level pension system established for a short period of time, the "public pension system for urban and rural residents", which consists of social pooling financed by government subsidies and individual account financed by personal contribution. By the end of 2014, public pension, containing two parallel pension systems, had covered about 80% of the total population (842 million people).

"Five-pillar" pension system was first put forward in one of the World Bank reports named "Old-age income support in the 21st century: an international perspective on pension systems and reform" in 2005. It is said to be especially suitable for developing countries' situation which includes five basic elements for the design of pension systems: (a) a noncontributory or "zero pillar" (in the form of a demogrant or social pension) that provides a minimal level of protection; (b) a "first-pillar" contributory system that is linked to varying degrees to earnings and seeks to replace some portion of income (mandatory DB plan); (c) a mandatory "second pillar" that is essentially an individual savings account (DC plan); (d) voluntary "third-pillar" arrangements that can take many forms (individual, employer sponsored, defined benefit, defined contribution) but are essentially flexible and discretionary in nature; and (e) informal intrafamily or intergenerational sources of both financial and nonfinancial support to the elderly, including access to health care and housing.

In China, pension system is designed according to multi-level principle and we have four parallel public pension systems for urban employees working in enterprises, public-sector employees, civil servants and urban & rural employees. From the perspective of "five-pillar" arrangements, the current retirement income security system has the following characters and problems.

In the first place, the current situation in China is that the first pillar pension scheme is over developed while the other pillars are overly underdeveloped. No more than 10% of participants enrolled in the public pension for urban employees working in enterprises take part in the "second pillar" occupational pension schemes, not to mention the "third pillar" personal saving, which is only a concept without any policy. For urban and rural residents, however, the uni-pillar, basic pension scheme is only available so far.

In the second place, the combination of the social pooling and individual has blurred the boundary between society and individuals, and has also amplified government's responsibility. In the design of the firs-pillar, individual account as well as public account are created to pursue efficiency. However, the individual account is of low efficiency because the *Aaron Condition* is not met. The fund in social pooling will be used if the fund in individual account is not enough to pay for current retirees, thus the boundary between individuals and the society is no longer clear. Apart from that, there are four different designs on individual accounts for urban enterprise workers, public-sector workers, civil servants and urban & rural residents in the way interest rates are calculated, as displayed in table 1, leading to unrealistic comparison among different group.

Table 1. System structures among the parallel public pension schemes

Scheme	structure	funding	Interest rate	Rate of return	efficiency
Enterprise employees 1997	DB + DC	Empty account (10% funding)	Deposit rate	Low and stable	low
Urban & rural residents 2009/2011	subsidies + DC	funding	Might invest in market	Volatile return	low
Public employees 2015	DB + DC	funding	Might invest in market	Volatile return	unknown
Civil servants 2015	DB + DC	Notional account	Set by the government	High and stable	unknown

In the next place, one pension scheme is set to cover both formal and informal employment within the public pension system for enterprise employees, thus creating unsustainability of the system. There is an obvious dual character of the urban employment. The policy is aimed to cover the most people by lowering the threshold for eligibility, which has led to "free riders" during contribution period and inadequate benefits during their retirement, thereby a large amount of financial subsidies and future unsustainability of the pension system would happen.

Moreover, the unrealistic comparison on pension benefits between different public pension schemes will probably arise public pressure and political risks. In the present, there are four parallel pension schemes in China. Public pension schemes for civil servants and public employees are beginning to merge into the basic pension system for urban employees, which in essence is a combination of Defined-Benefit (DB) social pooling and Defined-Contribution (DC) individual account, but they differ from each other in the way interest rate is calculated. Whereas the nature for residents' public pension is government subsides plus individual accounts, which means it is not social insurance at all. The benefit is very low, with only 119 yuan per month per capita in 2015. More seriously, the lower benefit compared to urban employees lead to huge pressure for the government. Table 1 below describes system structures among the parallel pension schemes. The four parallel pension schemes

with different individual accounts have various rules for interest rates, which could lead to unequal benefits in the end.

Last but not the least, the government plays an unlimited financial role in the provision of public pension system for urban enterprise employees. The government has promised to ensure the basic pension benefits for retirees because of transitional cost borne by the system itself, leading to the unlimited financial role of the government. This is of course not a sustainable way for the development of the system. As is shown by Figure1, the financial input for the pension scheme goes up dramatically from 2002 to 2015, with 2.5571 trilion yuan accumulated in total.
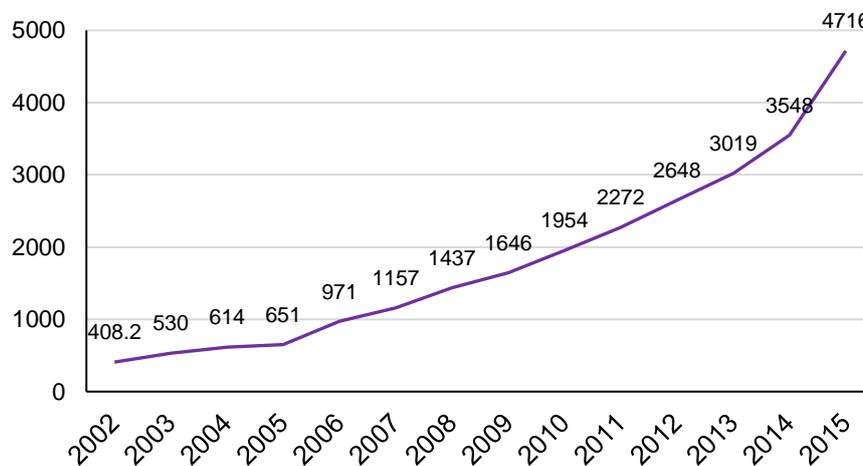
Figure1. Government financial subsidies for public pension system for urban employees (100 million yuan)

Pension System for Urban employees

Pension system for urban employees has a longer history and more complete framework than the pension system for urban residents. Currently there are two pillar pension systems designed for urban employees: first pillar public pension scheme and second pillar occupational pension scheme.

First Pillar Pension Scheme

History and Latest Reform

With great transformation of China's society, public pension system for urban employees has transformed from the "state-enterprise model" based on planned economy to "social security model" based on market economy.

- Traditional retirement system (1952-1991)

In the early 1950s of the 20th century, China established an urban pension system based on the Soviet model. China's urban enterprise workers followed the earliest retirement plan in February, 1952 after the State Council promulgated the "Labor Insurance Regulations". The main features of the welfare system in China were "low-wage, high-employment, high subsidies and high welfare". Enterprises had unlimited liabilities for their employees' health, old age, sickness, death and disability. As almost all enterprises were state-owned, Chinese government was responsible for the final debt. The retirement system was an important part of the Labor Insurance System. The traditional retirement system had high coverage rate and high level of pension benefit (usually 80% of the last year personal wages). Also, there were strict conditions to obtain pensions: workers must work for 30 years; retirement age for female blue-collar workers was 50 years, for female cadres was 55 years, and 60 years for men. Relative to population life expectancy at that time, retirement age requirements were high.

In sum, in traditional retirement system, enterprises and individuals did not need to contribute; pensions were part of labors cost of enterprises, but at the final phase, government was responsible for retirement pension. As a result, we call the traditional public pension system "the state-enterprise model".

- Transition to social security model (1991-1997)

With transformation of planned economy system into a market economy, central government retreaded from traditional pension system, which could not adapt to economic development. As a consequence, lots of problems were created: 1) the majority of state-owned enterprises operated in losses and could not afford the pension system; 2) risk pool was too small; 3) labors working in private firms and self-employees were excluded; 4) labor mobility between different ownership-type

firms was hampered. Thus from 1991-1997, Chinese government began to pilot some cities for exploring public pension reform for urban employees.

- Establishment and development of old-age social insurance (1997-)

In 1997, Chinese government established the Urban Employee's Basic Old-Age insurance and extended it throughout cities and towns nationally. Since 2005, self-employees and flexible working individuals have been covered by the public system. The other separating pension system in urban area, public pension for civil servants, has merged into the Public Pension for Urban Employees since January 2015.

Contents of Public Pension System for Urban Employees

Features of a hybrid System

In the 1990s, China reflected on "egalitarian" values in the planned economy era, while the values of the Bismarkian social insurance model, Neo-liberalism, the "three pillar scheme" proposal by World Bank as well as the success of the privatization of social security in Chile, Singapore funded system had influence on China's policy makers. It is a hybrid system, consisting of social pooling and individual account, designed to make a combination of "efficiency" and "equity". Policymakers also hope the public pension system could achieve multiple goals such as wide coverage, basic protection and sustainability. The social pooling was designed as a defined benefit plan with pay-as-you-go financial system, while the individual account system was designed as a defined contribution plan with funded financial system.

Parameters of the Urban Pension System

Contribution rate for employer is 20% of employees' wages and employee pay 8% of his or her wage which goes into the personal account, the total rate is 28% of wages; the lower and upper limits of the contribution wage base are 60 and 300 percent of the social average wage of the previous year respectively; the minimum contribution period is 15 years; retirement age is 60 years for men, 55 years for women cadres, and 50years for female workers (blue collars). The pension system gives one-year deposit interest rate to assets of individual accounts.

Policy Expectations on Pension Level

Since the replacement rate of traditional retirement system was too high, the new system decided to

offer basic protection only, which must comply with the "basic protection" principle. Under this principle, the pension level decreased by several adjustment. First, modify the final-wage replacement rate of workers into social-average-wage replacement rate. Second, decrease the replacement rate from 80% to 60%. The level and structure of pension under the new system are as follows: Target replacement rate: 59% of the social average wage, in which, 35% is paid by the social pooling system and 24% paid by the individual account system. Adjustment mechanism of pension is set up with linkage to inflation and average salary to ensure that pension income will not decline dramatically.

Determinants of Pension Benefit

Basic pensions are calculated and paid as follows: when the insured person reaches retirement age and the minimum 15-year-contribution period is satisfied, social pooling pension is calculated on the basis of the previous year's local average wage and the person's record of monthly average contributory wage of life time; each full contribution year qualifies for 1% of the basis of social average wage and one's average wage separately. Individual account pension: each month equals the total accumulated amount divided by planned payment months, which are determined by the average life expectancy, personal retirement age, interest rate and other factors. For those retiring at 50, 55 and 60-year-old, the planned payment months specified as 195, 170 and 139 months respectively[29].

The Evolution of coverage and its implications

Up to the 1990s, enterprises beyond the state-owned and collective ones had developed and more labor was employed. Under this context, the coverage extended to all enterprises with different ownership in 1997, including state-owned enterprises, collective enterprises, foreign-funded enterprises, joint ventures enterprises, private enterprises, joint-stock enterprises and so on. In 2005, coverage was extended further to self-employees and flexible employees (without long-term stable employment), who would be treated a favorable contribution rate/ contribution base while enjoying the same calculation method with ordinary employees. Contribution rate for them was 20% of their wages, of which 12% goes into the social pool, and 8% into individual accounts.

Table 2 is a brief summary of the content on public pension system for urban employees.

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[29] No survivors' pension.

Table 2 Main contents of the basic public pension system for urban employees ("First Pillar")

System Structure		Social Pooling	Individual Account
Type of System		PAYG System, DB	Funded System (empty), DC
Protection Target		All urban enterprise workers, self-employees, flexible employees	
Contributions of employees		20% of total wages (employer)	8% of personal wage (employee)
Contributions of self-employees, flexible employees		12%	8%
System Parameters	Retirement age	Male 60, female cadres 55, other female workers 50	
	Contribution base	60-300% of average social wage	
	Minimum contribution period	15years	
Rate of return on individual account		One-year bank interest rate	
Monthly Pension		Basic pension = (indexation of the average monthly wage of local workers in the previous year +the insured person's average monthly contribution wage) * 1/2 * n * 1%	Individual account accumulated amount (determined by the one-year bank rate) divided by 139,170,195 relative to the insured person's retirement age
The expected replacement rate (% of average wage)		35%	24%

Current Situation

Public pension for urban employees has been playing a very important role in China. First, it has secured multi-ownership of economic structure during great transformation from planned economy to market economy. Second, it has played the role as a social stabilizer during the reforming period of state-owned enterprises. Third, it has created a multi-responsibility sharing mechanism to alleviate financial risk of government. Last but not the least, social insurance has important significance to free labor flow. Several indicators are listed as follows to reflect the status quo.

Coverage expansion

China has achieved great progress towards the goal of "wide coverage". In 2013, there were about 382.4 million urban employed populations, among which 241.77 million urban employees involved in the public pension system, whereas 80.41 million retirees began to claim pension benefit. Chinese governments at all levels made great efforts for this goal, not only by lowering the threshold to encourage the low-income earners, self-employees, flexible employees to participate in the system, but also by offering other favorable terms. For example, some local governments encourage the elderly employees who are not insured to pay lump-sum contributions with the lowest contribution base, lowest rate and shortest contribution period for pension eligibility. Since 1993, the number of insured employees and retirees has increased dramatically and the coverage rate has ascended from 40% to 63% in 2013 (see figure 2).
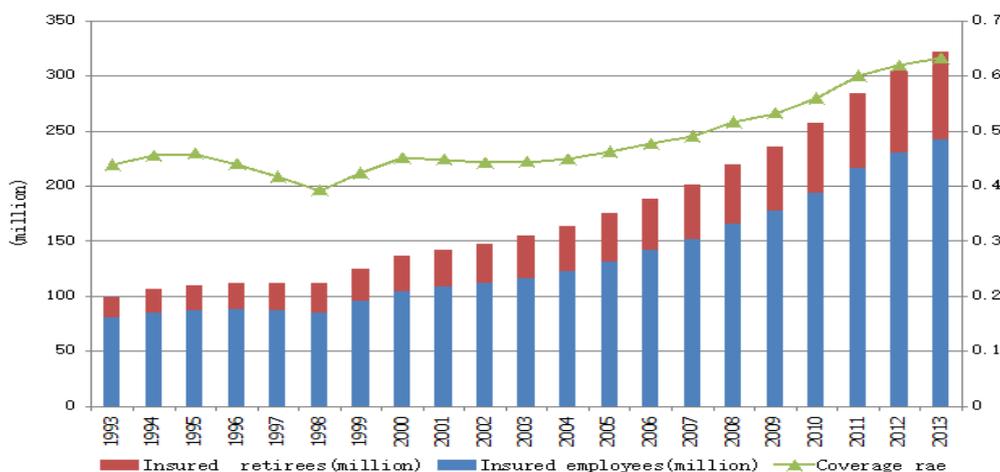
Figure 2. Coverage Rate of Public Pension for Urban Employees (1993-2013)

Benefit Level

From 1997 to 2013, total pension payments increased rapidly from 125 billion to 1847 billion, while replacement rate of public pension benefit to social average salary of urban employees dropped gradually from 76% in 1997 to less than 44% in 2013. Although Chinese government has adjusted benefit level year by year, replacement rate is still too low to sustain basic living standard for some urban employees.
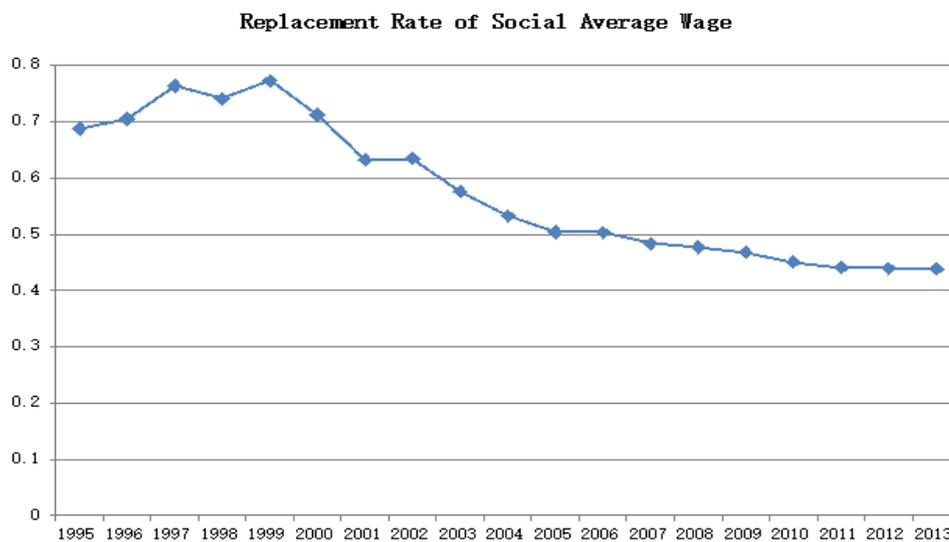
Figure 3. Replacement Rate of Social Average Wage(1995-2013)

Source: Statistical Yearbook of China, Social Security Bulletin

Regardless of the wide gap between the actual level of protection and policy design level, the 44% of the average wage average replacement rate in 2013 is not enough to provide "basic protection" for the retirees. Some scholars argue that the U.S. pension replacement rate is only 40%, and, as a developing country, there is still room for China to decrease the replacement rate. However, they ignore the fact that in the U.S the Engel Coefficient is 6%, that means if $100 per capita is spent only $6 is spent on food, while Engel coefficient is 37%[30] for urban China today, which means the elderly in China will spend significant portion of their pension on food. Besides, the old-age income

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[30] Zhen Li, Wang Haidong. Research on the Replacement Rate of the Basic Pension Insurance [J]. Insurance Studies, No.2, 2012, p. 100.

structure is quite different: basic public pension is usually the only source of income for retirees in China, while only 30% of retired population in the United States completely relies on public pension, and nearly half of the retirees have other systems to provide incomes, such as corporate pension plans and Individual Retirement Accounts[31].

Pension fund and financial subsidy

From 1995 to 2013, pension revenue for urban employees grew from 95 billion to 2268 billion, and pension expenditure increased from 84.7 billion to about 1847 billion respectively, with over 2827 billion pension funds accumulated by the end of 2013, i.e. 4.8% of GDP (see Figure 4).
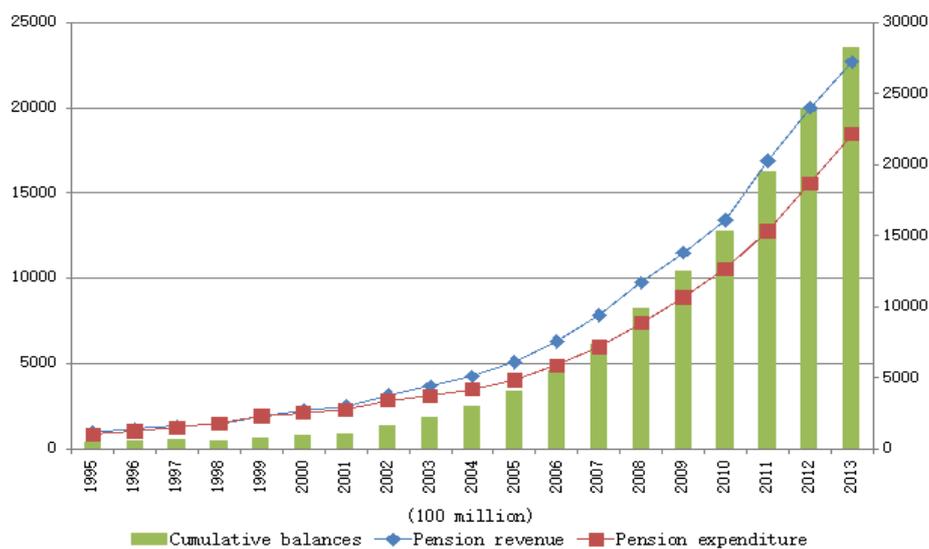
Figure 4. Pension Balance of Urban Employees (1995-2013)

Source: Statistical Yearbook of China, Social Security Bulletin

In the recent decade, gross revenue of public pension system, composed of contribution revenue, interest revenue & others, and financial subsidies(central and local government), increased continuously from 248.9 billion in 2001 to 2268 billion in 2013. Meanwhile, gross expenditure grew with high speed of around 20%, exceeding growth rate of total revenue in 2009, 2010, 2012 and 2013 (Table 3).

Table 3. Revenue and Expenditure of Public Pension Fund for Urban Employees

(100 million)

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[31] Zhen Li, An analysis on the Basic Old-age Insurance of China, People's Press, 2013, p. 49

Year	Gross revenue	Growth rate of gross revenue	Contribution revenue	Interest & other revenue	Financial subsidies	Gross expenditure	Growth rate of gross expenditure	Cumulative balances
2001	2489	9.26%	——	——	——	2321	9.74%	1054
2002	3171.5	27.42%	2551.4	211.9	408.2	2842.9	22.49%	1608
2003	3680	16.03%	3044	106	530	3122	9.82%	2207
2004	4258	15.71%	3585	59	614	3502	12.17%	2975
2005	5093	19.61%	4312	130	651	4040	15.36%	4041
2006	6310	23.90%	5215	124	971	4897	21.21%	5489
2007	7834	24.15%	6494	183	1157	5965	21.81%	7391
2008	9740	24.33%	8016	287	1437	7390	23.89%	9931
2009	11491	17.98%	9534	311	1646	8894	20.35%	12526
2010	13420	16.79%	11110	356	1954	10555	18.68%	15365
2011	16895	25.89%	13956	667	2272	12765	20.94%	19497
2012	20001	18.38%	16467	886	2648	15562	21.91%	23941
2013	22680	13.4%	18634	1027	3019	18470	18.69%	28269

Source: Statistical Yearbook of China, MOHRSS Bulletins on Social Security Development

Difficulties and Challenges

Although the public pension for urban employees has been playing an increasingly important role in

providing basic protection for over 80 million urban retirees in China, it faces challenges like coverage with loopholes, inadequacy of pension benefit, unsustainability under ageing society.

Coverage: many migrant workers are not included

Although 63% of the employed urban population has taken part into public pension system, nearly 37% of the urban employees, most of whom are migrant workers[32] in informal sectors, are excluded from the public pension system for urban employees. Among 269 million migrant workers in 2013, there were only 48.95 million migrant workers, constituting 18.2% of insured public pension system for urban employees[33]. As a result, the majority of migrant workers, especially those working in informal sectors have not been covered by the public pension system. Besides, there are quite a few people participating into the pension with low contribution density which will lead to long-term problems.

High contribution burden

Currently China's social insurance system has five schemes: pension insurance, medical insurance, unemployment insurance, work injury insurance and maternity insurance.

According to the Ministry of Human Resources and Social Security statistics, among the world's 173 countries and regions with social insurance systems, China's five social insurance contribution rate, altogether reaches 40% of total wages, ranks No.13 in terms of high contribution rate. Within 40% of payment, employers contribute 30% and employees bear 10% of their wages[34]. Contribution rate for public pension alone has reached 28 percent, which may be among the world's highest. It is a big burden for the working generation. In a survey conducted by the Chinese Entrepreneur Survey System in March of 2013, 55.8% of the 1000 entrepreneurs selected "social security, the tax burden is too heavy" as the biggest obstacle to enterprise development; for three consecutive years for all twenty options it ranked second place; and western regions, small businesses, non-state-owned enterprises and foreign-funded enterprises select "social security, the tax burden is too heavy," with an even higher proportion. As can be seen, there is no further space for companies to increase the

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[32] Migrant workers here mean Chinese workers from other provinces. The reason why pension system does not have full mobility for workers because social pooling level is only in provincial level or county level.

[33] http://www.mohrss.gov.cn

[34] High contribution rate of old-age insurance. http://insurance.hexun.com/2012-09-21/146112151.html.

theoretical contribution rate[35].

Inadequate pension benefit

The indicator of pension replacement rate has been widely employed by Chinese researchers to evaluate the adequacy of China's Basic Old-Age Pension for Urban Employees (Zhu, 2002; Chu, 2004; Zheng, 2012; Li & Wang, 2013) because pension benefit of public pension for urban employees is mainly determined by contribution base, contribution years, retirement age and interest rate of individual account., Average replacement rate has been introduced in section 2.1.3.2 above to describe average level of pension adequacy, whereas in this section we will discuss pension adequacy of retirees belonging to different income groups with different contribution level.

- Quantitative analysis

Given current policy on minimum contribution base, minimum contribution years, statutory retirement age and interest rate of individual account set by the central bank, and empirical data collected since 1997, the assumptions are set as follows:

i.   Employees contribute continuously before retiring for n years up to retirement (As 15 years contribution shall be 15 years prior to retirement or pre-retirement lump-sum payment of premium for 15 years).

ii.   Employers contribute 20 per cent of total wage payment and employees contribute 8 per cent of individual wage payment. The former goes into social pooling part while the latter enters the individual accounts.

iii. Individual accounts yield about 2.9% of interest rate. According to the empirical data from 1997 to 2009, the average bank-deposit interest rate in one-year is 2.9%, which means r = 2.9%.

iv.   The individual account requires months divisor 195 (50-year-old retired), 170 (retirement age of 55) and 139 (retirement age of 60) respectively, meaning that m=195,170 and 139 respectively.

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[35] Such rates are only theoretical, indeed, as employers and workers have a large discretionarily in deciding their contributory base, and sometime there is also direct bargaining between companies and the administration that collects the revenues.

v.   Growth rate of social average wage is 8%, that is g = 8%. (This is a modest assumption, adapted to current economic environment). From 1997-2009, growth rate of average wage among insured workers was 16.1%).

Models for calculating replacement rate can be set below:

(1) Social pooling (basic pension)

$$R_1 = (n * (1+g)^t + a * (f * \left(1 - \left(\frac{1+e*g}{1+g}\right)^n\right) * (\frac{1+g}{g-e*g})))/(200 * (1+g)^t$$

$$= (n * (1+g)^t + n * a * f)/(200 * (1+g)^t) \quad (e=1)$$

(2) Individual account

Individual account is a Defined-Contribution (DC) funded system. Theoretically, funding asset is determined by contributions and return on investment. It is assumed that the growth rate of personal wage equals to that of local average wage g (e=1); c is contribution rate of individual account; a is rate of contribution base. In theory, final value of the individual account for a participant contributing n years continuously can be calculated according to the formula:

$$F = 12 * a * c * v_1 * ((1+r)^n + (1+g)(1+r)^{n-1} + \cdots + (1+g)^{n-1} (1+r))$$

As a result, the replacement rate of individual account for people retired for t years is below:

$$R_2 = 12 * a * c * f * (1+r) * ((1+r)^n - (1+g)^n)/((r-g) * (1+g)^{n+t-1} * m)$$

$$(r \neq g)$$

$$= 12 * a * c * f * n/(m * (1+g)^{t-1}) \quad (r = g)$$

Based on formulas above, results are presented in table 4 and table 5. Table 4 shows the replacement rate when a person enters the first year of retirement at a choice of 60% and 100% of contribution base with 15 years of continuous payment (male workers usually retire at the age of 60 whereas female workers retire at 50 according to the rule in China).

Table 4. Replacement rate at different contribution base with 15 years of contribution

Contribution base	Retirement age	Social pooling (%)	Individual account (%)	Total (%)
60% of social average wage	60	11.11	4.31	15.42
	50	11.11	3.07	14.18
100% of social average wage	60	13.89	7.18	21.07
	50	13.89	5.12	19.01

As it can be seen from table 5, given the same retirement age, total replacement rate of pension benefit to social average wage will increase around 1% when one more contribution year is added. Second, replacement rate is a bit lower for female retirees, especially for female workers. Third, given the situation of current retirement age and contribution base, although male workers contribute continuously to 40 years and female cadres contribute continuously to 35 years, the total replacement rate for them is still far behind objected replacement rate of 58-60%[36].

Table 5. Replacement rate at different contribution years with 100% contribution base

Retirement age	Contribution years	Social pooling (%)	Individual account (%)	Total (%)
60	40	37.04	11.89	48.93
	35	32.41	11.34	43.75
	30	27.78	10.65	38.43
55	35	32.41	9.27	41.68
	30	27.78	8.7	36.48
50	30	27.78	7.59	35.37

Note: Statutory retirement age for males, female cadres and female workers is 60, 55 and 50 respectively in China.

According to further calculations[37], in order to achieve the expected replacement rate goal (namely

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[36] Hu Xiaoyi. Pension Benefit Level should be compatible with Social Productivity Level and other Social Economic Capacity in China. Social Insurance of China, 1997, No.11.

[37] Zhen Li, An analysis on the Basic Old-age Insurance of China, People's Press, 2013.

replacement rate of social pooling part reaches 35%, individual account reaches 24%), social pooling requires 100% of the average wage contribution base for at least 35 continuous years. Meanwhile individual account should offer targeted 24% replacement rate only when the following conditions are met: 1) Contributing 8% of 100% base to individual account for 40 years; 2) Interest rate of assets on individual account is equal to wage growth rate; 3) The retirement age should be 60, making the minimum divisor of individual accounts of 139 months.

However, as analyzed before, total replacement rate of public pension for urban retired employees could not meet the original goal (replacement rate of 58-60%) under the consideration of current policy design.

Challenge: Ageing trend of the public pension system

- Generally young but fast aging population

As is shown by figure 5, China is still at the stage of a young age population structure; especially the total dependency ratio is really low. In the 1990s when the Basic Old-Age Insurance was devised, China's elderly dependency ratio was only 15% (elderly dependency ratio = the population aged 60 and above / population aged 15-59), and this indicator is 18% now, which is still low. But the challenge is that China's population is aging fast. It is forecasted that China will experience rapid aging in the next 40 years, and by 2050 the elderly dependency ratio will reach 63%[38].

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[38] UN, World population Prospects: 2012 Version, http://esa.un.org/undp/wpp/index.htm
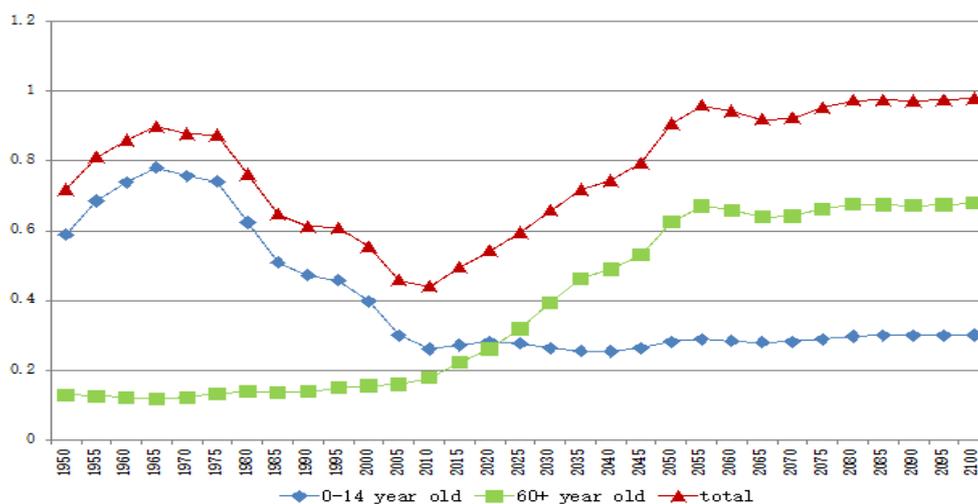
Figure 5. Development and future trends of China's population dependency ratio (1950-2100)

Source: UN, World population Prospects: 2012 Version, http://esa.un.org/undp/wpp/index.htm

- The dramatic change in support ratio

China's old age dependency ratio is not high, but the covered population in the public pension for urban employees is ageing fast. In 1978 the ratio of urban employees to retired population was 30:1, and then decreased rapidly to 3.4:1 in 1997 at the time of the establishment of the pension system. Since 1998 till now, it further decreased to around 3:1 (see figure 6). Compared with data in Figure 4, the same period the elderly dependency ratio of the total population increased from 8% to 11%, indicating that general population aging is not the only reason for aging in the pension system.

Statistically speaking, the ratio of insured employees to insured retirees is 3:1 in the current pension system. However, not all the three employees insured actually pay their contribution continuously. According to the Human Resources and Labor Protection survey, 23% of the insured employees suspended contribution in 2011. As a result, the actual contributing population to the retired population (dependency ratio) is worse in reality.

Support ratio = employees / retirees
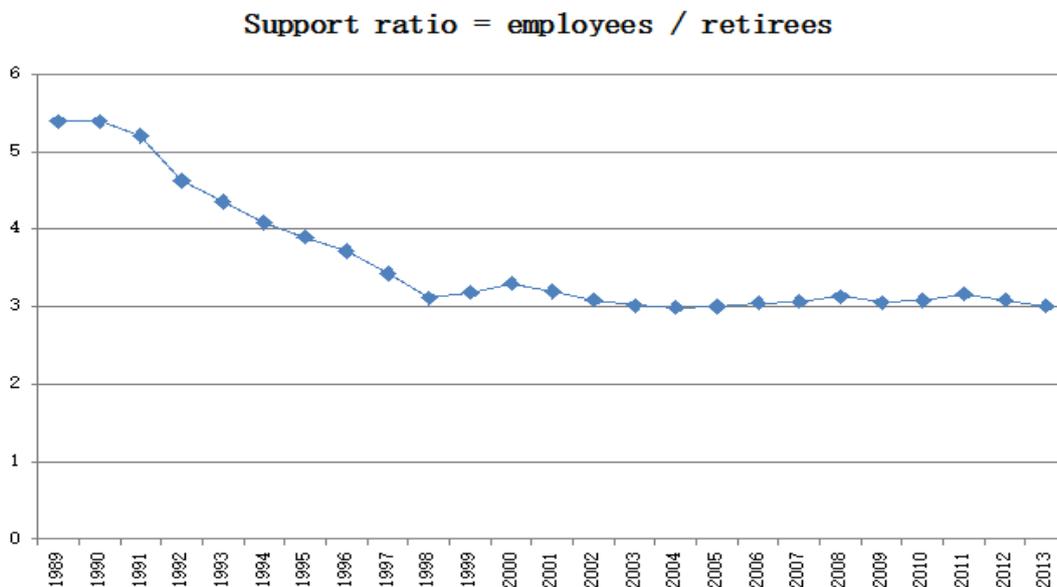
Figure 6. Support ratio of the Basic Old-Age Insurance (1989-2011)

Source: China Statistical Yearbook(1988-2012). http://data.stats.gov.cn

Financial sustainability

The public pension system faced short-term financial difficulties and long-term challenge on financial sustainability in terms of pension debt.

- Current deficit regardless of financial subsidy

According to *Yearly Report of the Development on China's Social Insurance* (2014), the deficit of public pension has increased year by year after removing financial subsidies. Currently 18 provinces face the problem that contribution revenue has exceeded pension expenditure, among which Heilongjiang province has the largest amount of this "deficit". The "deficit" began to emerge from 2013, when it was 95.9 billion yuan regardless of financial subsidies. From then on, "deficit" of public pension has already ascended to 156.3 billion yuan in 2014 and 302.49 billion yuan in 2015[39].

- *Empty* individual account and enormous liabilities

According to the system design expectations, the accumulation of funded system of individual accounts is to cope with the peak of future population aging. However, owning to insufficient financial resources in the 1990s, the government was not committed like the Chilean government to pay transition cost. Moreover, the contributions from employers are insufficient to pay pensions of retirees, so the contributions from employees were used on a PAYG base instead of accumulated on individual accounts in many regions. The local governments have been funding the system to compensate for the liabilities of individual accounts since 2002, but financial expenditure was far from enough. Table6 shows that there is only a little bit more than one tenth of contributions paid on individual accounts funded, and about nine of ten had gone. Chinese describe this problem as "empty account problem".

Although social pooling part has surplus funding in general, it is still less than the liabilities of individual accounts. As is shown by table6, in 2013, all the surplus of social pooling (2826.9 billion) still cannot cover empty scale (3095.5 billion).

Table 6. Funding status of the individual accounts 2006-2013 (100 millions)

Year	Recorded scale	Real asset	Empty scale	Surplus of social pooling

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[39] http://sy101c3c105.dedeadmin.com/sy101c3c105b1x50702n416060247.html

2006	9994	—	—	5489
2007	11743	786	10957	7391
2008	13837	1100	12737	9931
2009	16557	1569	14988	12526
2010	19596	2039	17557	15365
2011	24859	2703	22156	19497
2012	29543	3495	26048	23941
2013	35109	4154	30955	28269

Source: Zheng Bingwen, China Pension Report (2011-2014)

- Implicit pension debt and transformation cost

Implicit Pension Debt (IPD) is defined as the present value of total obligations on future pension benefits to current pensioners as well as current contributors if the PAYG system has to be terminated. It is measured by adding the present value of benefits that will have to be paid to current pensioners plus the present value of pension rights that current workers (future pensioners) have already earned and would have to be paid if the original system were terminated today[40].

Transformation cost stems from IPD but it is not equal to IPD. Transformation cost relates to the financing gap created when payments to pensioners and future retirees must continue even though part of the contributions have been transformed into funded individual accounts. Thus transition cost comes from the need to pay off the debt of the old PAYG system over a period of time. If the new pension system follows a mixed model, such as China's public pension for urban employees, then the present value of transition costs is smaller than IPD.

The size of IPD and transitional cost has been calculated by various institutes and researchers. However, there is no agreement on the result as different measurement usually relies on different assumptions on economic and demographic factors, eg. age structure of covered workers and pensioners, coverage, pension benefits, retirement age, replacement rate, indexation mechanism and discount rates.

In terms of transformation cost, Wang et al (2001)'s simulation resulting from a dynamic CGE model

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[40] Ma Jun, Zhai Fan. Financing China's Pension Reform. http://www.hks.harvard.edu/m-rcbg/Conferences/financial_sector/FinancingChinasPensionReform.pdf

suggested that the transition cost is ranging from 0.5 to 0.6 percent of GDP during 2001-2035 to 0.3 percent of GDP in 2050. Dofman and Sin (2000) evaluated the transition cost of China's pension reform by employing the World Bank actuarial model, PROST. They projected that if there would be no reform of the current pension system, the pension deficits would increase to 0.36 percent, 0.75 percent and 0.89 percent of GDP in the year of 2030, 2050 and 2075, respectively. Chen Fengyuan et al (2013), by the use of accrued-to-date liabilities method from a static perspective, proposed a new way for calculating the transitional costs and analyzed the mechanism of transitional cost payment according to pension reform practices during the past decade. They calculated transitional cost of distinguished group with different gender, character of employment and type of participation ("old" or "middle"), and the total amount was close to 6.832 trillion yuan under basic scenario. Sensitive analysis was followed to make further estimation on transition cost.

In terms of IPD, World Bank (1997) estimated China's IPD at between 46 percent and 69 percent of GDP. A latter estimate puts the IPD at 94 percent of the 1998 GDP (Dorfman and Sin, 2000). Song Xiaowu's report estimated ten different scale of implicit pension debt based on reform in 1997, setting three kinds of average wage -growth rate (5%, 4%, 3% in the next 5, 6 to 10, over 10 years), growth rate of pension benefit as 60% of average wage's, average supporting ratio as 3.25:1 and two kinds of investment rate. One of the results showed that the standard IPD was equivalent to 145.4% of current GDP with 4% as investment rate[41]. Wang Yan et al (2001) estimated China's IPD is around 71 percent of GDP in 2000 based on the model of countable general equilibrium. According to calculation of Jia Kang et al (2007), the total debt (comprised of basic pension for "old" men and transitional pension for "middle" men) in 2007 is about 1080 billion yuan if the old pay-as-you-go system terminates, under the assumption that no new participants would join in the system. Taking new working generation into consideration, Wang Xiaojun (2002) estimated the pension liability at transition period and forecasts the trend of liability in the future 50 years based on the actuarial methods for IPD. As is shown below, IPD would reach by 160% of GDP between 2045 and 2050 (see figure 6).

With ageing process, implicit pension debt and financial sustainability has increasingly become a hot topic in current China. Estimation results on IPD by nationally renowned research teams in recent years using latest data are overwhelming than past prediction. In June 2012, Cao Zhengyuan (Chief

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[41] Song Xiaowu et al (State Council). Report on Implicit Pension Debt of China's Old-Age Social Insurance. 2000.

economist of Bank of China) and presented their calculation result: IPD in 2013 would be as much as 18.3 trillion yuan (31.12% of GDP in 2013 (58.8 trillion yuan))[42]. According to Ma Jun's estimation in December 2012, financial subsidy being unchanged as the level of 2011, accumulated surplus of public pension for urban employees will be used up by 2022, thereafter the pension system will be in the status of liability. The cumulative gap between 2013 and 2050 is equal to 83% of GDP in 2011 (including 14% from public institutions), which amounts to the present value of 37 trillion yuan[43]. In November 2013, Zheng Wei from Peking University evaluated that there would be a gap between pension revenue and expenditure by 2037 and surplus pension fund would be exhausted by 2048[44]. In December 2013, the estimation conducted by Li Yang from Chinese Academy of Social Sciences reveals that the public pension will begin to face a gap in 2023 and the cumulative pension fund will run out in 2029. By the end of 2050, cumulative pension gap will reach 802 trillion yuan, constituting 91% of that year, which is higher than Ma Jun's projection. The scale of IPD has reached 46.5 trillion yuan, constituting 98% of GDP in 2011[45]. In June 2014, Wei Jizhang, also from Chinese Academy of Social Sciences, evaluated history debts of the public pension, finding that in 2012, the IPD of social pooling part was 83.6 trillion yuan while IPD of individual account was 2.6 trillion yuan, which amounted to 86.2 trillion yuan altogether, taking 166% of GDP in 2012[46].

Despite existing different measuring results on IPD and financial status of public pension due to diversified actuarial models and assumptions adopted, an indisputable fact is that the scale of IPD in the future is enormous that policy makers should be aware of and necessary measures should be taken in advance.

Problem analysis

The reasons why current pension system faces above mentioned difficulties are mainly related to structural and parametric problems in the design of the pension system as well as moral hazard

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[42] Cao Zhengyuan et al. Reinventing National Capacity of Asset and Liability. Cai Jing, No.15, 2012.

[43] Ma Jun et al. Research on China's National Balance Sheet of Asset and Liability. Beijing, Social Science Literature Press, 2012.

[44] Zheng Wei et al. Medium Term Measurement on Public Pension System and Discussion on Future Reform. The Fifth Forum on China Social Security, Nov. 2013.

[45] Li Yang et al. China's National Balance Sheet of Asset and Liability 2013: Theory, Method and Risk Measurement. Beijing, Chinese Social Science Press, 2013.

[46] Zheng Bingwen. China Pension Report 2014. Beijing, Economy & Management Publishing House. 2014.

problems in management.

Structural problems

Inefficiency of current hybrid system

The original purpose of designing the hybrid system (social pooling plus individual account) is to combine function of equity/social solidarity and incentive/efficiency together. In the reality, however, neither of the function has been realized. Why? The hybrid system has mixed the border between government and individuals. Consequently beneficiaries do not care about how much pension their individual account have really accumulated, instead they are interested in the final pension benefit they could receive when retired, since they know the government will put financial fund to ensure their basic retirement living standard. As it can be seen that the individual accounts do not encourage beneficiaries to work longer and contribute more, thus it has not demonstrated efficient from micro perspective.

Inefficient individual account

Problems caused by the Individual Accounts: first, there is no real accumulation of funds in the individual accounts and there is no real gain on them, while an interest rate must be credited on the personal account, so the system's future liabilities increase. Second, both China's economic growth rate and the average social wage growth rate are high, but interest rate of the accounts (one-year bank deposit rate) is far lower than the salary growth rate. According to *"Aaron condition"*, if return rate on funded pension plan were less than growth rate of average wages, funded pension would be less efficient than pay-as-you-go pension system. This was one important reason for the reduction in the level of pensions. As the system matures, this problem is even more evident. Table 6 shows that individual accounts are ineffectively functioned in China as return on individual account is less than the growth rate of average wage, and it is even exceeded by inflation rate in certain years. Based on empirical data of one-year deposit rate, we find that a female participant, with average wage, 30 years of contributions, can only obtain her pensions from her individual account at the level of about 4% of social average wages[47]. Thus the individual account has not demonstrated efficient from macro perspective.

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[47] Zhen Li, An analysis on the Basic Old-age Insurance of China, People's Press, 2013, p. 95

Inefficient individual account has led to the decrease of pension replacement rate, thereby government has to use social pooling pension to offset shortage of individual account, and even adopt policy adjustment to guarantee basic pension benefit, which will probably do harm to fiscal sustainability in the long run.

Table 7. Comparison of individual account related indicators

Year	Growth rate of average wages (%)	Inflation rate (%)	One-year bank deposit rate (%)
1998	15.60	-0.80	4.59
1999	11.59	-1.40	2.25
2000	12.28	0.40	2.25
2001	16.00	0.70	2.25
2002	14.28	-0.80	1.98
2003	13.03	1.20	1.98
2004	14.13	3.90	2.07
2005	14.60	1.80	2.07
2006	14.36	1.50	2.52
2007	18.72	4.80	3.47
2008	17.23	5.90	3.06
2009	12.00	-0.70	2.25
2010	13.47	3.29	2.5
2011	14.28	5.39	3.25
2012	12.11	2.60	3.25
2013	10.08	2.60	3.00
Mean	13.98	1.90	2.67

Source: China Statistical Yearbook 2012, People's Bank of China website

Some may argue that investing the assets of the individual accounts on the capital market may gain higher returns. In June 2013, Ministry of Human Resources and Social Security has newly drafted a regulation on investment of public pension fund. Approximately 2 trillion pension fund would be invested and managed by professional market institutions[48]. Nevertheless it is hard to ensure that the

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[48] Ministry of Human Resources and Social Security: 2 trillion pension fund may be invested and operated by market institutions. New Beijing Daily, 2015-07-01.

return of the pension funds can be higher than growth rate of wage. Moreover, one question should be asked: who should be responsible for the loss of investment during economic crisis or failed investment?

Parametric problems

Very low contribution base

System with a minimum salary base is 60% of the social average wage, which is a relatively low condition that helps to improve coverage rate. The lower contribution base means less current premiums as well as lower pensions for future retirement. One more problem is that lower contribution base provides some participants with the "free rider" opportunity. It means some participants are not low income earners but pay the contributions with lower base. Wages in China are not very transparent, and moral hazard in contribution base is prevailing. This problem damages the fairness and long term balance of the system. In the formula for calculating pensions, those who contribute on a smaller contribution base benefit more from the system. The truth is that not only those with low wages paid contributions at a lower base, but also some working in formal sectors with higher wages did so. In July 2013, the social security auditing department in Zhengzhou City of Henan Province released a set of statistics showing that over 90% of Zhengzhou employers paid social security illegally: employers did not pay contributions for their employees at all or contributed at a lower contribution base[49].

Short minimum contribution periods

Policymakers took into account the large number of China's non-regular employment, and in which large numbers are migrant workers with unstable employment. In order to improve accessibility to the public pension system for this part of the population, merely 15 years of contribution years is required. This low threshold conditions are conducive for expanding coverage rate, however, lead to a number of problems: it not only worsens real dependency ratio of pension system reducing the system's revenue, but also reduces the individual's pension benefit because contribution year is an important parameter for deciding pension level. According to the calculations mentioned before[50], in

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[49] People's Daily, " Nearly nine out of ten employers in Zhengzhou social security payment illegal", People's Daily, March 27, 2013

[50] Li Zhen , An analysis on the Basic Old-age Insurance of China, People's Press, 2013.

order to fulfill the expected replacement rate of 59 percent of the social average wage, it requires continued contribution for 35 years for the social pooling part, and the individual account requires 40 years of continuous contribution. Fifteen years of contribution can offer only 15% of the average wage from the social pooling part, while individual account part is even less.

Low statutory retirement age

Retirement age is an important factor for the financial balance of old-age insurance. Its impact is in twofold: it affects the working population as well as the retired population. When retirement age is lower, working population is small while retired population is large. The trend toward the increase of dependency ratio is mainly due to China's very low retirement age. In the 1950s China set retirement age for men at 60, female worker at 50, female cadre at 55. At that time population life expectancy in China was only 50 years which reached 74 years in 2010, but we are still using the retirement policy that was introduced 60 years ago. Compared with life expectancy, China's retirement age is too low. All things being the same, the higher retirement age, the longer contribution period and the higher basic pension of Social pooling part. It is the same case for individual accounts: the higher retirement age, the more accumulated in individual account; the lower retirement age, the shorter contribution period, the lower the amount of accumulation in individual accounts, while the monthly divisor is larger, the average monthly pension is lower[51]. The divisor of individual account accumulation for male is 139, for female retiring at age 55 is 175, and for female retiring at age 50 is 190, so women's individual accounts pension will be substantially less than men's. According to the life expectancy table for insurance industry, in the years of 2000-2003, the life expectancy of female at 50-year old was more 32 years; 27.5 years for female at age 55; 20.2years for male at age 60. This means most retirees will outlive many years after their accounts are used up. If social pooling system continues to subsidize them; it will further harm long-term sustainability of the pension system.

Moral hazard problems in management

Moral hazard problem in management is the main reason for payment imbalance at present and in the future. Moral hazard comes from both individuals and local governments. Some of the insured take advantages of loopholes in policy and management system and claim their pension benefit only on the basis of minimum contribution basement, shortest contribution years and minimum retirement

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[51] Li Zhen. "Empirical Analysis on China's retirement age", China Social Insurance, 1998 (4) :21-22

age. What they have contributed to the public pension system is far below what they have gained from the pension system. Therefore such action is imitated by more and more participants. Local governments' behavior constitutes another source of moral hazard. In order to increase current revenues and expand coverage rate of pension system, the local government usually encourages various non-agricultural employed population and even agricultural population to pay a lump sum of 15 years' premium to get their pension benefit. It is obvious that these populations participate into public pension system with minimum threshold. The local government would have more motivation to encourage this action especially after the twelfth five-year plan when "social pooling in a national level" has been proposed.

Voluntary Second Pillar Pension Scheme

Compared with first pillar pension system, voluntary second pillar is really underdeveloped. The following will introduce policy development, status quo and obstacles of the second pillar pension scheme for urban employees.

Policy development of China's occupational pension scheme

Second pillar pension scheme was first proposed in 1991 policy-file issued by state council: "Government encourages enterprises to establish complementary old-age pension scheme for employees". In 2000, "complementary old-age pension scheme" was replaced by "occupational pension scheme" mentioned in the *pilot policy of perfection on urban social security system*. Liaoning province was the first to pilot occupational pension plan for urban employees. Trial Act of Occupational Pension Scheme was published in 2004, indicating that the framework of second pillar pension system had been established in China. Later on, ministry of finance and state administration of taxation launched several tax related regulations. Until 2011, newly revised act, Regulation on Fund Management of Occupational Pension Scheme, has been published. Issues such as governance structure, investment and supervision are further illustrated by the policy. More and more small and medium sized companies are encouraged to participate in occupational plans.

With regard to the features of China's occupational pension scheme, it can be described as unprotected, defined-contribution, voluntary, employment related private pension plan, according to standard set by OECD (see figure 7). Its main goal is to provide supplementary income to the elderly.

Besides, the occupational pension scheme has adopted the governance structure of "trust" model (see figure 8). Founders of such scheme (enterprises/employers and their employees), acting as clients, sign trust contract with trustees (corporate trustee institutions). Thereafter, trustees sign entrust management contract with investment manager, fund depositary and account manager separately. However, government set very strict rules on investment strategy and supervise fund management. According to the latest policy, the proportion of investment on stock must be no more than 30% of total fund under quantitative supervision

Figure 7. Classification of Private Pension Plan: Perspective of Function

China's occupational pension scheme
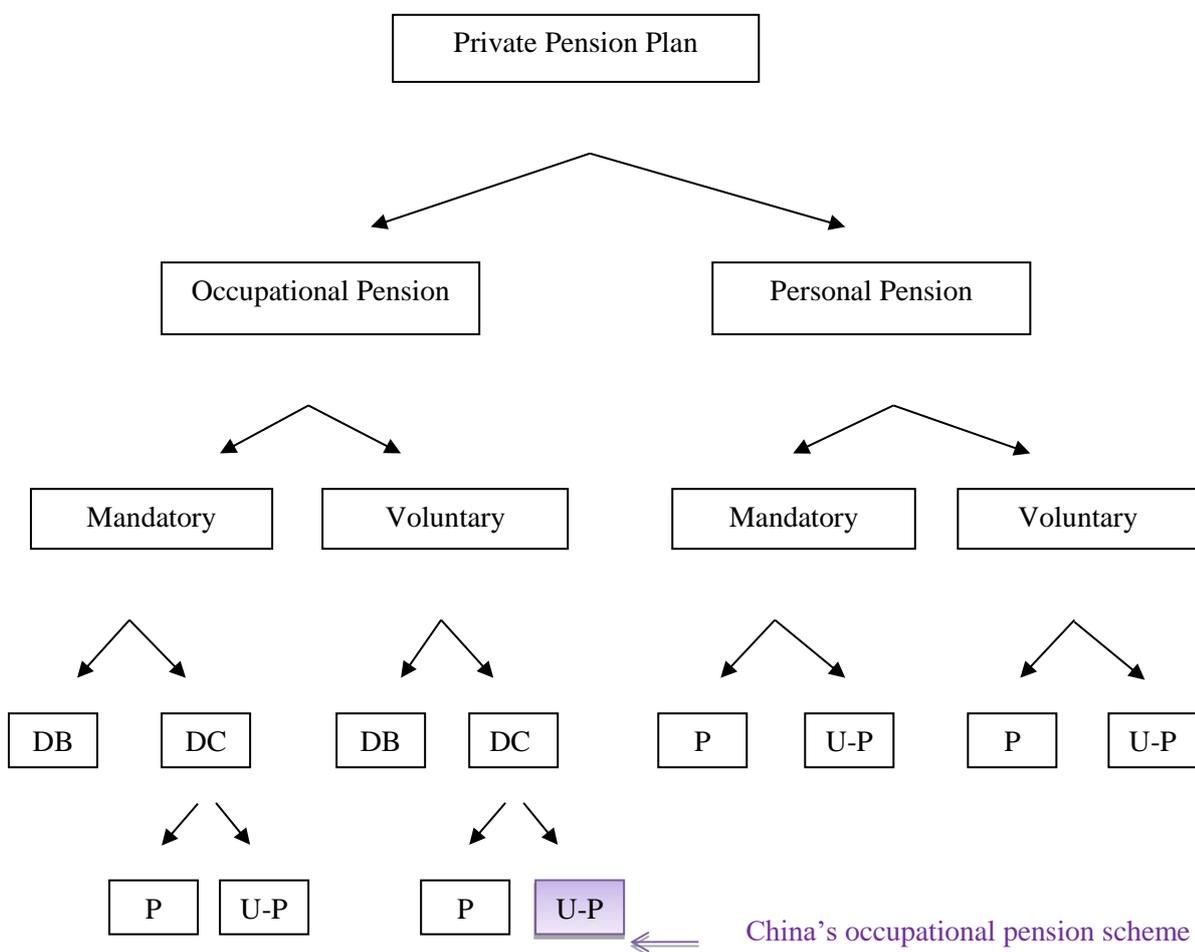
DB: Defined Benefit

DC: Defined Contribution

P (Protected) : Guarantee for return on investment or final pension benefit

U-P (Unprotected) : No guarantee for return on investment or final pension benefit

Source: Private Pensions：OECD classification and glossary. 2005, P14.
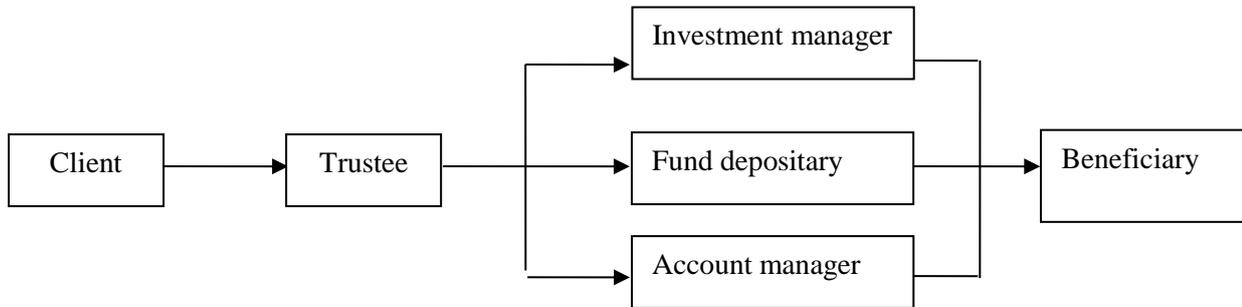
Figure 8. Governance Structure of China's Occupational Pension Plan

Current Situation

During the past decade, the absolute level of coverage and pension fund has grown gradually, but the relative level has been quite small compared with development speed of first pillar pension system and it has varied greatly within regions and different kinds of enterprises.

Coverage

Since pilot of occupational pension scheme in 2000, the number of participants has increased gradually from 5.6 million to 20.56 million in 2013. Meanwhile, the number of enterprises taking part in the 2nd pillar pension scheme increased from 162 hundred in 2000 to 661 hundred in 2013.

Relatively speaking, however, the number of 2nd pillar insured employees as a percentage of urban employees was 2.42% in 2000 and 5.38% in 2013, and the number of 2nd pillar insured employees as a percentage of 1st pillar insured employees was 5.36% and 8.5% correspondingly, which was far behind coverage rate of public pension for urban employees (1st pillar pension system) ranging from 44% to 63% (see figure 9).
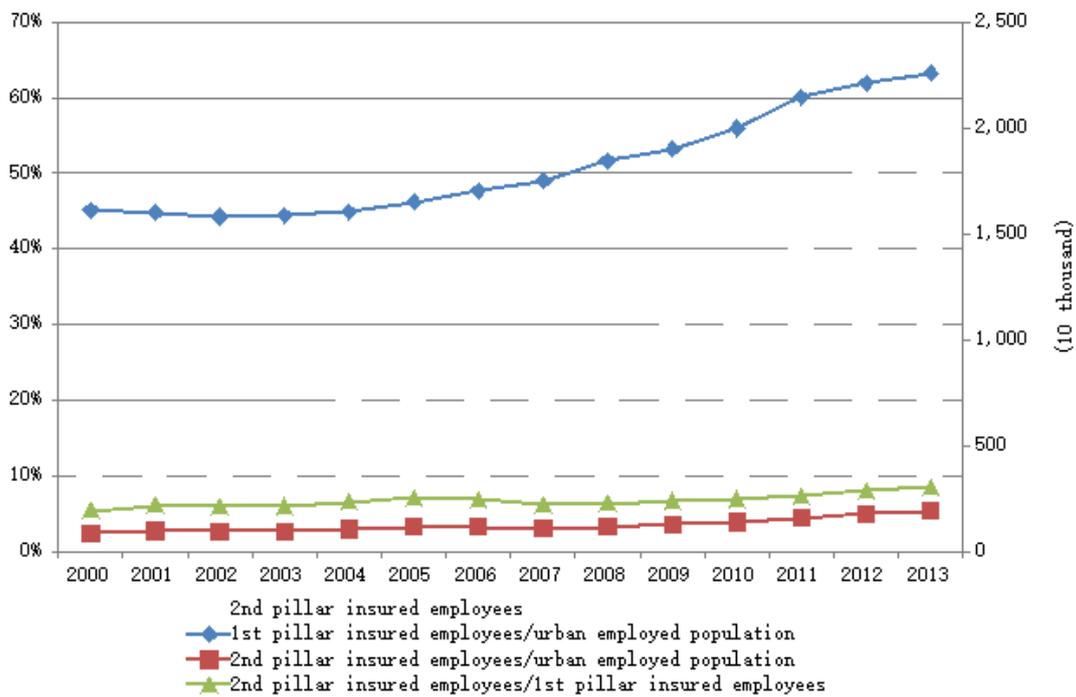
Figure 9. Coverage Rate of Second Voluntary Pension Scheme

Source: Statistical Yearbook (2001-2014)

Pension fund

Although the accumulated pension fund of occupational scheme has grown rapidly from 19.2 billion (2000) to 603.5 billion (2013) over the past decade, the accumulation of per capita fund in 2000 and 2013 was merely 3427 yuan and 29,352 yuan (see figure 10), constituting about 36% and 56% of social average wage for urban employees. Concerning the return on investment, it fluctuated violently compared with inflation rate and one-year bank deposit rate, especially during the world economic crisis era. As is shown by figure 11, the return rate of occupational pension scheme on investment dropped dramatically from 41% in 2007 to -1.83% in 2008.
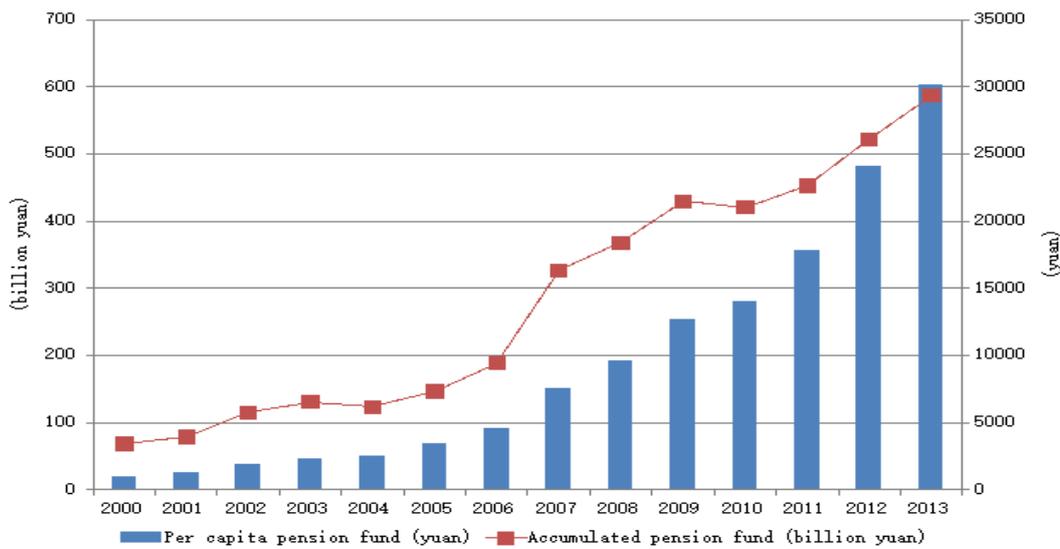
Figure 10. Pension fund of 2nd pillar pension scheme

Source: http://www.cnpension.net/index_lm/2014-05-08/1449297.html

	2007	2008	2009	2010	2011	2012	2013
return on investment (%)	41	−1.83	7.78	3.41	−0.78	5.68	3.67
inflation rate (%)	4.8	5.9	−0.7	3.29	5.39	2.6	2.6
one-year bank deposit rate (%)	3.47	3.06	2.25	2.5	3.25	3.25	3
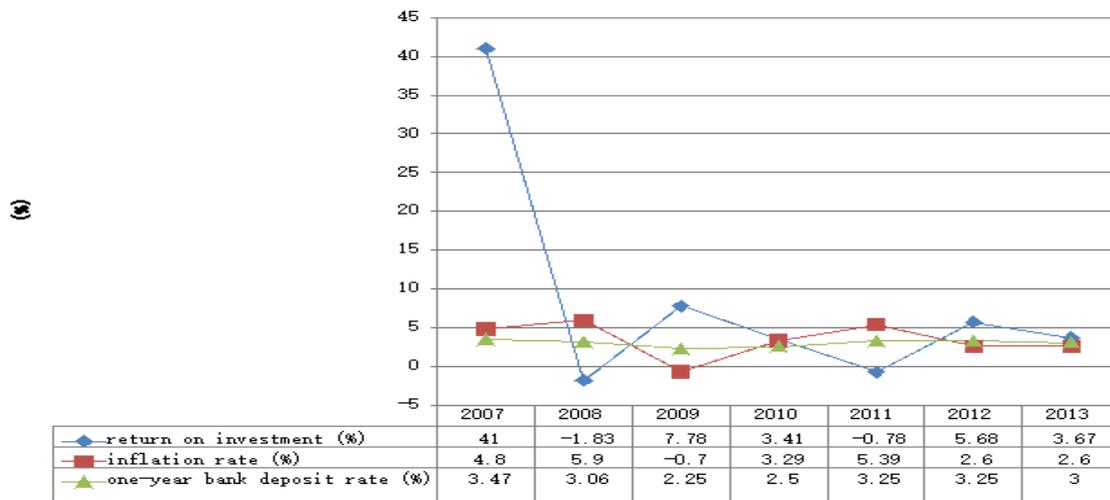
Figure 11. Return of 2nd pillar pension fund on investment

Source: http://www.cnpension.net/index_lm/2014-05-08/1449297.html

Structural unbalance

There are structural unbalances in the development of China's voluntary second pillar pension

scheme.

From the perspective of enterprises' property, it is obvious that the number of people from state-owned monopoly industries participating in the 2nd pillar pension scheme is far higher than that of people from other industries; people from large enterprises involved in the scheme are more numerous than that of workers of small and medium sized companies; people from formal sectors are more than those from informal sectors or floating population. Enterprises involved in such pension schemes are concentrated on the monopolistic field of power, petroleum, telecommunication, civil aviation, etc. Among 11 industries establishing occupational pension schemes for urban employees, there are about 3891 state-owned enterprises, constituting 93% of the total number of participating enterprises. In the meantime, there is a huge gap among executives and ordinary staff in terms of occupational pension benefit. According to a research on 4000 employees in Shanghai, allocation of occupational pension scheme is becoming weird: the benefit gap between senior managers and ordinary staff had been 3 to 5 times and some occupational pension scheme only covered a small proportion of managers[52].

From the perspective of regional distribution, coverage rate as well as the amount of pension fund' accumulated assets are higher in developed regions, such as Shanghai, Guangdong, Zhejiang and Beijing, than in underdeveloped regions. Participation within various regions has developed unbalanced these years (table 8).

Table 8 Participation status of occupational pension scheme within regions in 2013

Region	Number of enterprises	Number of participants	Pension funds' assets (10 thousand yuan)
Beijing	2689	1,306,198	2,583,869.85
Tianjin	1222	234,103	356,470.20
Hebei	590	476,384	601,162.94
Shanxi(山西)	630	535,159	1,575,750.93
Inner Mongolia	379	284,957	281,744.39
Niaoning	1124	375,596	910,711.75
Jilin	325	151,855	318,521.06

[52] Workplace Observation: How dose occupational pension scheme become "personal bonus" of SOE executives?
http://news.xinhuanet.com/employment/2008-10/13/content_10186032.htm

Heilongjiang	658	186,343	361,615.05
Shanghai	8551	1,086,487	3,838,483.21
Jiangsu	3683	657,037	2,109,864.45
Zhejiang	2098	398,639	1,455,002.63
Anhui	972	501,702	1,545,381.48
Fujian	1726	402,103	1,051,273.98
Jiangxi	693	192,551	572,635.85
Shandong	2558	616,352	1,293,595.88
Henan	2588	641,732	801,571.85
Hubei	987	300,618	869,357.12
Hunan	307	242,519	661,178.85
Guangdong	6153	1,059,244	1,509,758.58
Guangxi	2778	281,637	268,662.40
Hainan	216	24,109	55,606.24
Sichuan	932	346,611	691,625.91
Chongqing	367	86,736	267,606.42
Guizhou	348	149,288	372,804.70
Yunnan	626	302,116	867,483.55
Tibet	12	8,310	13,044.62
Shanxi(陕西)	422	379,848	773,996.00
Gansu	302	454,891	539,022.09
Qinghai	109	53,623	76,247.02
Ningxia	163	90,133	131,498.07
Xinjiang	470	119,832	396,065.16
Xinjiang Construction Corps	2	9,102	41,869.11

Source: http://www.cnpension.net/index_lm/2014-05-08/1449297.html

A brief summary

Currently, the occupational pension scheme is developing slowly in China. It is very difficult for the voluntary second pillar to further extend coverage to small and medium sized companies. The obstacles the pension scheme is facing can be summarized as follows:

- External factors

Firstly, Lack of preferential tax policy makes occupational pension plan be short of favorable external environment (Pu, 2005; Long, 2006; Yue, 2009; Du, 2010, etc). Tax policy is still not clearly stated during investment and payment phase, so the employers and employees do not have motivation to participate compared with countries adopting EET pension policies (Liu, 2011). Secondly, the burden for urban employers and employees to take part in the first pension scheme is still very high and they do not have enough capacity to contribute to the second pension plan (Pu, 2005; Yue et al. 2009). Currently, employers' contribution rate on social insurance would be 30% in total (20% for public pension, 8% for health insurance, 1.5% for unemployment insurance, 2% for work injury insurance), which leaves little space for contribution on second pillar. Lastly, it is not transparently, professionally and efficiently functioned and regulated for the "trustee" construction of occupational pension scheme (Pu, 2005; Wu, 2006; Liu, 2011).

- Internal factors

For one thing, oversupply of labors on labor market determines that enterprises would have strong power in the negotiation between labors and enterprises, and this situation will be deteriorated by weak role of trade union in China. In that case labors will have little voice in bargaining with employers in respect of welfare including occupational pension plan. For another, most employees in formal sectors have formed an idea of "relying on children to support their old-age" for a long time, and not a few employees still depend heavily on first pillar public pension (Liu, 2005; Wen & Zhang, 2007; Liu, 2010). They have not formed a concept that they could look for supplementary old-age income from occupational pension system, which is regarded as a more reasonable way to ensure adequacy of pension benefit[53].

Pension System for Rural and Urban Residents

Currently there is only first pillar pension system designed for rural and urban residents: public pension system for rural and urban residents, which has experienced policy integration. In the following, policy development, status quo and brief evaluation of the pension system will be discussed.

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[53] Robert Holzmann and Richard Hinz. Old-Age Income Support in the 21st Century: An International Perspective on Pension Systems and Reform. World Bank Report, 2005.

Policy Evolution

Pension policy for rural residents

Since 1986, Chinese government had run pilot program on old-age social insurance for rural residents in some areas. In 1992, Ministry of Civil Affairs issued basic plan for County-Rural Old-Age Social Insurance, which was regarded as a milestone for rural residents. Regulated by the plan, the source of finance mainly came from personal contribution and was supplemented by collective subsidy with policy support, which was regarded as the feature of "old rural pension system". In reality, however, fewer and fewer take part in the pension plan because of their poor financial capacity and low benefit level it caused. Till July 1997, the policy of "old rural pension" was stopped by state council.

With the importance of rural issues becoming increasingly highly valued, the establishment of social security in rural areas has been reconsidered by Chinese government since 2002. Cities like Baoji, Donghai, Beijing, Shanghai and Dongguan, etc. began to pilot "new rural pension system" driven by government subsidies. Under the background of population ageing, economic crisis and the process of urban-rural integration, New-Rural Old-Age Social Insurance was started up nationwide in 2009. The essential difference between "old rural pension system" and "new rural pension system" is that government subsidy is made up of the primary financial source of new-rural pension system.

Table 9. Contents of policy on "new-rural pension system"

System Structure		Social Pooling	Individual Account
Type of System		PAYG System, DB	Funded System, DC
Protection Target		Rural residents above 16 years old	
Contribution	Personal contribution		Five grades: 100, 200, 300, 400, 500 yuan/year (subjected to adjustment)
	Collective subsidy	Subsidy standard determined by each village committee	

	Government Subsidy	Central government: West and middle regions: 100% basic pension benefit; East regions: 50% of basic pension benefit	
			Local government: no less than 30 yuan/year/person
Rate of return on individual account		One-year bank deposit interest rate	
Monthly Pension		Basic pension = 55yuan + additional	Individual account accumulated amount divided by 139
Conditions claiming for pension benefit		Pensioner age: above 60 (contribution by offspring) Specific contribution period	

Pension policy for urban residents

For quite a long period of time, urban residents without work have not had any public pension. In July 2011, public pension for urban residents was established and from then on the pension system was gradually extended nationwide. Policy contents are presented in the following table 10.

Table 10. Contents of policy on public pension system for urban residents

System Structure		Social Pooling	Individual Account
Type of System		PAYG System, DB	Funded System, DC
Protection Target		Urban residents above 16 years old without work	
Contribution	Personal contribution		Ten grades: 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000 yuan/year

		(subjected to adjustment)
Government Subsidy	Central government: West and middle regions: 100% basic pension benefit; East regions: 50% of basic pension benefit	
		Local government: no less than 30 yuan/year/person
other		Other communities or social organizations
Rate of return on individual account	One-year bank deposit interest rate	
Monthly Pension	Basic pension = 55yuan + additional	Individual account accumulated amount divided by 139
Conditions claiming for pension benefit	Pensioner age: above 60 Specific contribution period	

Policy integration

In February 2014, the state council issued guidance on building unified public pension for urban and rural residents, putting forward a proposal that new-rural pension system and urban-residents pension system be merged into a unified system by the end of "the twelfth five-year plan", and gradually construct a universal public pension system for all residents. According to the guidance, specific regulation can be generalized as table 11.

Table 11. Contents of policy on public pension for urban & rural residents

System Structure	Social Pooling	Individual Account
Type of System	PAYG System, DB	Funded System, DC
Protection Target	Urban & rural residents above 16 years old without public pension	

Contribution	Personal contribution		Twelve grades: 100—2000 yuan/year (subjected to adjustment)
	Government Subsidy	Central government: West and middle regions: 100% basic pension benefit; East regions: 50% of basic pension benefit	
			Local government: no less than 30 yuan/year/person (minimum contribution grade); no less than 60 yuan/year/person (contribution grade more than 500 yuan)
	Collective subsidy		Village committee and other communities or social organizations
Rate of return on individual account	One-year bank deposit interest rate		
Monthly Pension	Basic pension = 70yuan + additional		Individual account accumulated amount divided by 139
Conditions claiming for pension benefit	Pensioner age: above 60 Specific contribution period		

Source: http://baike.baidu.com/view/12246129.htm

Current situation and challenges

Coverage as well as pension financing are the two main aspects concerned with public pension for urban and rural residents.

Increasing Coverage

The number of people enrolled in the new-rural pension system increased quickly to 86.91 million in 2009 and then grew drastically to 326.43 million in 2011, with 15.56 million pensioners in 2009 ascending rapidly to around 85.25 million pensioners in 2011 in rural areas (see figure 12). As is show in figure 13, public pension system for urban and rural residents extended fast during the recent years. The number of participants increased from 331.82 million with 87.6 million pensioners in 2011, to 497.5 million with 137.68 million pensioners in 2013. The growth rate has slowed down since 2012.
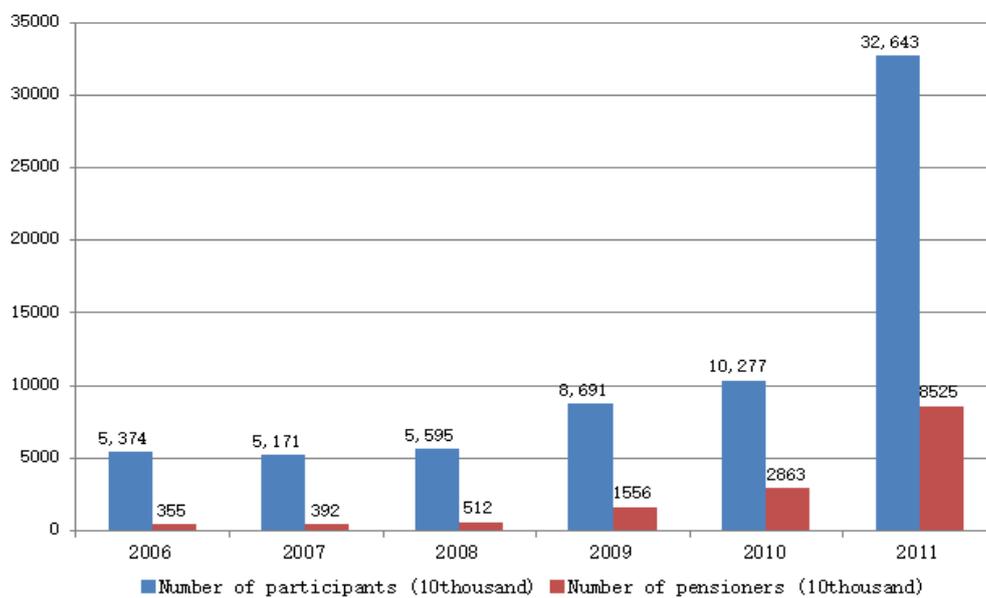
Figure 12. Coverage of New-rural pension system

Source: statistic yearbook
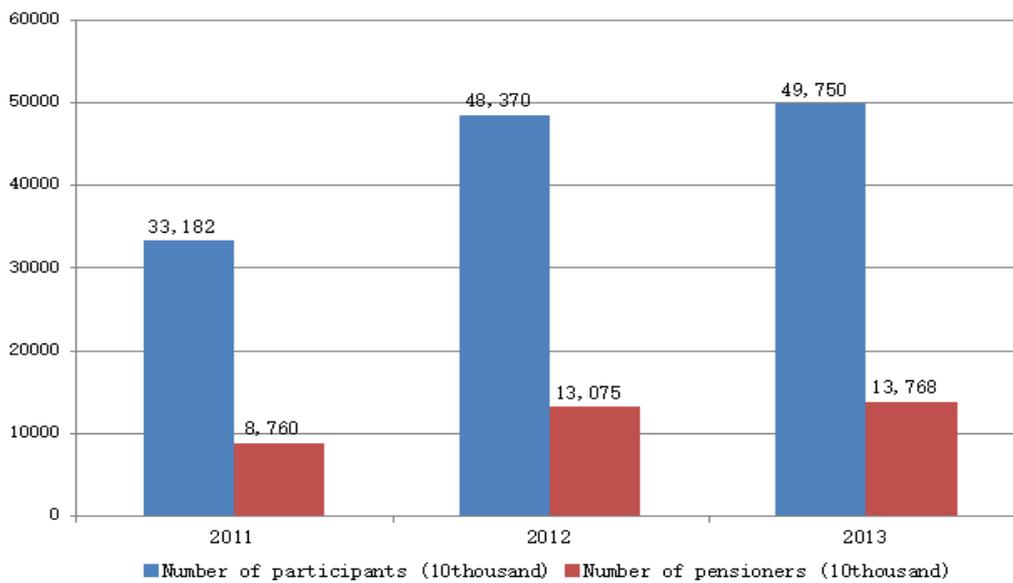
Figure 13. Coverage of public pension system for urban and rural residents

Source: statistic yearbook (2012-2014)

Pension fund and financial sustainability

According to the statistic data of a short period, in 2013, total pension revenue of public pension for urban and rural residents was about 205.2 billion yuan, increased by 12.19% percent compared with that of 2012. Among the total revenue, personal contribution constituted 31% (63.6 billion), whereas government subsidy comprised of the rest 69%[54]. Meanwhile, total pension expenditure of the pension system was 134.8 billion yuan in 2013, increased by 17.27% of the previous year, exceeding the growth rate of pension revenue. This will add burden to financial sustainability in the future. The accumulated pension assets was up to 300.56 billion yuan, raised by 30.56% (see table 12).

Table12. Pension fund status of public pension for urban & rural residents

Year	2012	2013
Pension revenue (billion yuan)	182.92	205.23
Growth rate (%)	29.6	12.19
Pension expenditure (billion yuan)	114.97	134.83
Growth rate (%)	79.84	17.27

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[54] http://www.mohrss.gov.cn

Cumulative balances (billion yuan)	230.213	300.566

Source: Social Security Bulletin (2013), http://www.mohrss.gov.cn

Insufficient pension benefit

According to official data, average monthly pension for urban and rural residents was 81 yuan per person in 2013 and 90 yuan in 2014[55], and it is projected to rise to approximately 100 yuan after increase of basic pension from 55 yuan to 70 yuan[56]. Compared with monthly consuming expenditure on food, 90 yuan seems quite insufficient for food consumption (see table 13).

Table 13. Pension benefit level and comparison with living expenses (2013)

Resident (per person)	Average monthly pension (yuan)	Average monthly Consumption expenditure (yuan)	Engel coefficient	Consumption expenditure on food * (yuan)
Urban	81	1501.9	35%	525.6
Rural	81	552.1	37.7%	208.1

* Consumption expenditure on food = Average monthly Consumption expenditure * Engel coefficient

Source: Statistic yearbook (2014)

A brief summary

Despite a short history, public pension for urban and rural residents has rapidly extended social security coverage to people who could not take part in the traditional public pension system for employees, which has largely improved equity of pension system. However, the pension system depends heavily on financial subsidy, which may probably induce sustainability issue in the long run. Moreover, pension benefit is inadequate for the over 137 million pensioners.

Problem analysis

Essence: government subsidy plus individual account

Differently from public pension system for urban employees, the public pension system for urban & rural residents is, in essence, constituted by government subsidy plus individual accounts, rather than

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[55] http://money.163.com/15/0630/10/ATBQ6QMU00254TI5.html

[56] www.cnrencai.com, 2015-02-04.

a social insurance system. As a result, the pension system cannot play the role as risk-diversification mechanism. Instead, government usually plays the major role in the finance of the pension. As revenue of local government becomes more and more limited, a large amount of pension subsidies will be given to urban & rural residents elderly at the sacrifice of future tax payers. This will also lead to potential threats on long-term fiscal sustainability.

Inefficiency of individual account

The policy has set several levels for individuals to contribute, from 100 yuan per year to 1200 yuan per year. In fact, most people tend to choose the minimum level (100 yuan per year) and minimum periods (15 years) to contribute. In addition, the accumulated pension fund of individual account is recorded with a low interest rate, merely the one-year bank deposit interest rate, which is below inflation rate in most years. The value of pension assets is hardly going to be even just maintained, not to mention increased, particularly when high management cost is taking into consideration. Generally speaking, minimum personal contributions, limited financial resources, low interest rates together with high management costs have resulted in insufficient pension benefits. Monthly pension benefit of 90 yuan in 2014 for urban and rural residents is far from enough to keep basic living.

Literature Review on Improvements of Current Pension System

As analyzed above, public pension system has played the major role in providing old-age income to urban and rural residents, although it has faced challenges like inadequate pension benefit and financial sustainability. Second voluntary pension scheme as well as third pillar voluntary saving or commercial insurance is underdeveloped in China. Considering current unbalanced structure of pension system, proposal to establish multi-layer, multi-tier or multi-pillar pension system has reached an agreement. However, researchers have different opinions on how to reform current pension system to a multi-layer or multi-pillar pension system. Improvement path can be summarized as following figure.
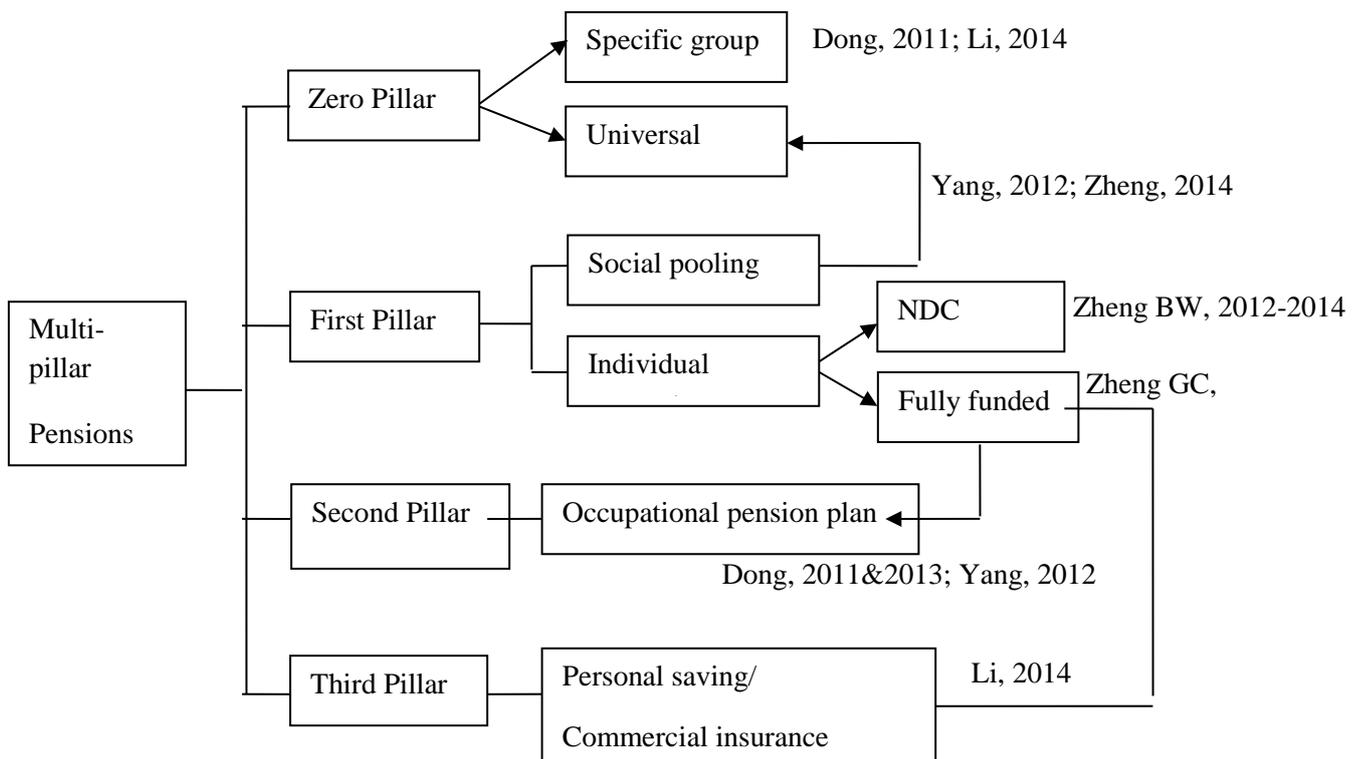
Figure 14. Literature review on improvement of China's pension system

"Zero-pillar" pension system: specific or universal?

Currently, Chinese citizens do not have zero-pillar pension system as suggested by World Bank (2005). In order to cover the small proportion of people who cannot participate into any public pension systems because of short of money, the proposal on setting up "zero-pillar" pension scheme is put forwarded by many experts. There is nearly no doubt that "zero-pillar" pension scheme will be financed by government tax revenues but there is no consensus on whether the entire population or specific group of people should be covered by the system. Dong keyong (2011) proposed that state pension scheme aimed at preventing old-age poverty be focused on rural residents and low-income group who could not contribute to "first pillar" public pension system[57]. Li Zhen (2014) advised that old-age allowance based on means-test be given to agricultural population and unemployed urban residents and meanwhile the minimum subsistence guarantee system be strengthened[58]. However,

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[57] Dong Keyong, Sun Bo. From Multi－Tiered to Multi－Pillar：Rethinking of Old－Age Security System Reformation. Journal of Public Management (Quarterly), Vol.8 No.1 Jan., 2011.

[58] Li Zhen. Thinking on the Establishment of Multi-layer and Multi-pillar Old-Age Pension System. Journal of Public Administration Reform. No.1 2014.

Yang Yansui's proposal on building universal "zero-pillar" state basic pension is based on division of current social pooling and individual account in "first-pillar" pension system. Finance of the state-basic-pension will come from social pooling part. Also, pension benefit of the universal "zero-pillar" will be equal from the prime minister to peasants[59].

"First-pillar" pension system: key areas of reform

The most controversial part of reform is about the "first-pillar" public pension system. What the future reform-direction of social pooling and individual account would be is still of hot debate.

Separation of social pooling and individual account

Not a few experts propose that social pooling and individual account be split up and operated separately (Dong, 2011; Yang, 2012; Zheng, 2013; etc.), making the responsibility between government and market much clearer (Li, 2014). Dong (2011) suggested that the first pillar pension system should be focused on employed population and comprised of current social pooling part with Pay-As-You-Go, defined-benefit arrangement, in order to guarantee basic living standard and realize social redistribution. Zheng Gongcheng (2013) not only agree on the separation of social pooling and individual account in public pension systems, but also advise to compress the scale of current individual account while expand the scale of social pooling part. To be more specific, the contribution rate to individual account should be decreased from 8% to 3~5% and increase the relevant contribution to social pooling part, thus alleviating pressure of value increasing on fully funded individual account while promoting mutual aid and redistribution within social pooling[60]. Apart from Yang yansui (2012) who believes that separated social pooling should develop into universal state pension scheme, most experts maintain that social pooling should be strengthened and even play a much more significant role in the **first** pillar pension system.

Reform path of individual account

After the individual account's separation from the social pooling part, there is more heated discussion concerning individual account.

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[59] Yang Yansui. Universal state-basic-pension: equal benefit from prime minister to peasant.
http://jingji.cntv.cn/20120322/118727.shtml

[60] Zheng Gongcheng. Deepening the Reform of China's Pension System. Journal of Teaching and Research. No.12, 2013.

Fully funded pension scheme

Dong keyong (2011, 2013) suggested the separately operated individual account be merged into the "second-pillar" occupational pension scheme with fully funded and defined-contribution mechanism, which is also focused on employed population. This idea is supported by Yang yansui (2012) and others. Li Zhen (2014) proposed another possible way: current individual account run by government should be cancelled and the original contribution rate of 8% or less can be put into voluntary personal saving account to stimulate the development of "third-pillar" pension system. This proposal could be feasible not only to public pension system for urban employees but also to urban & rural residents based on Chinese tradition on saving, and also would make current 8% of wages be used in a more efficient and flexible way.

However, Jin weigang (2014) pointed out that by the end of 2013, the actually accumulated pension fund of individual account in public pension for urban employees was only 415.4 billion yuan while the nominated pension fund had reached 3 trillion yuan (5.27% in 2013), so "empty account" is a serious problem. He also mentioned the dilemma that individual account faced: if it were designed to be fully funded, the transitional cost, which is not a small number (see detailed contents in 2.1.4.4), as well as investment issues must be taken into consideration in priority; if it were transformed to social pooling, it would be a great challenge to cope with huge pressure on pension expenditure at the peak of ageing society.

Notional Defined Contribution (NDC) account

What is NDC?

The NDC was first introduced to China in the beginning of 2000s and a series of report introducing best practices in Sweden, Poland, Italy has been brought in. The Notional Defined Contribution account is a combination of pay-as-you-go financial mechanism and defined-contribution benefit calculated mechanism. However, in current pension system, we do not have NDC account in public pension system. Instead, we have designed a fully-funded defined contribution individual account but it actually turns into "empty" account unfortunately.

Necessity for Reform

In 2014, Zheng published a report proposing reform action of current first pillar pension system to

NDC pension system, which has strongly aroused the attention of Ministry of Finance. According to Theory of Mechanism Design, Zheng suggests that current "empty" individual account transform into NDC and then gradually expand the scale of NDC so as to solve the problem of incentive compatibility and achieve "actuarial equity". The main goal of the proposal is to motivate people to contribute more to make pension system sound and sustainable[61].

It has proved in practice that the combination of social pooling (PAYG, DB) and individual account (empty account) is unsuccessful and inefficient. Zheng (2014) points out that social pooling has led to low portability of pension right, low management level of pension fund, fragmented systems, unsustainable finance because of free riders, difficulty in increasing retirement age, anti-redistribution between the rich and the poor, etc. As a consequence, it is high time that incentive factor ("equity") was introduced into first pillar pension system to avoid a "tragedy of the commons".

Reform plan: reduce or cancel social pooling

Zheng (2014) has provided three scenarios of NDC. They are small account, big account and total NDC account (see table14), among which total NDC account is the ultimate goal while small and big account can be implemented during transition period. In this way, however, social pooling would be finally replaced by NDC account. Moreover, Zheng and his team suggested that government subsidies to social pooling part in public pension system could be used as finance source of state pension system (similar to "zero-pillar"), thus to realize function on poverty prevention and social redistribution of public finance.

Table 14. Three scenarios of NDC reform

Proposal	Contribution distribution		Source of contribution	
	Individual account	Social pooling	employee	employer
Small account	8%	20%	8%	20%
Gig account	16%	12%	8%	20%
Total account	28%	0	8%	20%

Source: Zheng Bingwen. China Pension Report 2014. Economy & Management Publishing House, p115.

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[61] Zheng Bingwen. China Pension Report 2014. Economy & Management Publishing House.

Advantages of the design on "total account"[62]

Theoretically, it has following advantages. Firstly, it could smooth fluctuation of population by "personal saving" mechanism and adapt to the transformation of population-ageing structure automatically. Secondly, it will facilitate the accumulated individual account transform into life-time annuity based on actuary, thus to adjust to the changing life-expectancy automatically. Thirdly, it would help replace the political adjustment on pension benefit randomly with regularly index-adjustment on pension benefit. Fourthly, it would make people choose retirement age in a more flexible way. Fifthly, contribution will be regarded as "saving", thereby decreasing distortion of labor market. Lastly, it would make benefit decline implicitly, so as to realize financial and political sustainability.

Practically, the total NDC account will be suitable for China's situation. First of all, it may defuse "moral-risk" for local government, to realize national pooling in one step. In the next place, it is possible for China's public pension system to obtain a higher return rate on pension fund under current economy with high growth rate. Finally, under the precondition of present limited coverage, NDC account, which seeks to realize longitudinal actuarial equity, is more likely to achieve financial sustainability.

Comment: Will the NDC solve the problem?

Li (2013) has pointed out that NDC would face the dilemma of whether to record a higher or lower interest rate in a notional defined-contribution account. On the one hand, as there is no real pension asset in the NDC account, there is no return on investment correspondingly and it is usually impossible to record a high interest rate. It is not hard to imagine that pensioners will suffer great loss when the record interest rate is far below growth rate of annual wages (return rate of PAYG). On the other hand, if a high interest rate were required to be recorded, it would mean a huge amount of debt to be paid in the future[63].

The NDC was first invented by the Swedish and the original goal was to solve the problem of early retirement by introducing incentive mechanism of NDC. The Swedish model has solved the problem

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[62] Zheng Bingwen. China Pension Report 2014. Economy & Management Publishing House, p160-169.

[63] Li Zhen. Reform of Individual Accounts in Public Pension System: fully funded, NDC or separation?
http://www.yicai.com/news/2013/11/3103258.html

of financial sustainability but forget to take pension adequacy into consideration. There is a very famous design in the NDC system, the Automatic Balance Mechanism, which is functioning through balance ratio[64]. If the balance ratio is less than 1, the system is in a state of financial imbalance; the pension liability exceeds the assets which are to finance it. Meanwhile, the balance between assets and liabilities is to be restored by multiplying the income index by the balance ratio, thus creating a new index series, called a "balance index", which is used instead of the *income index*. In 2008, 2009 and 2012, the balance ratio was calculated at less than 1, which means that the record rate of NDC is calculated by balance index, which is below the actual growth rate of annual income. In that case, pensioners suffered loss of their pension benefit. In sum, the role of Automatic Balance Mechanism is simply to make the system financially balanced, regardless of pensioners' benefit adequacy.

In reality, NDC in Sweden has failed to motivate people to work long and contribute more. In 1999, the number of people began to draw their pensions before the age of 65 constituted 10.3% of the retired population, whereas the number of pensioners after 65 took the proportion of 77.3%. In 2009, the indicators were 25.7% and 55.4% correspondingly[65]. In other words, from 1999 to 2009, more and more elderly began to retire at early ages. As a result, the Swedish NDC pension system have not showed incentive function as it supposed to be. In 1999, 3.6% of the elderly aged 61 began to claim their pension benefit; in 2013, however, this indicator increased to 6.9%.

One more thing should be mentioned is that the Swedish NDC pension system has inherited substantial pension assets from the previous pay-as-you-go pension system, and these assets could help NDC record a higher interest rate in sound economic environment. However, China is short of this condition on the way to NDC pension reform.

Although the Swedish government has provided minimum guaranteed pension, old-age poverty is still worsened.

Authors' road map on improving current pension system

Diagnosis on problems of current pensions system

Problems of the current multi-layer structure can be summarized as follows:

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[64] Balance ratio=(contribution asset + buffer fund) / pension liability

[65] Orange Report: Annual Report of the Swedish Pension System 2013.

(1) In the design of the first-layer pension system, we attempt to cover all the people with different income levels by using one universal system to pursue the principle of equity and unification, which demonstrates to be unrealistic. In China, there is an obvious dual urban-rural structure, with rural residents constituting 50% of the population, meanwhile there are formal and informal sectors-employed population in urban areas. To realize universal coverage, the system will decrease the threshold on participation, and the result is that working generation joins the system with the minimum requirement (so called "free riders") and thereby they would probably get insufficient pension benefit during their retirement. Hence the government will subsidize the system, which leads to unsustainability in the long run. Nevertheless, there are one third of the urban employees not being able to participate in the basic pension system.

Pension system for urban and rural residents is not social insurance in essence, and it is merely a system with combination of government allowance and individual account. The individual account is designed to be in accordance with unification while the function of security is tiny, efficiency lose is huge and moreover, it has conducted comparison among citizens within different systems, which has exerted pressure on the government.

(2) The individual account becomes inefficient as it cannot meet "Aaron condition". That is also one of the reasons why contribution rates stand so high while pension benefit continues to decline.

(3) The multi-layer structural pension system is targeted to urban employees and only provides this group with diversified old-age income security, whilst for rural residents, self-employees and flexible employees, there is only first-layer pension instead of multi-pillar pension system providing to them. Even for employees, the development of occupational pension scheme is extremely limited and third pillar saving scheme is merely a concept because of lack in policy.

Policy recommendation: From the "Multi-layer" Pension System for Urban Employees to the "Multi-pillar" Pension System for Entire Population

Government's boundaries should be reasonably and clearly defined

Within the multi-pillar pension system, the government should play three important roles. First of all,

the government should calculate and pay the transitional cost of current pension system for urban enterprise employees explicitly. These include the early retirement caused by bankruptcy of the state-owned enterprises during the transformation from planned economy to market economy, and also the "empty account" brought by the transition from traditional Pay-As-You-Go DB pension system to the hybrid "DB plus DC" pension system. Next, the unlimited financial role of the government should be limited to specific program for specific group. That is to say the responsibility of the government should no longer be unlimited subsidies for basic pensions but navigate to the specific program, such as the "zero-pillar" pension for low-income group, so as to make government's financial role restricted. Moreover, for the supplementary personal pension plans, the government ought to give tax credits in order to encourage the development of the second and the third pillar pensions.

To establish the dual-basic urban employees' pension system after separating the individual account

(1) To establish the dual basic old-age social insurance for urban employees. On the one hand, public pension system for urban employees could be set to provide basic income security for urban employees working in formal sectors. Raise the current insured threshold, to realize the goal of "high threshold, high pension benefit". On the other hand, national pension system should be provided for urban employees working in informal sectors. Lower the threshold for informal-sector workers, to realize "low threshold, low pension benefit and universal coverage". In this way, we can achieve the goal of "universal coverage, sustainable finance, and income smooth within people from various income-level" by different arrangement of pension system.

(2) Separating individual account from basic public pension system and establishing voluntary personal-saving-account for retirement. Mandatory individual account will engender a series of problems and government will be the final payer of the loss. In comparison, voluntary personal-saving-account can be used much more flexible especially for low-income groups and young people: it can be merged into occupational pension plans, purchase life insurance or other financial assets.

Towards a "zero-pillar" pension system for residents

Individual accounts in the existing public pension system for urban & rural residents should be canceled, and the system should go back to "zero-pillar" Pension System for residents. The existing

public pension system for urban & rural residents is a combination of government allowance and individual account rather than social insurance. It will arouse comparison among people in different pension systems, and generate political risks. In consequence, we should call off the individual account, and help it return to the nature of government allowance, namely "zero pillar" of pension scheme, so as to provide "safe net" (non-contributory pension system) for the poor or those without work.

Establish, strengthen and encourage the national voluntary personal saving accounts as the "third-pillar" pension scheme

In the background of population ageing, multi-pillar pension system should be set to make sure the sustainability of the first pillar scheme. And in the condition of continuous economic and income growth, there are feasibility for the development of other pillar pension schemes. The source of fund of other pillars is from individual accounts separated from public pension system for urban and rural pension system plus certain amount of household saving from urban and rural residents. Personal choice are given so that people would not focus on the pension gap. In that case, public opinion environment will be sound and health for the development of social security.

Attach importance to the function of intergenerational support from family

From historical perspective, the tradition of "informal security" is an important feature of China's traditional welfare culture. In China, the support responsibility from other family members is responsibility set by law. According to the Protection of Rights and Interests of Older Persons Act (2015 amended), the offspring of the elderly have the responsibility to support their elder parents in retirement income, elderly care and spiritual consolation.

Proposal for the Design of Multi-pillar Pension System in China

Group	Public pension		Private pension		Informal institution
	0 pillar	1st pillar	2nd pillar (mandatory)	3rd pillar (voluntary)	4th pillar
residents	Elderly subsidies	--	Non-	Personal saving	Informal family and intergenerational support
Urban employees	Non-	dual DB scheme		Occupational scheme + Personal saving	
Public sector-employees		DB scheme		Occupational scheme + Personal saving	
Civil servants		DB scheme			

Figure15. **Proposals for the design of multi-pillar pension system in China**

With regard to the road map, our "five-pillar" pension system can be described as: "Zero Pillar" is to realize the function of poverty alleviation. The function of the first pillar is to smooth lifetime income of labors, and provide the basic level of security. Employment based mandatory DC plan provide supplementary income security. Voluntary personal saving can not only be "fuel delivered in the snow" for employees working in informal sectors, extending coverage of pension system, but also be "flowers added to embroidery" for people who have first & second pillar. Fourth pillar, generational transformation within family members and re-employment of retirees, can provide further income security for the elderly, which is especially important for developing countries.

Compared with other road map of improvements, "five-pillar" pension system will be more suitable for China as a result of:

(1) About half of rural residents under Small-scale peasant economy: no employment relationship, low income and unstable income. The saving rate of 20% rural residents is -60% (Figure 16).

(2) A large number of employment in informal sectors and flexible employment in formal sectors exist in urban areas. The number of urban employees was 359million, in which 60.7% was informal sector employment.(Yan, 2013)

(3) The traditional Confucian family culture

(4) Strong saving preferences and value-added preference

(5) China's economy is still growing at a fast speed (7%+), and the growth rate for population is also positive.

The first two points determine that employment related public pension plan cannot cover the entire population, so zero pillar is essential. Point 3&4 illustrate that household and personal saving could play a more important role. Point 5 shows that mandatory individual account is hard to be efficient in China.
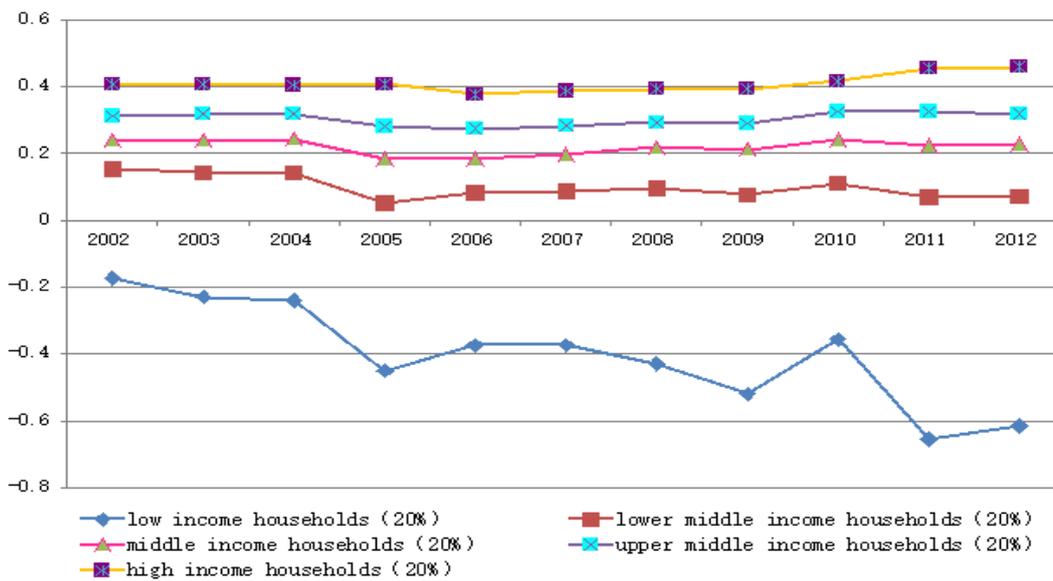
Figure 16. Saving Rate Distribution of Rural Households by Income Percentile

Only in this way, could China build an adequate and sustainable multi-pillar pension system for the entire population in the ageing society.

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Tools and measures to manage a basic pension system based on individual account

Roberto Notaris

Italian Social Protection Institute (INPS)

Contents

Abstract

The paper covers different topics related to

The first part describes the **Unified Account Statement,** an instrument that connects in a single place the essential information present in different archives for a given citizen, providing an organic, immediate and dynamic representation of his situation in the social protection system. The Unified Account Statement provides a representation of the individual situation under many perspectives. More specifically, it contains the *descriptive* elements related to the different segments of the working life and the *accounting* elements that record the progression of the contribution level.

The Italian legislation provides several **instruments for social change and income redistribution**, designed to mitigate the imbalance between very large pensions and pensions below the poverty threshold. These instruments are essentially of two types: the first intervene on low contributions, during the active life (with the indirect effect of speeding up the access to benefit and/or increasing its amount); the second on low benefits during the years of retirement (with the direct effect of increasing the net amount of the benefit through an integration of money or a tax relief).

The paper contains four sections. The first three present some best practices related to the nominal personal account:

- the tele-transmission of the monthly data of employees (UNIEMENS), that is actually the fundamental routine to implement the individual personal account;

- the online service "My Pension", which uses the account statement as a tool to create a "culture" of social protection and as a solicitation for citizen to think about their own economic future;

- the creation of an unified database of all the active workers, based on a technological synergy among different administrative bodies.

The fourth section presents a short history of the maternity protection in the Italians system, from the beginning of the twentieth century up to now.

The Unified Account Statement as management tool of the nominal personal account (UNEX)

*In Italian, the word "contribution" has two meanings: on the one hand, it indicates the **flow** of payments that finance the system (we say: "to pay contribution") together with the financial contribution of the State; on the other hand, it indicates the contributions paid up to a certain moment in time (the **stock** of contribution), and allows the worker to check its possibility to access a pension benefit and to estimate the amount of the pension. The Unified Account Statement (UAS) allows the simultaneous control of the two aspects: the correct payment of contributions and the possible outcomes in terms of the right to a pension benefit as well as the amount of the benefit.*

2.1 The Unified Account Statement as representation of the Nominal Personal Account

The **Unified Account Statement (UAS)** has played a very important role in gradually standardizing an extremely complex environment, characterized by strong differences between jobs in terms of timing, access to social security protection, mode and frequency of contributions' payments, management of the funds, archives and data management.

For each type of work (permanent, intermittent, agricultural, maritime, self, occasional, flexible, part time, etc.) there were (and still remain) different rules that establish the "value" of the time covered by the insurance, the income to be used to compute the amount of the benefit, the amount of the payments to be made. The UAS provides a complete representation of all working periods, helping the account holder to use in the best way the contributions accrued under different pension funds.

The **account statement is a timely and progressive representation of the individual working life**, **regardless of the pension system**. In particular, the statement allows individual worker to ascertain its right to the pension and to compute the amount on the basis of its past payments, regardless of the fact that they have been deferred and capitalized until the retirement date (funded pension scheme), or they were used to finance the general pension expenditure during the years of his stay at work (pay-as-you-go scheme).

2.2 Dual use of the individual account statement

The individual UAS is important not only for the account owners, but it is equally important for the Social Security Institute. In fact, on the one hand, it allows **the CITIZENS** to check the development of their pension position and, on the other, **the INSTITUTE** to timely provide its services.

In order to reach both goals, the UAS provides:

- A <u>descriptive presentation</u>, a "picture" of the insured life that depicts all the relevant events in chronological order. Furthermore, the presentation allows a comparison of the single registrations and is particularly useful in case in case of overlapping periods, in order to identify any mismatching.
- An <u>accounting presentation</u>, the shows the elements relevant to operational purposes for the management of the consulting phase and timely release of the pension benefit.

2.3 Meaning of UNEX (acronym of Unified Extract)

The UAS must incorporate a context of extreme complexity, because the information coming from various sources and different systems. In general, a pension position is formed gradually with the flow of mandatory, voluntary, figurative and redeemed contributions that reside in specific archives with different frequencies and forms. The different categories of contributions have a very articulated subdivision relating to the type of work activity, the history of the fund and the method of contributions' payment.

MANDATORY CONTRIBUTION	
Employees registered in mandatory general insurance	**Self-employed registered to respective special schemes**
Employees in a private and State-controlled sectors	Artisans and merchants
Managers of industrials companies	Farmers
Employees of agricultural sector	Employees in a private and State-controlled sectors
Domestic workers	Employees in a private and State-controlled sectors
Fishermen	Employees in a private and State-controlled sectors
Freelancers registered to "Separated-scheme"	**Employees registered in special funds of social protection**
Collaborators	Employees of electricity, telephone and transport sector
Occasional and door-to-door sellers	Staff of flight (pilot, technologist, assistants)
Professional without insurance fund	Staff of State Railway Company
Workers of performance art and sport	**Public Employees**

Ordinary	Employees of State (Schools, Defense Force, Ministries)
Dancers	Employees in Local Organs (Region, City administration, Local health institutions)
Actors	
professional sportsmen and sportswomen	

VOLUNTARY CONTRIBUTION	"FIGURATIVE" (VIRTUAL) CONTRIBUTION
Voluntary payment of employees	Periods of unemployment
Voluntary payment of self-employed	Periods of mobility
CONTRIBUTION BY REDEEM	Income assistance and decreasing working time for solidarity
Redeem for part time- periods	
Redeem for legal university course	Antitubercolar assistance
Redeem for working period in foreign Countries without agreements with Italy	Work in Social Work Program
Life annuity for the omitted contributions	Natural disaster
Redeem of the period of maternity or assistance of disabled, in absence of an employment relationship	
Redeem for particular life situations (for family's reasn, education and study)	
Redeem for period of suspension or interruption of working activity	

Moreover, the various contributions can be presented by day, week, month or year.

KIND OF JOB	PAYMENTS METHOD	CONTRIBUTION IN "UNITS TIME"
DOMESTIC COLLABORATOR	*Three-monthly payments on the basis of the work hours*	HOURS
EMPLOYEE IN FARM	*Three-monthly payments on the basis of the work days*	DAYS
EMPLOYEE IN PRIVATE COMPANY	*Monthly payments on the basis of the work weeks*	WEEKS
FIGURATIVE PERIODS	*Reported by employer or required by employee*	WEEKS
ARTISANS AND TRADERS	*Proportional to annual income divided in 6 installments*	MONTHS
SELF EMPLOYED FARMER	*Fixed contributions divided in 4 installments*	YEARS
EMPLOYEE IN PUBLIC COMPANY	*Monthly payment or provision for the whole period of service*	YEARS
(...)		

The time units are conventional time spans, defined by the rules set by the different funds. For example: the "days" of work accredited in the agricultural sector are converted into "weeks" in accordance with a very old and historical rule (*pro tem*); the "months" allocated in the Scheme of freelancer are determined by the amount of wage received, without any correspondence to the period of effective work, and so on.

Because of this complexity, the descriptive presentation makes a synthesis, channeling very heterogeneous data in a standard presentation of the:

➢ Type of contribution
➢ Period of contribution from/to
➢ Number of contributions that give the right to a pension benefit
➢ Number of contributions that influence the economic size of the pension benefit
➢ Name of the employer or of the subject who pays the contribution

2.4 Using UNEX as multiform tool

In summary, the Italian **UNEX** procedure (where UNEX is the acronym of "Unified Extract") is a tool that shows the personal insurance account of a citizen in a unified view, regardless of the multiple archives that contain the analytic data of the different kinds of job.

Therefore, UNEX is not a database. It is an application that extracts the relevant data from heterogeneous sources and organizes them in a standard format. The insurance data are uploaded and managed in the respective archives, which provide the quality control of the information received.

In fact, **every type of job has its own system of collecting data and its own way of displaying the insured working time.**

And these differences don't depend on the contribution rate but on the payment procedure, the transmission channel of the data, the history and the rules of the specific fund, the way to calculate the working time.

UNEX simply takes care of interrogating for each individual all the dataset, using the individual **fiscal code**. From every dataset, it selects the information relevant for the personal account, importing and inserting it in a standard scheme. The result is an **ordered and homogeneous representation of the whole working life of each individual**.

In the Italian system, characterized by many social-security rules, different modalities of representation of insurance periods, two or more calculation rules for the same pension due to the slow process of legislative transition, the personal account statement necessarily contains many information, including an analytic representation of every working period with its own peculiarities.

In fact, until the pension reform will be fully implemented, the Italian account statement must provide the information necessary to compute the pension rate on the basis of:

- the salaries of the last years
- the number of "working weeks" accrued in every type of work
- the amount of the contribution actually paid in the whole working life, with the due revaluations

all elements that at present influence the calculation of the pension.

In a less complex system, a single representation could suffice. For example in the case of a defined *contribution plan* an accounting section with the contributions paid for every calendar year can be enough;

(PIC 2) Calculation of the total amount

SOLAR YEAR	TAXABLE INCOME	% RATE	ANNUAL CONTRIBUTIONS	amount of the previous year	REVALUATION COEFFICIENT	TOTAL AMOUNT
2004	2554,00	33,00	842,82		*1,039272*	842,4200
2005	4166,00	33,00	1374,78	842,82	*1,040506*	2251,7393
2006	4319,00	33,00	1425,27	2251,74	*1,035386*	3756,6893
2007	4447,00	33,00	1467,51	3756,69	*1,033937*	5351,6901
2008	1337,00	33,00	441,21	5351,69	*1,034625*	5978,2024
2009		33,00	0,00	5978,20	*1,033201*	6176,6847

2010		33,00	0,00	6176,68	*1,017935*	6287,4635
2011		33,00	0,00	6287,46	*1,016165*	6389,1003
2012		33,00	0,00	6389,10	*1,011344*	6461,5783
2013		33,00	0,00	6461,58	*1,001643*	6472,1947
2014		33,00	0,00	6472,19	*1,011344*	6545,6105

Useful to pension right: TOT 260 weeks (5 years)   **ACTUAL AMOUNT   6.545,61**

A calculation rule based on a formula that takes into account factors like the number of years of service and the worker's average salary (*defined benefit plan*), requires a descriptive view detailing what happened in the single years of work.

PIC 1 Descriptive section

TYPE OF ACTIVITY	PERIOD FROM / TO	CALCULATION		INCOME		EMPLOYER
		rights	measure	lire	euros	
Military service	01/11/1975 – 31/12/1975	weeks	9	9		
Military service	01/01/1976 – 31/10/1976	weeks	43	43		
Dependent job	01/07/1979 – 31/12/1979	weeks	26	26	3.001.000	1.549,88	S.N.C. MARMI VALBREMBANA
Dependent job	01/01/1980 – 31/12/1980	weeks	52	52	7.188.000	3.712,29	S.N.C. MARMI VALBREMBANA
Dependent job	01/01/1981 – 31/12/1981	weeks	52	52	9.473.000	4.892,39	S.N.C. MARMI VALBREMBANA
Dependent part time	01/01/1982 – 31/12/1982	weeks	50	34	7.247.000	2.742,76	S.N.C. MARMI VALBREMBANA
Unemployment benefit	01/01/1983 – 30/06/1983	weeks	26	26			
Self employment	01/09/1984 – 31/12/1984	months	4	4	2.624.000	1.355,18	MILESI GIANCARLO
Self employment	01/01/1985 – 31/12/1985	months	12	12	11.485.000	5.931,50	MILESI GIANCARLO
Dependent part time	01/01/1986 – 31/01/1981	weeks	3	2	700.930	362,00	COOP. WORK POINT

About "working time".

If the retirement plan is such that the benefits are subject to a working time requirement, the personal account must determine how to accredit and show the insurance periods in terms of "conventional time units". One possibility is to connect the full or partial coverage of the year to an income limit. In this way it is possible to visualize the years of contribution as conventional time units. This is particularly appropriate for informal and discontinuous workers, because it allows to progressively build their right to retirement by adding different and occasional jobs.

Conversely, if the requirements are related to the periods effectively worked, the personal account must define the rules for standardizing different types of job in a single measure of seniority.

As a matter of fact, while civil servants and permanent workers have a total agreement between calendar and insured working time; for workers with discontinuous, intermittent, seasonal, informal employment spells it is necessary to establish equivalences between daily and continuous work with intermittent work.

Some examples

CIVIL SERVANTS	Full correspondence between working and calendar time
PROFESSIONAL WORKERS WITH A SPECIFIC INSURANCE	Full correspondence between working and calendar time
EMPLOYEES IN PRIVATE COMPANIES	A conventional week for each paid week, regardless of the number of days actually worked
EMPLOYED IN A FARM	52 conventional weeks every 270 working days in the solar year
SELF-EMPLOYED WORKERS IN THE AGRICULTURAL SECTOR	52 conventional weeks every 156 working day in the solar year
DOMESTIC WORKERS	A conventional week for 24 working hour in a week (also in different households)
ACTORS AND DANCERS	52 conventional weeks every 120 working days in the solar year

FISHERMEN	4,33 conventional weeks every monthly payment with a fixed amount

Measures aimed to strengthen the income redistribution

*The method of calculation of the Italian pension is currently very complex, because the system is passing from a calculation rule based on the average of the last salaries ("**pay system**") to a calculation rule based on the revalued capital of contributions paid throughout the whole working life ("**contribution system**"). Another fundamental criterion that distinguishes the "pay system" (previously in force) and the "contribution system" (now in force) is the different articulation of age and contribution requirements, which has a substantial effect on the calculation of the worker's pension. For the current generation of retired workers, the application of the different reforms under the principle of "pro-rata" produces the coexistence of two or more calculation rules in the same benefit (mixed calculation). This situation will persist until the workers with contributions prior to 1996 will have access to retirement.*

Regardless of the calculation rules, **the Italian legislation provides several instruments for social change and redistribution of income**, designed to mitigate the imbalance between very huge pensions and those below a certain poverty threshold.

These redistribution instruments are essentially of two types:

1. instruments that act **on low contributions**, **during the working activity** (with the indirect effect of speeding up the access to benefit and/or increasing its amount;
2. instruments that act **on low benefits**, **during the years of retirement** (with the direct effect of increasing the benefit net amount through an additional integration of money or a tax relief.
3.

a. ACTING *INDIRECTLY* ON LOW CONTRIBUTIONS

The Italian corpus of security laws has always intervened to protect the periods of working weakness resulting from need or disability. This is an effect of the Italian Constitution, that explicitly requires the protection of situations such as unemployment, illness, maternity.

"Every citizen unable to work and without the necessary means of subsistence has a right to welfare support. Workers have the right to be assured adequate means for their needs and necessities in the event of accident, sickness, disability and old age, and involuntary unemployment. Disabled and handicapped persons have the right to education and vocational training. The duties under this Article shall be undertaken by Entities and Institutions established or supplemented by the State. Private assistance is free" (Italian Constitution, Article 38).

Therefore, the social security regulations provide many tools to protect periods without contribution because of particular events ("figurative contribution"), or to improve the value of work done under difficult conditions ("contributory increases"). As a further balancing tool there is also a mitigation mechanism for very high salaries ("contributory ceiling").

Figurative contributions serve to recover the loss of contributions in correspondence of some specific events protected by law. More in detail:

- absence from work because of illness or accident at work
- periods of assistance for tubercolar illness
- absence from work for maternity or child care
- period of maternity outside an employment relationship
- period of giving assistance to disabled relatives
- periods of unemployment
- periods of suspension of work because of Company crisis
- absence from work because of public office (as member of Parliament, Mayor, etc.)
- periods of mandatory military service (or civil service)

The mechanism involves considering these periods as if the citizen had actually worked and paid the correct contribution amount. They are registered in the personal account with the same characteristics of the work period during which the event occurred.

Contributory increases serve to improve the value of certain periods of work, so that the requirements relating to working time are achieved more quickly. More in detail:

- periods spent in particularly strenuous and heavy work (night shift, assembly line, glass processing, driving heavy vehicles for public transport)
- periods of work on board ships
- periods of work with asbestos exposure
- periods of work in the underground (tunnels, quarries, mines)
- periods of work in confined spaces or with exposure to high temperatures
- periods of work done by disabled people
- periods of work done by blind people

The mechanism aims to increase the time actually spent on the work activities, according to conventional criteria established by law. Depending on the cases, this kind of increases may be applied for the right and/or the measurement of the benefit.

> **Some examples**
>
> **Periods on board ships** are extended with an additional period corresponding to every Saturday, Sunday and holiday and vacation day accrued for the same period.
>
> **Periods of work with asbestos exposure** are multiplied for 1,5
>
> **Periods of work done by blind** people shall be increased by 4 months for each year of work.

The **contributory ceiling** is another balancing tool, because it acts indirectly to prevent too high benefits. The application of the ceiling requires that the entire salary received above a certain limit is not subject to social security contribution. And therefore the workers with very high salaries will get a smaller pension than they would have received if the ceiling was not applied.

b. ACTING *DIRECTLY* ON THE LOW BENEFITS

The Italian welfare system provides for the granting of social benefits (fully paid by State) in favor of the elderly and poor people who are not entitled to a pension on the basis of working contributions.

The same system also provides for the integration and increase of social security benefits, in the case where the amounts accrued during their working life are below a certain poverty line.

These types of instruments are subject to the income of the benefit holders and, in some cases, of their family members too. To be more timely, INPS provisionally delivers the benefits in advance; afterwards, an income verification (tax audit) is carried out in order to confirm both the right and the correct amount of the benefits.

A typical example of an Italian legislative instrument to redistribute income on pensions is the so-called "**integration to a minimum treatment**" (by a law of 1983), that guarantees the Constitutional right to a decent life for every citizen. If the benefit gained through work is below a certain amount annually set by law , the pensioner may be entitled to an additional amount (as long as the worker and the family members don't exceed a certain threshold of total income). The aim is to increase ("integrate") the low benefit up to an amount considered as "minimum subsistence" by law.

The minimum treatment for 2016 is about 501 Euros monthly.

If the person is not married, **the income limit for 2016** for the right to a *complete integration to the minimum treatment* is equal to 6,524.07 Euros yearly; whereas the *partial integration* may be granted up to 13,049.00 Euros (two times the "minimum" in the year). Above that limit there is *no integration*.

If the person is married, the complete or partial integration depends on the personal and familiar income (no more than 13,049.00 Euros for the holder and 26,098.00 for the whole family).

When assessing the income decisive for the right, the dwelling house is not considered.

In addition to the minimum treatment, the social security system provides other increases (the so-called "**social increases**") in favor of low pensions when the benefit's holders go forward with age and their total income does not reach certain thresholds.

SOCIAL INCREASES 2016 (monthly)

25,83 Euros   from 60 to 64 years old

82,64 Euros   from 65 to 69 years old

Additional sum to reach 640 Euros   septuagenarian and more

ANNEXES

THE ELECTRONIC FLOW OF INFORMATION ("UniEmens" system)

Since mid-1970s, INPS has built a system for constantly up keeping the archives that collect the contribution data of enterprises and the insurance data of every employees. The data, initially collected using paper forms, then with different types of magnetic support, are now collected through a tele-communication infrastructure. From 2010, INPS has introduced a monthly implementation system (UNIEMENS) that allows companies to submit a single data stream inclusive of wages paid, contributions paid and any credit amounts for each worker.

Before UNIEMENS system

No matter what the type of support was (paper, magnetic tape, tele-flow), before 2010 the multiple information about contribution, insured periods and salary were collected and updated by companies in different moments, both in aggregate and individual form

- Information about the contributions paid and to be paid and any amounts to be deducted for various reasons (facilitation by law, economic services anticipated by company on behalf of INPS, etc.)
- Information about the typology of contracts of single workers.
- Information about every salary received by each worker, with the indication of the number of payment weeks and the general salary loss due to events such as unemployment or maternity.
- Information about the total amount of salaries and wages.

From the company perspective, the processing and transfer of this kind of information became part of the activities related to the payroll and to the correct payment of salaries, in addition to tax compliance as witholding agent

From the perspective of INPS, it was necessary to activate a series of complex procedures for examining and checking *in the aftermath* the coherence and the adequacy of the information received. In particular, the total salary of workers declared every month (DM10) was compared with the data contained in the tax declaration presented by the company the following year. If the company presented inconsistent data, INPS would start a procedure of credit recovery, and the company had to correct its position by presenting another model (DM10/V) with the contribution previously omitted.

From an organizational perspective, this procedure involved a clear separation between the area of contribution collection and the process of providing pension benefits, because of tardy comparison of contribution data and that of salary. It was inevitable that much time should spend between the payment of contributions and the update of the worker's account statement

The introduction of the UNIEMENS system

With the **UNIEMENS system,** introduced in 2010, the information flow related to the contributions and salaries of all worker has been unified in a single electronic document that companies send every month through Internet. This has simplified the commitment of companies, since now they can use the same data both for payroll and for preparing the flow of information to be transmitted to INPS. The aggregate data, useful to the management procedures of INPS, are no more requested to companies, but are reconstructed by INPS through periodical processing of all received data.

Furthermore, the use of Internet allows companies and their agencies to consult their data in the archive of INPS (state registry, arrangement of workers, paid contributions, balance amount, salaries reported) and to directly correct data or substitute wrong reports.

In conclusion, with UNIMENS:

➢ The procedure of data transmission has been simplified;
➢ The consistency between salary and contribution data can be examined contextually, with the possibility for INPS to intervene early in case of anomalies;
➢ The companies can use a technological platform to communicate with INP in real time, sharing database and contributing to the quality of the information in the archives.

MY PENSION: A PROACTIVE AND CONSULTING SERVICE

A complete Account Statement, reliable and frequently updated, allows INPS to provide an innovative service that turns upside down the concept of assistance, changing it from passive to proactive, from a situation in which INPS was waiting for the citizens to demand a service, to a situation in which it anticipates their needs and provides them with a personalized consultancy. With the web service "My Pension", citizens can use their Account Statements as an instrument to keep in constant communication with the Institute.

Functionalities of the web service "My Pension"

Since May 2015, all the workers that have already a fully automated Account Statement (about 19 million), can access a web service that allows to estimate the date of retirement and the future amount of the pension (**My Pension**), on the basis of the contribution already accumulated and those that will presumably be forthcoming. In 2016, INPS will extend the service "My Pension" to whole the insured that amount to around 23 million.

In this web application, citizens are first invited to check their current Account Statement and to signal incorrect or missing data through an Internet form. In this way, citizens actively participate to implement a correct set of information. The same section shows other relevant data, for example the number of weeks accumulated to satisfy the pension requirement, or the elements necessary to compute the specific time units on the basis of the rules that apply case by case.

In the following section, the application proposes to the users a simulation of their future pension (TAB 1), as well as a series of other relevant information. More specifically

- **The date of retirement -** it is estimated on the basis of the worker's age and of the number of contributions he has already accumulated. In the case in which he could apply for an anticipated retirement, the system will present the data for both options (old age pension and earlier pension);
- **The monthly pension amount** (**gross**) **-** it is at present prices (it does not take into consideration future inflation) since this allows to better evaluate the purchasing power of the pension they will receive;

- **The latest salary before retirement** – it is estimated by projecting the present working situation over the time period the worker will have to stay at work in order to receive a pension and taking into account increases in line with expected national productivity.

- **The gross replacement rate** is the ratio between the first pension and the last salary.

TAB 1 Forecast of the pension

	OLD AGE PENSION
Date of retirement	01/01/2033
Gross monthly pension amount	**€ 3.233,00**
Latest Salary / Estimated Income	€ 4.500,00
Gross replacement rate	71,84%
See detail	

By pressing the button "**See details**", the user can examine the data and the hypothesis on which the computations is based upon. In particular, he can see the future development of his salary and the estimated future contributions (in orange).

In the **standard simulation** (obtained in default), the periods are added without solution of continuity from the latest known until the day before the retirement. The last annual salary is is repeated for all future years, applying a 1.5% rate of increase, in order to obtain a theoretical wage to be used in the simulation. However, in order to check the impact of new situations and simulating more retirement scenarios, the user can change some of the parameters of the computation.

More specifically he can access an **advanced simulation**, which allows changing some parameters using the buttons reported below.

CHANGE THE REMUNERATION TREND

CHANGE THE DATE OF RETIREMENT

CONTINUE WORK UNTIL A DATE CHOSEN BY YOU

SUGGEST A SUSPENSION FROM WORK
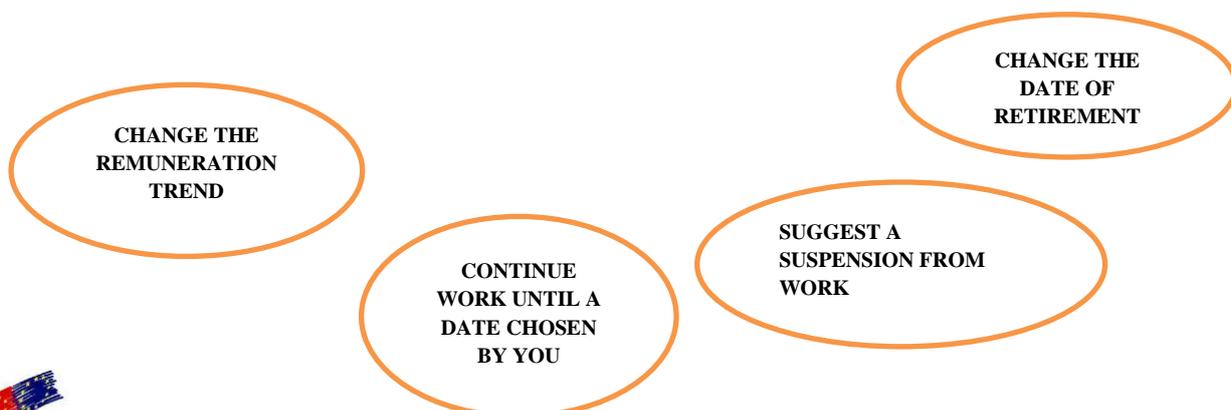
The use of the Account Statement in the proactive and consulting mode.

The simulations we have just described can play an important role in increasing the pension culture and make Italian citizens to better understand the relation between the typology and evolution of their working career and the pension. The consultation of the Account Statement is also a stimulus to think about the future and acquire a deeper knowledge on the perspectives offered by the pension system in exchange of a mandatory contribution. Moreover, repeating the simulation from time to time allows a citizen to test and understand the impact of the events that take place in his life or in the socioeconomic context in which he lives: how does a change in the job situation or a legislative change affect the pension? Moreover, this dynamic and projective use of the individual Account Statement can help people to make informed choices and better plan their future.

Furthermore, the on line simulation is an incentive to frequently consult the Account Statement; this will increase the probability that mistakes will be corrected or lacked contribution periods be indicated. In this way, the Account Statement becomes an area of permanent information's sharing in which the account owner is directly involved in checking the completeness and quality of his data.

The individual account dos also increase the demand for additional information. When a citizen realizes that some information (for example the period during which he had worked abroad or on a ship or he paid his contributions in a different Pension Fund) is not present in the Account Statement, he will be stimulated to contact INPS to solve the problem. To better deal with these situations, INPS has a personalized consultancy service, generally by appointment, that helps the account owners to improve their situation. At the same time, INPS uses these opportunities to recover lacking information, acquire useful documents and ensuring that the information contained in the Account Statement is complete and accurate.

In conclusion: the dynamic use of the Account Statement allows to progressively consolidate the data and to constantly monitor the information flow, guaranteeing its correctness and completeness

A. SYNERGIES AMONG DIFFERENT ADMINISTRATIVE BODIES (Active Worker Record)

The Italian pension system is extremely complex. Although there have been many legislative changes aimed to incorporate different pension systems and different Administrations have been integrated, there are still many welfare Funds alternative to the mandatory general insurance administered by INPS itself or by other institutes. The necessity of integrating the information created the pre-condition for building an informative system shared among all the administrations and the organs that manage public protection schemes and labor data.

The complication of information systems

The reforms approved in the last decades have determined a progressive convergence in INPS of numerous social institutes were operating autonomously for specific categories of workers: agricultural workers, managers of industrial enterprises; workers of special sectors as transport, telephone, electricity, art and sports; employees of the national post service; public employees. There has been also a gradual equalization of calculation rules and entry requirements, although some differences still survive. All these processes of integration and equalization are still ongoing inside INPS and find a common ground in the database constituted by the Unified Account Statement.

However, a series of other Accounts or Institutes that manage autonomously mandatory protection schemes are still existing, with their basic registration and information structures, especially for professional categories as doctors, planners and engineers, business consultants, journalists, notaries, veterinaries and other professionals that pay the mandatory contribution to their own Funds. Besides, other Public Administrations structures have information that are extremely important for an integrated view of labor phenomena:

Municipalities (family structure data)

Ministry for Internal Affairs (residence permits for foreigners)

Ministry of labour and Regions (data on employment and unemployment)

Ministry of Finance (income data)

The creation of a unified database of active workers

To have a more complete labour market information, the trend of employment and the dynamic of labor market, INPS and other organs managing public social protection have worked together to build a unified database of all active workers, the **Active Workers Record**. This infrastructure is managed by INPS and is shared with all the Administrations that have information of relevant social interest.

The **Active Workers Record** does not substitute the information system of each of the administrations, neither reduces their responsibility on contribution history of their members and the quality of information content, but it is in charge of collecting data from heterogeneous sources and associating them to the subject, using the fiscal code as a unified key of aggregation. Briefly, the Active Workers Record realizes *for different Administrations* the same things that the Unified Account Statement has done *for different schemes administered by INPS*.

The first result of the Record is an **integrated document**, which shows to the citizens the different segments of insurance eventually paid to different Organs. Depending on the rules stipulated by law, workers have different options on how to use the contributions paid in different schemes. To help them in taking such decisions they are supported by an advanced consultancy system. that. These types of consultancy are provided by INPS itself or by authorized intermediaries only by appointment.

The unified database of active workers is very useful also for the Public Administrations, since it facilitates the operation of the transfer periods from one institution to another (in case of rejoining), or the total calculation of the contribution only for getting pension rights (in case of totalization). The second contribution of the Record is to **support planning and public decision**. Displaying information about all the workers, employed and unemployed, the Record allows a sophisticated monitoring of employment and planning of labor policies, including the formulation of social protection laws. Finally the unified Record of Active Workers, together with the Unified Pension Record, constitutes an instrument with great potentiality in monitoring the overall trend of social spending.

B. SHORT HISTORY OF MATERNITY PROTECTION IN ITALIAN SYSTEM

At the dawn of the Italian protection of female work (1902), the right to mandatory absence from work for maternity concerned only employees and workers of the industrial sector and it was limited to just a month after the childbirth (without any pay or right to keep the job!). In the following years the mandatory rest was granted also for the month before the estimated date of childbirth

Until the beginning of the fifties, , there were strong differences between the treatment of white collar and blue collar workers for what related to the identification of an optional pre-natal period rest due to serious health reasons: up to three months before the expected date of childbirth for white collar workers; only a month and a half for blue collar workers. This difference in treatment, totally unjustified from a health point of view, was due to the class legacy of the Fascist regime.

Since the early Seventies, the **mandatory rest for maternity** began to shorten it's the *ante-partum* period (from three to two months) and to lengthen in the *post-partum* period (from two to three months).

The current maternity leave provides for the possibility of restricting the *ante-partum* period to one month and, consequently, extending the *post-partum* period up to four months. In general, in addition to the progressive extension of protection to all the categories of workers, the tendency to restrict the rest period for pregnancy and to increase the postnatal period is the main feature of the post-industrial society evolution. For the same reasons, also the **optional leave for the postnatal period**, already provided since 1951 for a maximum of six months within the first year of the child's life, was increased in 1971 by three more months for child's illness within the first three years of life. Moreover, the "optional leave" can be accessed by the father instead of the mother.

According to the current regulation, the so-called **parental leave** has further extended the protection of female and male workers in the first period of a child's life, including the possibility of absence up to a maximum of ten months (in total for both parents) within the first eight years of the child's life, with an individual limit of six months (also non continuous) for a single parent. Similarly, **the leave for children's illness** has been structured in a specific leave to which both parents can alternately have access to.

The Italian protection has now surpassed the areas of pregnancy and childbirth, addressing more extensively and in detail the needs of family care by both (also adoptive) parents.

Topic 2.2.2 Models and Methodologies for the Social and Economic Sustainability Analysis in Social Protection System in China

Xiaojun Wang, Professor, School of Statistics, Renmin University of China

Contents

Introduction

This is the situational analysis report for Models and Methodologies for the Social and Economic Sustainability Analysis in Social Protection System in China, which is one part of the EU-China Social Protection Reform Project.

Background of the project

The situational analysis report is one part of the Component 2.2.2 of EU-China Social Protection Reform Project (EU-China SPRP).The overall scope of EU-China SPRP project is to further develop social equity and inclusiveness of economic development throughout Chinese society. Within the project, Component 2 has the specific scope of enhancing institutional capacity for financial management and supervision concerning social security funds in collaboration with the Ministry of Finance (MoF).

As identified in the project, one crucial point in China is the supervision and management of the social security funds, since the number of the funds has rapidly increased in the last decade. Several problems are connected to the management of these funds, which in the last decade are facing different social and economic conditions. The fragmented situation of various levels of management of these funds together with the lack of an appropriate centralized supervision and management of the social security funds have increased the risks on sustainability and on adequacy of the system.

On this issue the main purpose of the Component 2 is to support the efforts of the MoF in managing the above described matter, enhancing its capacity to fit better methodologies and financial, statistic and actuarial methods and models.

Among several results the project is expected to achieve, one result is establishing Actuarial Analysis Models Conducted by MoF for Basic Pension Insurance Reform. Component 2.2.2 is "Models and Methodologies for the Social and Economic sustainability analysis in social protection system"

What is the Social Protection System?

There is no universally accepted definition of the scope of social protection system, nor does there exist one that suits all purposes. Brunori etc.,(2010) review and discuss the most influential definitions of social protection in the framework of development and aid policies and explain how the operational definition of social protection has been conceived in the European Report on Development(ERD). The working definition adopted by the ERD (European Communities, 2010) is that, "A specific set of actions to address the

vulnerability of people's life through social insurance, offering protection against risk and adversity throughout life; through social assistance, offering payments and in kind transfers to support and enable the poor; and through inclusion efforts that enhance the capability of the marginalized to access social insurance and assistance."

Eurostat (2008), which is the Statistical Office of the European Communities, published the ESSPROS Manual on the European System of integrated Social Protection Statistics. According to the manual, Social protection encompasses all interventions from public or private bodies intended to relieve households and individuals of the burden of a defined set of risks or needs, provided that there is neither a simultaneous reciprocal nor an individual arrangement involved. The list of risks or needs that may give rise to social protection including sickness/health care, disability, old age, survivors, family/children, unemployment, housing and social exclusion not elsewhere classified. The benefits granted within the framework of social protection can take many forms; however, in the core system, they are limited to cash payments to protected people, reimbursements of expenditure made by protected people and goods and services directly provided to protected people.

Generally, the extension of social protection is wider than social security. In China, Ministry of Human Resources and Social Security (MHRSS) is the governmental department for social protection, and use the term of Social Security instead of Social Protection. Social Security contains social insurance, social assistant, social welfare and special care. Social insurance includes old age, medical, work injury, unemployment and maternity insurance.

What is the Financial Sustainability of the Social Protect System?

A general understanding for the financial sustainability on social protection system is that, in the long future time, social protection system has the ability to pay benefits when they fall due. Buiter (1983) point out the most advanced approach to assessing sustainability draws on the concept of the intertemporal budget constraint. For a contribution-based pension system that does not rely on any transfers from the central government budget, the present discounted value of future surpluses (contributions minus future accruals) must equal net pension liabilities.

For the financial sustainability of the social protection, many research report focus on pension and health system. Because many countries are facing the rapid aging of the populations, largely as a consequence of falling fertility rate and rising life expectancy, which have very large effect on the expenditure pertaining

mainly to pensions, healthcare and long-term care. So, under population aging, most pension and health systems are facing more and more financial sustainable problem.

How to assess the sustainability of the social protect system?

In fact, there is no single benchmark for the definition of sustainability. Generally, if the system has the positive financial balance (surplus) in which revenues exceed expenditures during the future long term or future infinite-horizon, the system is financial sustainability; If the deficits (negative financial balance) are large enough which over the government fiscal adjustment ability because of rising expenditures and falling contribution, then, the level of expenditures may not be sustainable; If the asset of the system is larger than the liability, the system is financial sustainability.

Sustainability can also be assessed in relation to current and future social protection spending as a share of GDP. Too high a share could be considered unsustainable because it crowds out more productive government spending such as education or capital expenditure, or results in an increase in taxation (including on wages) to a level that is counterproductive to growth (Clements etc., 2014).

How to supervise the financial situation and sustainability of the social protection system?

Based on the international experience, some countries like United State, United Kingdom, Canada, Japan, etc., use regular or special actuarial assessment to value and supervise the financial situation and sustainability of the social security system and social protection policy reform.

Some countries use social budgeting system to make quantitative management of a national social protection system. Because social budgeting is part of the general social policy planning process and part of any meaningful medium-term financial planning process in those countries.

Usually, actuarial assessment for social protection system mainly used on social insurance, especially used on old age insurance, which the promised benefits are financed by contribution. Social budgeting system used on whole social protection system quantitative management.

Main contents of this report

This report contains 5 sections. Section 1 is the introduction of the report, including the background, some basic concepts on social protection system, brief introduction for international experiences on assessment and supervision of the financial sustainability for social protection system.

In section 2, we describe the situation of the social security budgeting and actuarial assessment in China. We discussed why our social security system need to be made actuarial valuation and budgeting; the experience of social security actuarial assessment and social insurance budgeting in China; governmental actuarial offices and budgeting offices.

In Section 3, we introduce the models and methods for social insurance budgeting. We discuss the basic social insurance budgeting process and the process and methods for China.

In Section 4, we introduce models and methods for social insurance actuarial assessment in China, including dataset availability, actuarial models for old age insurance, and actuarial model for medical insurance.

In section 5, we analyze the problems on social budgeting and social insurance assessment in China.

Section 6 is the concluding remarks for the report.

Situation of the social security actuarial valuation and budgeting in China

Why the social security system need actuarial valuation and budgeting

Social Security is one some kind of national social transfer system and is influenced by demography, economic and fiscal realities. Actuarial work is one tool in national financial, fiscal and social governance. Social budgeting is a part of the general social policy planning process and part of any meaningful medium-term financial planning process. So Actuarial valuations and budget are very important and indispensable quantitative management tools for social security sustainability development. Because the promised benefit of social security should be guaranteed to pay, and contribution or payroll taxes should be stable or adjust gradually during long-term under constantly changing environment including demographic, socio-economic and fiscal factor. To keep long term financial equilibrium of the system, the future financial conditions should be projected and assessed. The contribution rates should be prudently decided. The financial conditions should be monitored under changed environment. The income, outgo and the balance of the system should be

budgeted. In addition, when reforming the system, each of the reform proposals should be financially evaluated based on the financial projections.

Some experience on social security actuarial assessments in China

Under the pressure of increasingly serious inequitable(fragmented) and financial unsustainable, Chinese social security system began to be reformed including parameter reform, structural reform, enlarging the coverage and establishing new schemes step by step since the early year of 1990s, thereby need to assess the liability, transition cost, and possible financial result of each reform proposals and policy options. Some international organizations, including the World Bank, the Asian Development Bank, the International Labor Organization, EU and others, help China dealing with a number of actuarial calculations in old age insurance early or late. Moreover, some of Chinese universities and research institutes have also do some relevant studies. It can be said that, the people attach more attention to the actuarial assessment in social insurance, and relevant government departments gradually realized that the actuarial assessment of social insurance system runs an indispensable role.

Actuarial valuation experience for social insurance in China in early stage can be summarized as following. In May 1994, a special study group for social insurance system was founded by 12 units, including the Ministry of Labor, the Economic and Trade Commission, Ministry of Finance, Ministry of Civil Affairs, leaded by the State Commission for Restructuring the Economy. This study group researched and drew up an operational project for establishing social security system. In June 1994, the government commissioned the Chinese People's Insurance Company to conduct forecast actuarial project. In September 1994, under the basic of the study group, the State Commission for Restructuring the Economy, the Ministry of Labor, Ministry of Finance, Ministry of Personnel, the Bureau of Statistics, the State Development Planning Commission, People's Bank of China, and People's Insurance Company Group of China comprised another group for actuarial computation. This computation group calculated the long-term indicator of urban workers' basic old-age insurance and provided quantitative analysis of data for the overall pension insurance program: relevant sections provided basic data; the experts from Shanghai Jiaotong University and the Department of Space 710 prepared relevant materials; actuarial section of insurance department of People's Insurance Company was responsible for actuarial specific design model and an actuarial calculations. In February 1995, the special study group for social insurance system handed up "overall forecast report of urban workers' the basic old-age insurance ", which is the first actuarial valuation of old-age insurance in China.

In 1997, the World Bank published a report named "pension reform in china". The report included the measuring result of the implicated debts from *Shenyang* and *Shanghai* calculated by the World Bank and the

Shanghai Academy of Social Sciences. These two cities shared higher basic old-age dependency index in China. The report also simulated and analyzed the changes of future pension for different types of towns' retired workers under the different reform schemes.

In 2000, Professor Wang Xiaojun from Renmin university of China published "pensions and actuarial evaluation system in China ". This book systematically described the principles and methods of the old-age insurance actuarial assessment system and used actual data to practice the actuarial valuation for Chinese pension system.

In 2001, with the support from *Boshi* fund management company, department of legal system from Ministry of Labor and Social Security Secretary and social insurance institution developed "old-age insurance funds Measurement and Management in China " research topics, and then established a software for forecasting pension funds. Data sources were the sample of insured population from *Beijing, Shanghai, Chengdu, Dalian, Xi'an* and other five cities including 6.91 million insured employees from enterprises, 3.47 million retirees. Using the year 1999 as a base year, the balance of payments for the next 50 years was predicted.

In 2004, with the support from the Insurance Group of the Netherlands, Prof Wang Xiaojun presided over the "Guangdong Provincial actuarial assessment for endowment insurance system reform" project, and in 2006 published "Guangdong Provincial actuarial report for old age social insurance system reform". Guangdong Provincial Labor Department provided the data of report, and task group established the actuarial model for assessment to measure the financial result in the next 30 years under different reform schemes. This provided a quantitative analysis support for Guangdong Province's pension insurance reform.

In December 2006, the World Bank released the assessment report of social insurance pilot reform in *Liaoning* province. This report summarized and estimated the pilot experience in *Liaoning* and put forward some corresponding recommendations for future developable direction.

In recent 10 years, there are more and more actuarial analysis reports for Chinese social insurance done by some research institute including international organization rather than Chinese government department.

Two actuarial offices in two government departments

In 2004, the Ministry of Finance (MOF), Ministry of Human Resources and Social Security (MOHRSS) both established the actuarial sections. The System and Actuarial Section was established under the department of social security in the Ministry of Finance. Meanwhile, Social Insurance Agency, the subordinate of Labor and Social Security Ministry (predecessor of MOHRSS), also established actuarial section. Having those two actuarial offices indicate that the actuarial management of social security has been emphasized by

Government. The goals of both government departments are to provide reliable financial data and gradually establish a standardized system of the actuarial report with regular social insurance actuarial valuation.

In fact, there is only 3-4 staff in each actuarial office under limited authorized personnel. The staff is not expert in actuarial valuation. In addition, social security systems are fragmented and governed and managed by local government or local government agency, so, it is very difficult for those two actuarial offices to carry out independent actuarial works. Furthermore, as we have not legal requirement for actuarial valuation and reporting system, these two actuarial sections would inevitably encounter some obstacles, which affected the normal functions they play.

At nearly end of year 2013(Nov. 12th2013), the Communist Party of China(CPC) Central Committee adopted the "Decision of the Central Committee of the Communist Party of China on Some Major Issues Concerning Comprehensively Deepening the Reform." This decision point out to institute a fairer and more sustainable social security system. The social pension schemes should keep actuarial balance principle. It is the first time in the CPC central committee documents to use "actuarial balance principle" for social insurance. It should be to promote actuarial government in social insurance.

Two social insurance budgeting offices in two government departments

Like actuarial office in two government departments, Ministry of Finance (MOF) and Ministry of Human Resources and Social Security (MOHRSS) set up a social insurance budgeting office separately in recent years. Social Insurance budgeting office in MOF is under department of social security. Meanwhile, social budgeting office in MOHRSS is under Social Insurance Agency, the subordinate of MOHRSS. The main official duty of two budgeting office in two different government development are drawing up social insurance drafted budget for next year. In addition, the budgeting offices in two governmental departments have the duty to drawing up social insurance final account.

The models and methods for social insurance budgeting in China

Basic social insurance budgeting process

Social budgeting consists of two basic components. The first is the statistical basis. It is the methodologically consistent compilation of the revenues and expenditures of a country' social protection system, we call this component the social accounting system. The second is the forecast of income and expenditure, normally for a

medium-term period, and /or simulations of social expenditures and revenues under alternative economic, demographic and /or legislative assumptions. This component is called the social budget (Wolfgang Scholz, etc.,2000). From Social accounting to social budget, one should introducing interactions with demographic and economic determinants or social expenditure and revenue and also introducing interactions with the legal previsions of social protect.

There is not yet social budgeting system in China right now, so we don't follow the basic social insurance budgeting process mentioned above. In practice, social insurance budgeting use very simple and classical budgeting approach, we will discuss it in section 3.2.4.

The process and methods for social insurance budgeting in China: old age insurance schemes as an example

Old age insurance schemes in China

At present, there are two different old age insurance (social pension) schemes for different coverage. One is social pension scheme for urban employee. Another one is social pension scheme for rural and urban residents. For civil servant and other public institution formal employee, they have another non-contributory retirement system since 1950s. This system is transferring to a contributory public pension system and will be combined to urban employee social pension system in the near future.

General budgeting process for old age insurance schemes

In China, different social pension schemes are governed by different level's local government. The local governments have the first financial subsidy duty, then the government at the next higher level until central government. So, the social pension schemes budgeting have different governmental level.

In 2010, the State Council issued Document No. 2 which decided to begin social insurance budgeting. According to the document, drafted budgeting of local social insurance should be made by local Social Insurance Agency and summarized and checked by local Human Resources and Social Security Bureau, and then more checked by local Department of Finance, then two governmental department together report the drafted budgeting to local government and then report to superior Finance Department and Social Security Department.

National social insurance budgeting is summarized by Ministry of Human Resources and Social Security and checked by Ministry of Finance, and then report by MOF and MOHRSS together to the State Council.

At the end of the year, local Social Insurance Agency made the drafted annual accounting and summarized and checked by local Human Resources and Social Security Bureau, and more checked by local Department of Finance, then report together to local government and then report to superior Finance Department and Social Security Department.

National social insurance annual accounting is summarized by Ministry of Human Resources and Social Security and checked by Ministry of Finance, and then report by MOF and MOHRSS together to the State Council.

Social pension scheme budget item

Social pension scheme budget item include revenues, expenditure and annual balance.

Types of revenue including:

- Contribution
- Employers' contributions
- Employee's contributions
- Contribution by Self-employed
- Interest
- Subsidies
- From central government
- From local government
- Transfer from other regions
- Others
- Transfer from government
- From government at the next higher level
- From government at the lower levels

    Types of expenditure including

- Basic retirement benefits
- Disability pensions

- Medical allowance: for some special case, to retiree

- Funeral expenses and survivor allowance

- Transfer to other regions

- Others

- Transfer to government at the next higher level

- Transfer to government at the lower levels

Among the above item, here,

Annual Revenue=contribution income + interest income + subsidies from government + transfer income + others income +subsidies from government at the next higher level +subsidies from government at the lower levels

Governmental subside income=from central government+ from local government

Annual expenditure=basic pension expenditure + medical allowance+ funeral allowance+ transfer +others+ transfer to government at the next higher level + transfer to government at the lower levels

Annual balance=annual revenue-annual expenditure

Accumulated balance=balance at end of last year + annual balance in the year

Methods for budgeting

In China, Social insurance use simple budgeting approach, which is the projection based on extensions of time series, such that the last available statistical value of a specific expenditure given variable y_{t-1} would be multiplied by a factor k in order to calculate a value for y_t.

For example:

Contribution income=annual average contributor $\times$ annual average insurable earnings $\times$ contribution rate $\times$ compliance rate.

Annual average contributor=contributor in last year $\times$ (1+increasing rate of contributor)

Annual average insurable earnings=annual average insurable earnings in last year $\times$ (1+increasing rate of earnings)

Basic retirement benefit=number of retiree in the end of last year × survival rate × annual average basic retirement benefit ×(1+benefit increase rate)+new retiree in budget year × annual average basic retirement benefit for new retiree.

The models and methods for social insurance actuarial valuation in China

Basic actuarial valuation process

The actuarial valuation of a social insurance scheme is a lengthy exercise. It is usually organized in a series of steps that are generally the same for all practitioners. It includes the preparatory work (identifying the objectives and scope of the actuarial valuations), data collection and analysis, model building and adjustments, selection of assumptions and indicators, feeding of the model, base run and results analysis, sensitivity testing, additional simulations, writing of the report and presentation of findings and recommendations (Plamondon, etc., 2002).

Following are the basic actuarial valuation process for social pension schemes.

First, identifying the objectives and scope of the actuarial valuation, the basic valuation outputs are the size of annual expenditures and annual income in the future years under future demography, social-economic, fiscal and program specific environment. Based on annual income and expenditure, the potential fiscal subsidies, annual balance, long term actuarial balance, reserves and net liability may be derived. The valuation may take the form of a periodic actuarial review or a special scheme reform.

Second, collecting the necessary data, including participants (active participants, the terminated participants and the beneficiaries), employment, coverage, salary, inflation, benefit, demography etc., the data come principally from the administrative files, but statistics concerning general demographic and economic variables must be sought from the national statistical office or from other sources.

Third, model building and adjustments under the objectives of the valuation and the database, it should to construct the computer programmes that simulate the annual changes of the demographic structure of the active participants and their salary by age and sex, of the demographic structure of the beneficiaries and their average benefit, etc. Every time the valuation is carried out, these programmes should be updated and sometimes improved.

Fourth, selecting actuarial assumptions, actuarial assumptions are determined on the evolution of the general population, economic development and scheme specific variables. Different assumptions may be necessary

for the different scenarios under study. Population assumption includes mortality rates by age and sex, withdrawal rates from the scheme by age and sex, disability rates by age and sex, salary scale by age and sex. Economic assumption includes price increase rate, wage increase rate and rate of investment return of the reserve fund. These actuarial assumptions are produced through using the relevant statistics. It should be sorted out beforehand what kind of statistics is necessitated.

Fifth, running the model and analysing the results. To put into the models the data collected and actuarial assumptions and run the computer programmes, we can get the results. Then, it is necessary to do sensitivity testing to estimate a range of realistic results. Alternatively, blocks of assumptions may be tested in order to arrive at a limited set of consistent scenarios.

Sixth, writing of the actuarial report. The actuarial report contains information on the valuation's aims, the methodology and assumptions used, an analysis of past results and the results of the projection concerning the base projections, alternative scenarios and sensitivity tests. It usually contains a series of recommendations.

Dataset Availability

Solid database is the foundation for sound actuarial valuation. The building of the statistical base must be in line with the methodology of the model. Modelling the future financial status of a social insurance scheme requires a set of information describing model variables and the scheme's rules, including the general demographic and economic environments, the legal provisions of the social security scheme under review, including the definition of the covered population, insurable earnings, eligibility conditions, benefit formulae; the characteristics, on the valuation date of contributors, beneficiaries and dependents of insured persons, the profile of new entrants to the insured population and pattern of exits and re-entries into the group of insured persons.

Demographic data

Demographic data including general population data:

- Population by sex and age group at the year of valuation, historical years and official forecast for future years if available.

- Total Fertility rate, fertility rates by age group and sex ratio of newborns at the year of valuation, historical years and future if available.

- Mortality rates by sex and age group at the year of valuation, historical years and future if available.

- Immigration and emigration by sex and age group at the year of valuation, historical years and future if

available.

The source of population data is generally from the database of national statistical bureau, it is census date or vital statistics. For population projection, the data usually come from national demographic projections, world population prospects prepared by the United Nations Population Council, and other demographic studies.

Labor market data

Labor market data include activity rates, employment rates, type of employment, transition probabilities from each job status to the others. Source of date is from national statistical bureau of the labour market surveys.

- urbanization ratio, average number of people by sex and age group at the year of valuation, historical years and official forecast for future years if available.

- Labour force, average number of people by sex and age group at the year of valuation, historical years and official forecast for future years if available.

- Labour force participation rates by sex and age group at the year of valuation, historical years and official forecast for future years if available.

- Total employment, average number of people by sex and age group at the year of valuation, historical years and official forecast for future years if available.

- Employee, average number of people by sex and age group at the year of valuation, historical years and official forecast for future years if available.

- Self-employment, average number of people by sex and age group at the year of valuation, historical years and official forecast for future years if available.

- Unemployment, average number of people by sex and age group at the year of valuation, historical years and official forecast for future years if available

- Unemployment rate by sex and age group at the year of valuation, historical years and official forecast for future years if available

Earning, GDP and inflation data

Economic data for the actuarial valuation include as following, the source of date is from national statistical bureau of the labor market surveys.

- Total compensation of employees in current prices by economic sector at the year of valuation and historical years.

- Wage share of GDP by economic sector at the year of valuation and historical years.

- National average wages and average wage by economy sector at the year of valuation and historical years.

- Gross domestic product (GDP) in current prices and in constant prices by economic sector at the year of valuation and historical years.

- GDP deflators by sector at the year of valuation and historical years.

- Inflation and interest rates.

- GDP in current prices and in constant prices by expenditure components at the year of valuation and historical years.

- GDP expenditure deflators at the year of valuation and historical years.

- Primary income distribution from historical year available to valuation year.

- Consumer price index and annual rate of increase from historical year available to valuation year.

- Nominal interest rates from historical year available to valuation year.

Scheme-specific data

Database on the insured population

- Number of insured persons at the valuation data, includes present contributors and inactive insured persons registered in the past but not having contributed during the last financial year.

- The age and sex distribution of active and inactive insured persons is necessary to project future new beneficiaries.

- New entrants and re-entrants to the insured population by age and sex in three years prior to valuation date.

- Number of beneficiary: historical number of beneficiary and expenditure

- Number of active insured persons who contributed density factors

- Insurable earnings and lower and upper limits from the past year to valuation date.

- Monthly insurable earnings in year of valuation by age and sex.

- Past insurable credits of active insured persons as of valuation date by age and sex.

- Past insurable credits of inactive insured persons as of valuation date by age and sex

The source of the data is from social security database of social insurance agent of MOHRSS.

Social security legal provisions and financial situation

Social security legal provisions including:

- Social security laws, regulation and amendments

- Summary of legal provision by benefit branch

✓ Legal coverage

✓ Sources of financing

✓ Insured contingencies

✓ Eligibility condition for entitlement to benefits

✓ Benefit formulae

✓ Duration of benefit payments

- Social security financial report for the past 5 years

Actuarial models for social pension schemes

Models frame for social pension schemes

The actuarial models for old age insurance contains some sub-models, including population, covered participant, earning, revenue, expenditure and the balance, as in figure 1.
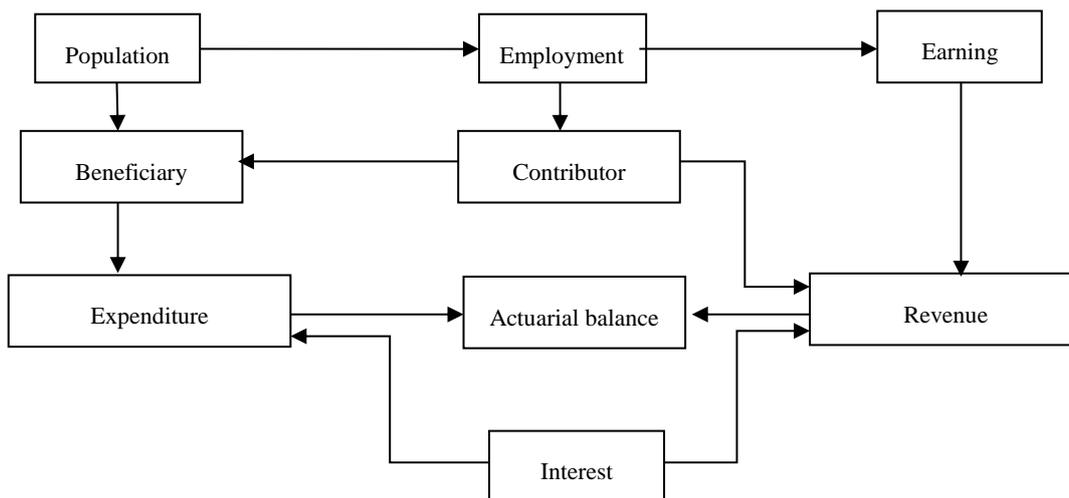
Figure 1   the frame of actuarial valuation for social pension scheme

Population projection

Population projections generally adopt the cohort component method, based on the assumption on fertility, mortality and migration, one can make population projection.

Let $P_{t,x}^m$, $P_{t,x}^f$ are male and female population at age x year t respectively, $q_{t,x}^m$, $q_{t,x}^f$ are male and female mortality rate at age x year t respectively, $I_{t,x}^m$, $I_{t,x}^f$ are male and female net migration at age x year t respectively, then,

$$P_{t+1,x+1}^m = P_{t,x}^m \cdot (1 - q_{t,x}^m) + I_{t,x}^m \quad x > 0$$

$$P_{t+1,x+1}^f = P_{t,x}^f \cdot (1 - q_{t,x}^f) + I_{t,x}^f \quad x > 0$$

Let B_t is number of newborns in year t, B_t^m, B_t^f are number of newborns for male and female respectively in year t, $m_{t,B}$ is sex ratio of newborns, $f_{t,x}$ is fertility rate at age x in year t, $p^m_{t,B}$, $p^f_{t,B}$ are the survivor rate of infant for male and female in year t respectively, then,

$$B_t = \sum_{x=15}^{49} P_{t,x}^f \cdot f_{t,x}$$

$$B_t^m = B_t \cdot BR_t, \quad B_t^f = B_t - B_t^m$$

$$P_{t,0}^m = B_t^m \cdot p^m_{t,B}, \quad P_{t,0}^f = B_t^f \cdot p^f_{t,B}$$

Insured population projection

Based on population by age and sex group, urbanization ratio, urban employment rate, coverage rate of the scheme, we can calculate the insured population of urban pension system. By cohort component method, we can make projection based on current insured population, transfer and mortality rate assumption.

Based on urbanization, employment and coverage, we can project new entrants and new retiree. The method consists of the following equations:

$$(EP)_{t,x} = P_{t,x}(RLEP)_{t,x}(1 - (RUE)_{t,x})$$

$$(CL)_{t,x} = (EP)_{t,x}(RC)_{t,x}(RP)_{t,x}$$

Where $(EP)_{t,x}$ is employment number of people by age x at year t, $(RLEP)_{t,x}$ is the participation rate at age x in year t, $(RUE)_{t,x}$ is unemployment rate at age x in year t, $(CL)_{t,x}$ is the number of contributor of social pension scheme at age x in year t, $(RC)_{t,x}$ is coverage rate of social pension schemes at age x in year t, $(RP)_{t,x}$ is compliance rate of contribution age x in year t.

Supposing every active participant retire at age r, then number of new retiree can be projected by number of active participants at age r-1 time survival rate at same age. The formula is as following:

$$(RP)_{t+1,r} = (CL)_{t,r-1}(1 - q'_{t,r-1})$$

$$(RP)_{t+1,x+1} = (RP)_{t,x}(1 - q'_{t,x}) \ x \geq r$$

Where, $(RP)_{t,x}$ is pension benefit beneficiary at age x in year t, r is retirement age, $q'_{t,x}$ is mortality rate of retiree at age x in year t, $(CL)_{t,r-1}$ is active insured persons at age r-1 in year t.

If the retirement age is a statistical distribution between age r - n to r + m, then new retiree in year t will be at age r - n to r + m. We can get number of new retirees at different age by above formula multiple retirement rates at different age.

Revenue and expenditure projection

Based on contributor number, average contributable earning and contribution rate, we can project annual revenue in future year.

Annual Revenue=contribution revenue + interest income + subsidies from government

If I_t is contribution revenue in year t, $L_{t,x}^a$ is contributor number at age x in year t, $S_{t,x}$ is the average contributable earning at age x in year t, c_t is the contribution rate in year t, then,

$$I_t = c_t \sum_{x=e}^{r-1} L_{t,x}^a \cdot S_{t,x}$$

Expenditure including (1) Basic pension expenditure for the "old" retiree(retiree before year t) at year t; （2）Basic pension expenditure for new retiree from pooling fund in year t;(3) Transitional pension expenditure for new retiree from pooling fund in year t; (4) Pension expenditure for new retiree from individual account in year t; (5) Death benefit in year t; (6) Individual account balance heritable expenditure in year t.

(1) Basic pension for the "old" retiree

Basic pension expenditure for the "old" retiree $(AOC)_t$ in year t is equal to the number of retiree $L^r_{t,x}$ multiply by average annual pension benefit $B_{t,x}$,

$$(AOC)_t = \sum_x L^r_{t,x} \cdot B_{t,x}$$

(2) Basic pension for new retiree from pooling fund

Basic pension for new retiree from pooling fund is as following:

$$1\% \cdot n \cdot \overline{s}_{t+n-1} \cdot (1 + \sum_{\alpha=0}^{n-1} \frac{s_{t+\alpha,x+\alpha}}{\overline{s}_{t+\alpha}} / n)/2 \qquad n \geq 15$$

Where $\overline{s}_t$ is social average salary in year t, $s_{t,x}$ is contribution base for age x in year t, n is contribution years.

(3) Transactional pension benefit

The formula for transactional pension benefit for new retiree from pooling fund is,

$$(AMC)^l_t = \sum_{x=r}^{r+t-t_0-1} L^m_{t,x} \cdot B^m_{t,x}$$

Where, $(AMC)^l_t$ is total transactional pension in year t, $L^m_{t,x}$ is pensioner number for age x in year t, $B^m_{t,x}$ is transactional pension for age x in year t.

$$B^m_{t,x} = \overline{s}_{t_0+r-x-1} \cdot k_x \cdot m \cdot \mu$$

Where, t_0 is valuation year, k_x is average contribution wage index, m is past insurable credit years, u is accrued rate, usually u is between 1%-1.4%.

$$k_x = (\frac{s_{t_0,x}}{\overline{s}_{t_0}} + \frac{s_{t_0+1,x+1}}{\overline{s}_{t_0+1}} \cdots + \frac{s_{t_0+r-1-x,r-1}}{\overline{s}_{t_0+r-1-x}})/(r-x)$$

(4) Individual Account pension expenditure

IA pension=individual account balance at retirement/annuity factor at retirement year

In practice, annuity factor is regulated by government, for age 60 is 139, for age 55 is 170. Theoretically, according to actuarial equivalence principle, annuity factor should contain cohort mortality improvement, inflation and interest rate trend. It should be adjusted with the changing environment.

(5) Death benefit

In practice, death benefits standard is different between different regions. In some regions, death benefit is about 2-6 months individual wages or pension benefits before death. Individual death benefit at different age and sex multiply by projected number of death people at same age and sex, we can get death benefit for different age and sex, total up all ages' death benefit, can calculate the total death benefit expenditure.

(6) Individual account (IA) heritage

IA heritage benefit expenditure is individual account balance at death.

Net Liability at valuation date

Net liability is the present value of future benefit minus present value of future contribution. There are three different definition and scope for net liability for social pension schemes (Robert, 2004).

The first one is *accrued-to-date liabilities*, represent the present value of pensions to be paid in the future on the basis of accrued rights; neither future contributions, nor the accrual of new rights on the basis of these contributions are considered. It is the accrued liabilities for pensioner and current active participant at valuation date and don't consider the new entrants in the future. So, it is the net liability on the assumption of liquidation of pension scheme, and close-system.

The second one is *Projected liabilities of current workers and pensioners* involve the assumption that pension schemes continue their existence until the last contributor dies, while no new entrants are allowed; both the future contribution of existing members and their new rights are therefore allowed under current rules. This is also referred to as the closed-group method for calculating these liabilities. It is the net liabilities for pensioner and current active participant at valuation date and don't consider the new entrants in the future but on the assumption of going-concern assumption of pension scheme.

The third one is *Open-system liabilities* include the present value of contributions and pensions of new workers under current rules; the range of options extends from including only children not yet in the labor force, to an infinite perspective. Normally, an arbitrary time period is chosen and the methodology is applied over that period. It is the liability during some time period, including new entrants, so it is the balance between present value of future expenditure and future revenue during long-term valuation period.

For the same concept and scope, the value of the net liability depends on the assumption including discount rate, assumed indexation parameter of wage growth, inflation, survival probabilities and so on.

(1) *Accrued-to-date liabilities*

Accrued-to-data liabilities include the liability for pensioner and for current active participant at valuation date. In China, we usually call the liability for retiree "old people" liability and the liability for active participant "middle people" liability.

The "old people" liability

For the retiree cohort, the liability is the present value of promised future pension benefit.

$$AL_t^r = \sum_{x=r}^{\omega-1} \sum_{k=0}^{\omega-x-1} v^k \cdot L_{t+k,x+k}^r \cdot B_{t+k,x+k}$$

Where AL_t^r is "old people" liability in year t, r is retirement age, ω is upper limited age, $L_{t,x}^r$ is number of retiree at age x in year t, $B_{t,x}$ is average pensions benefit for age x in year t, v^k is discount factor in year k.

The "middle people" liability

$$\left(AL\right)_t^a = \sum_{x=y}^{r-1} L_{t,x}^a B_{t,x}^a {}_{r-x}P_{t,x} v^{r-x} \ddot{a}_{t,r}$$

Where $(AL)_t^a$ is "middle people" liability in year t, y is entry age, $L_{t,x}^a$ is number of active participants at age x in year t, $B_{t,x}^a$ is accrued benefit for active participants at age x in year t, ${}_{r-x}p_{t,x}$ is survival rate from age x to retirement age r in year t, v is discount factor, $\ddot{a}_{t,r}$ is annuity factor for age r in year t.

Generally, $B_{t,x}^a$ is calculated by following formula.

$$B_{t,x}^a = \frac{x-y}{r-y} B_{(t+r-x),r} \qquad y \leq x < r$$

Where $B_{(t+r-x),r}$ is retirement benefit when participant age x in year t will retire at age r.

$$\ddot{a}_{t,x} = 1 + v_t \cdot p_{t,x} + v_t v_{t+1} \cdot p_{t,x} \cdot p_{t+1,x+1} + \cdots$$

(2) *Projected liabilities of current workers and pensioners*

The calculation formula for projected liabilities of current workers and pensioners is same with accrued to date liability. But the calculation assumption is different. Projected liabilities should consider promised benefit under current rules instead of accrued under past rules. So, the benefit $B_{t,x}$ may be indexation with CPI and average wage growth rate.

For "old people" liability, If pension benefit is indexed with g_i of the average wage growth rate j_i and h_i of CPI c_i, then,

$$B_{t+k,x+k} = B_{t,x} \prod_{i=0}^{k-1} (1 + j_{t+i} g_{t+i} + c_{t+i} h_{t+i})$$

The "middle people" liabilities equal to present value of future benefit minus present value of future contribution of current active participants under current system rules.

(3) *The Open-system liabilities*

The open-system liabilities equal to present value of future benefit minus present value of future contribution of current active and future participants during long-term period under current system rules. The calculation formula for future annual benefit and contribution is listed 4.3.4.

Fund ratio and actuarial balance

Fund ratio and actuarial balance is usually used to value the fund adequacy and sustainable solvency situation of the system.

(1) Fund ratio

Fund ratio is expressed as a percentage of the fund at end of year to annual expenditure next year of the scheme. It represents the proportion of a year's expenditure which could be paid solely with the reserves at the beginning of the year. It gives a rough indication of how long the scheme would be able to operate in the event of it suddenly no longer receiving contributions and investment earnings.

Fund ratio at end of year t=fund at end of year t/expenditure year t+1

Fund ratio is a standard method of assessing solvency of public pension system. If the fund ratio is positive throughout the valuation period and is either stable or rising at the end of the period, then the system be valuated has sustainable solvency.

(2) Actuarial balance

Actuarial balance is the difference between the summarized income rate and the summarized cost rate over a given valuation period.

Summarized cost rate is the ratio of the present value of annual expenditure to the present value of annual insurable earnings for the years in a given valuation period, expressed as a percentage. Sometimes, for evaluating the financial adequacy of the program, the summarized cost rate is adjusted to include the expenditure of reaching and maintaining a target fund level at end of year during valuation period. Usually, the target fund level of about 1 year's expenditure is considered to be an adequate reserve for unforeseen contingencies; therefore, the targeted fund ratio is 100 percent of annual expenditure. Accordingly, the adjusted summarized cost rate is equal to the ratio of: (1) the sum of the present value of the expenditure during the period plus the present value of the targeted ending fund level to (2) the present value of the annual insurable earnings during the projection period.

Summarized income rate is the ratio of the present value of scheduled annual revenue to the present value of annual insurable earnings for the years in a given period, expressed as a percentage. To evaluate the financial adequacy of the program, the summarized income rate is adjusted to include asset reserves on hand at the beginning of the period. Accordingly, the adjusted summarized income rate equals the ratio of: (1) the sum of the fund reserve at the beginning of the period plus the present value of annual revenue during the period to (2) the present value of the annual insurable earnings for the years in the period.

The calculation formula is as following:

$$(AB)_{t_0} = (SIR)_{t_0} - (SCR)_{t_0}$$

Where, $(AB)_{t_0}$ is actuarial balance at valuation year of t_0, $(SIR)_{t_0}$ is summarized income rate at valuation year of t_0 in a given period from t_0 to t_0+n, n is the given valuation period. $(SCR)_{t_0}$ is the summarized expenditure rate at valuation year of t_0 in a given period from t_0 to t_0+n.

For financial adequacy evaluation purpose:

$$(SIR)_{t_0} = \frac{F_{t_0} + (PVAI)_{t_0}}{(PVS)_{t_0}}$$

$$(SCR)_{t_0} = \frac{(PVAC)_{t_0} + F_n v^n}{(PVS)_{t_0}}$$

Where, F_{t_0} is the fund reserve at valuation date t_0, or at the beginning of the valuation period; F_n is the targeted ending fund level at the end of the valuation period; $(PVAI)_{t_0}$ is the present value of scheduled annual revenue; $(PVAC)_{t_0}$ is the present value of annual expenditure; $(PVS)_{t_0}$ is the present value of annual insurable earnings for the years in a given valuation period.

$$(PVAI)_{t_0} = (AI)_{t_0} + (AI)_{t_0+1} \cdot v + (AI)_{t_0+2} \cdot v^2 + \cdots + (AI)_{t_0+n-1} \cdot v^{n-1}$$

$$(PVAC)_{t_0} = (AC)_{t_0} + (AC)_{t_0+1} \cdot v + (AC)_{t_0+2} \cdot v^2 + \cdots + (AC)_{t_0+n-1} \cdot v^{n-1}$$

$$(PVS)_{t_0} = S_{t_0} + S_{t_0+1} \cdot v + S_{t_0+2} \cdot v^2 + \cdots \cdots S_{t_0+n-1} \cdot v^{n-1}$$

Where, v is the discount rate.

For financial balance evaluation purpose, that is, balance between contribution and expenditure in a given valuation period, then,

$$(SIR)_{t_0} = \frac{(PVAI)_{t_0}}{(PVS)_{t_0}}$$

$$(SCR)_{t_0} = \frac{(PVAC)_{t_0}}{(PVS)_{t_0}}$$

$$(AB)_{t_0} = (SIR)_{t_0} - (SCR)_{t_0}$$

Here, a negative actuarial balance (i.e., an actuarial deficit) is one measure of the unfunded obligation of the program.

Actuarial models for medical insurance

Social medical Insurance system in China

In China, health insurance was organized around rural agricultural communes or urban place of employment. Since the 1950s, rural populations were covered under cooperative medical schemes managed by agricultural

communes. For urban populations, the Labor Insurance System (LIS) was established in 1951 for employees of state-owned enterprises (SOEs) and collectively-owned enterprises and their dependents. The Government Insurance System (GIS) was established in 1952 for government staff and retired government staff, and university students. With economic reform after 1980s, new medical insurance systems have been established step by step.

At present, there are three different social medical insurance systems in China. It is the Urban Employees' Basic Medical Insurance system (UE-BMI), it was established in 1998, and covered urban employees; New Rural Cooperative Medical Scheme (NRCMS) established in 2003 and covered rural residents and funded by government and individual; Urban Resident Basic Medical Insurance (UR-BMI) established in 2009 and covered Urban Resident not eligible for UE-BMI, including seniors, unemployed, children, students, disable and funded by government and individual. Beyond that, for civil servant and public institute employee, there is a public health care system (PHCS) financed by public finance. Right now, four health care systems covered majority of all employee and residents in China.

Different medical systems are quite different in source of finance and benefit models and reimbursements. Also, different medical insurance systems have been governed by different government department, UE-BMI and UR-BMI is governed by Ministry of Human Resources and Social Security and NRCMS is governed by the Ministry of Health, PHCS is governed by Ministry of Finance and Ministry of Health. Even for the same system, it is administered at municipal or lower governmental level. Local governments determine the program's design and reimbursement schemes. For UE-BMI and UR-BMI, there are wide variations across municipalities in eligibility, financing, benefits packages. For NRCMS, counties determine the deductible, ceiling, reimbursement ratio, medical savings account.

(1) The UE-BMI schemes

For the UE-BMI schemes, the central government has fixed the rate for annual premiums at 8% of payroll. Employers pay a 6% payroll tax, and employees pay an additional 2%. The premiums are composed of two parts: social pooled funds (SPF) and individual medical savings accounts (IMSA). The employee share (2%) plus 30% of the employer share make up the medical savings account, and the remaining 70% from employers are paid into a pooled account.

Benefit models and reimbursements under the UE-BMI are different in different province. Provincial governments have the right to develop their own models in the design of the benefits packages, reimbursements, co-payments, and provider payment methods. There are two main models under the UE-BMI: the plate and corridor models. Under the more common plate model, the social pooled fund covers inpatient and catastrophic expenses beyond the deductible and below the reimbursement cap. Outpatient expenses are

covered by IMSA until it is exhausted, after which outpatient expenses are paid out of pocket. Under the corridor model, IMSA is used to pay for both inpatient and outpatient expenses below the deductible. Once the IMSA are used, patients pay out of pocket until they have reached the deductible. Beyond the deductible and below the reimbursement cap, a fixed percentage of medical expenses are eligible for reimbursement through the social pooled funds. Some cities have developed different payment arrangements for outpatient care for specific chronic disease conditions, such as hypertension and diabetes, which can result in wide variations in benefits across municipality.

(2) The NRCMS

For the NRCMS, premium contributions are subsidized by the government (at central and local levels) and individuals also contribute a share of the premium. In the wealthier regions, the local government is responsible for financing a larger part of the government share. Poor households are eligible for support from the Medical Financial Assistance program, which covers the individual share of the NRCMS contribution.

Benefit models and reimbursements under NRCMS evolved rapidly, there are essentially four types of benefit and reimbursement models under the NRCMS. The most common model is the formula-based reimbursement of inpatient services and IMSA for reimbursements of outpatient services and preventive care. Household are expected to make contributions to IMSA, and household members can use the individual medical savings accounts for outpatient services. A second model is similar. It uses the same inpatient reimbursement policy, but there is no IMSA. The third model reimburses both inpatient and outpatient services for catastrophic diseases, with separate deductibles and reimbursement caps. The fourth model used reimburses both inpatient and outpatient services from pooled funds. This growth of this new model over time will illustrate the transition from the IMSA to the pooled fund for outpatient reimbursement.

(3) The UR-BMI Schemes

The Source of financing for UR-BMI Schemes is similar to the NRCMS. Central and local government subside the system and individuals also contribute a share of the premium. In different regions, the government subsidy is different, the provincial contribution vary. Poor households are eligible for support from the Medical Financial Assistance program, which covers the individual contribution.

Benefit models and reimbursements under the UR-BMI variation exist across different municipalities in the benefits and reimbursements under the UR-BMI program. Generally, however, the emphasis is coverage for catastrophic events to prevent medically-induced poverty, and pooled funds are used for inpatient reimbursements. Most cities cover outpatient services for chronic diseases (i.e., diabetes) or fatal conditions. Some cities have established IMSAs (Sarah L. and Lan Y., 2010).

Following tables give an example between two municipalities in the benefits and reimbursements under the UR-BMI program.

Table 1 ER-BMI program in Shang Hai

Hospital level	Outpatient				Inpatient			
	Deductible(yuan)	Co-payment			Deductible	I	II	III
		I	II	III		50	100	300
Age between 18 to 60	1000	35%	45%	50%	copay	25%	35%	45%
Over age 60 and disabled	300					15%	25%	35%
Children and primary and secondary students	300					25%	35%	45%

Table 2 ER-BMI program in Chongqing

Hospital level		Inpatient				
		Deductible(yuan)	Contribution level I		Contribution level II	
			Annual cap	Co-payment	Annual cap	Co-payment
Adult	I	100	110000	15%	70000	20%
	II	300	110000	35%	70000	40%
	III	800	110000	55%	70000	60%
Children	I	100	150000	10%	100000	15%
	II	300	150000	30%	100000	35%
	III	800	150000	50%	100000	55%

Because large disparities exist between and across urban and rural programs in terms of their financing and benefits, the system is evolving with time, it is very difficult to make national long-term actuarial valuation for social medical insurance schemes in China.

In next section, we just give a general data requirement and the models for medical insurance valuation.

General data requirement for health insurance

There are four types of data that are needed for any modelling process:

a. *Coverage data*：describe the size and structure of the population which finances (or pays contributions to) the scheme, and of the population which is covered (or entitled to benefits) under the scheme.

b. *Utilization and infrastructure data* describe: (1) the infrastructure of the medical delivery system in the country or scheme(e.g. the number of hospitals by category, number of beds, number of outpatient care units, staffing ratios for inpatient and outpatient care units);(2) the pattern and intensity of the utilization of the infrastructure by the covered population.

  c. *Price data* on health care goods and services describe the cost to the scheme for services provided to the covered population over a certain period of time, whether these costs are directly incurred or purchased from providers (e.g. through capitation payments, wages or salaries).

d. *Expenditure and revenue data* describe the financial situation of the system or scheme by aggregating all expenditure and revenue items.

Long term equivalence model for health insurance

Following is the long term equivalence model for health insurance,

$$R_0 + \sum_{t=1}^{T} c_t \times TAB_t \times v^t = \sum_{t=1}^{T} TE_t \times v^t$$

Where, R_0 is the reserves at the end of year 0, c_t is the contribution rate in year t, TAB_t is the total insurable earnings (or assessment base) in year t, v is the discount rate, TE_t is the total expenditure in year t.

In fact, this equation reflects the principle of collective equivalence, and is valid for all funding systems, including pay-as-you-go systems, fully funded systems, and any form of intermediate funding.

Here is an atypical model structure, as used by the International Financial and Actuarial Service of the ILO. Each health insurance model should have the following four main modules: (Michael, 1999)

1. An *economic and demographic module* that provides a projection and simulation of the population, labour force, employment levels and other economic data that are needed as input for the calculation of expenditure and revenues of the scheme.

2. An *income module* that projects the assessment base for contributions, using the economic and demographic data supplied by the above module, together with assumptions regarding the contributor and compliance ratios of the contributing population.

3. An *expenditure module* that projects expenditure in various benefit categories, administrative expenditure, and other expenditure on the basis of the projection of the covered population (i.e. the eligible population) and assumptions or projections of future utilization and cost developments.

4. A *result module* that calculates the annual balance of income and expenditure, and calculates necessary contribution rates.

Among above four modules, the economic and demographic module and income module is same with in the old age insurance actuarial models we have mentioned in section 4.3. Here, we will focus on expenditure module.

The health insurance expenditure

Total expenditure in a health care scheme usually consists of three major elements: benefit expenditure, administrative costs, and other expenditure. In China, administrative cost is paid by public finance.

For benefit expenditure projection purposes, one should disaggregate the benefit package. The most common disaggregation would be: outpatient care, Inpatient care in different hospitals level, pharmaceuticals, medical technology (prosthetic devices) and other benefits.

Generally, the expenditure in each category of care is projected by multiplying a utilization rate (number of units of care or cases per capita) by the unit cost and the number of covered persons.

$$BE_t = \sum_j BE_{j,t}$$

$$BE_{j,t} = COVPOP_{j,t} \times UR_{j,t} \times UC_{j,t}$$

Where, BE_t is the total benefit expenditure in year t, $BE_{j,t}$ is the benefit expenditure of category j of care in year t, $COVPOP_{j,t}$ is the covered population in category j, $UC_{j,t}$ is the unit cost for category j of care, $UR_{j,t}$ is the utilization rates for category j of care.

Problems on social budgeting and social insurance actuarial valuation in China

As we have mentioned above, Chinese social security system have been evolving and reforming since 1990s. Right now, the system still faces many problems, such as disparities exist between and across urban and rural programs and long term financial unsustainability under population aging. So, there are long way to go to establish a fair and sustainable social security system. There are long way to go to establish a regular social budgeting and social security actuarial valuation system.

Fragmented system

In China, the insurers of the social insurance (we have introduced fragmented old age insurance and medical insurance system, in addition, work injury, unemployment and maternity insurance have the similar problem.) are provincial governments or municipalities. Although the central government subside the local social insurance program, the basic structure of the system provisions is common to all the insurers regulated by central government, its details vary between and across different programs. So it is difficult to make a national actuarial valuation and budgeting for social security system.

Data

As we have mentioned above, for social budgeting and social insurance actuarial valuation, we need lots of data including demographic, labor, economic and scheme specific data. We can get demographic, labor and economic statistical date from National Statistical Bureau and refer the projection data from some research institute. For scheme specific date, including active participant, the terminated participants and the beneficiaries, the benefit distribution and loss distribution etc., the source of the scheme specific data should be from social security database of social insurance agent of MOHRSS.

For the social security database, up to now, the nationwide network has been basically formed, and MHRSS have interconnected with 32 provincial-level units. All the social insurance monitoring data except unemployment data have been uploaded through the network to MHRSS. Insured personal information can be monitored by the system, including basic individual information, insured situation and benefit payment etc.

However, although MHRSS has made some progress on the information system of labor and social insurance statistics management, it basically focused on the hardware and software platforms supporting the national network of information systems and lack of a more in-depth data mining and comprehensive analysis. In addition, the database is not opened to other government department and to public, so, if the MOF or other institutions try to do social insurance actuarial valuation, they need have the right to assess the data first. So MOF has to reach an agreement with the MHRSS on how best to permit them to access to these data.

Models

To do social security budgeting and actuarial valuation, we need linking expenditure and revenue mathematically to certain determinants, such as demographic development and development of economic variable, including employment, unemployment, wages or prices as well as the legal provisions which govern the national social security system. So, social security budgeting and actuarial valuation models should contain several sub-models, including demographic model, labour model, economic model (to project GDP, prices, wages, labour productivity, employment, unemployment) and social security model, which consists of pension, health care, work injury, maternity, unemployment sub-models. So, social security budgeting and actuarial valuation models are very complicated, although the mathematical relationship is obvious, but every sub-model should be based on detailed data and empirical research.

At present, although we have annual social insurance budget requirement and some social security actuarial valuation experience based on some special purposes, we don't have whole social budgeting system and regular social security actuarial valuation system. We don't have necessary models and computer programmes. Certainly, the legal requirement and institution setting is more important than building the models.

Specialized Institution and personnel

There are two budgeting and actuarial divisions in two government departments in China. It may make confusion about the responsibility. There are only 3-4 staffs in each actuarial office and budgeting office under limited authorized personnel right now. Also the staff is not expert in budgeting and actuarial valuation. Moreover, it's very difficult to recruit and keep the professional and technical staff in the government because the admittance restriction. It is also very difficult to give them promotions in the government context.

Legislation

There is no provision in the social insurance legislation that requires regular actuarial valuation, actuarial report and social budgeting in China. And the social security legislation itself is incomplete.

Because social budgeting is a part of the general social policy planning process and part of any meaningful medium-term financial planning process. Thus, social budgeting is a macro device in national financial planning (Wolfgang, 2010). Social insurance actuarial valuation and actuarial report is indispensable way to value and supervise the financial situation and sustainability of the social security system in the face of the population ageing.

So, we suggest making relevant legislation on it as soon as possible. This legislation will first focus on the actuarial reporting system and require the insurers to periodically carry out actuarial valuations. In many countries the statute requires such periodical valuations and reports.

Concluding remarks

Both social budgeting and social insurance actuarial valuation are very important for social security fairness and sustainability development. After about 20 years reform on social security system, people gradually realized the important role of actuarial valuation and have some experience and bases on it. But there are still many problems.

In the future, we should solve the problem step by step, improve and complete the social security legislation, define the provision on regular actuarial valuation and social budgeting in the social insurance legislation, complete database and build the valuation models, set special institution and recruit expert and so on.

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Models and methodologies for the Social and Economic Sustainability Analysis of the Social Protection System in Italy

Angela Legini, EU-China SPRP Expert

Contents

Introduction

This report illustrates Italy's situation on Models and Methodologies for the Social and Economic Sustainability Analysis of the Social Protection System, which is part of Component 2 of the EU-China Social Protection Reform Project.

Italy, like most countries, redistributes an important part (23 per cent) of its gross domestic product (GDP) through social transfer systems, fueled by general revenues, payroll taxes and social security contributions. Redistributive mechanisms of this order are influenced by the demographic structure and by the economy and public budgets upon which they, in turn, have a significant impact.

The complexity of the social protection system requires elaborate analyses and methodologies to deal with complex demographic, economic, financial, institutional and legal aspects that all interact with each other.

The actuarial analysis is an essential tool to implement and monitor the Government's economic policies. Valuations require the handling of reliable statistical information, the formulation of prudent and safe, though realistic, actuarial assumptions and the design of sophisticated models to ensure consistency between the objectives and the means of the social protection scheme.

They must also be carried out and organized in an appropriate manner and in accordance with specific provisions, even in a European and international context, in order to ensure comparability.

This report aims to provide a brief description of the work of specialists involved in actuarial practice on pension policy development.

More specifically, the report has been broken down into three main components. The first component sets out the costs relating to the Social Protection System in Italy. The second component describes the organization and methodologies used by public bodies involved in the valuation of social security schemes. The third component defines the models for measuring the long-term financial balance.

Social Protection Benefits in Italy

Social protection benefits are part of the profit and loss statements of public administrations prepared annually by the ISTAT (the Italian National Institute of Statistics) according to the scheme of Public Finance Statistics (PFS). This scheme is contained in the European System of National Accounts (ESA 2010) which allows the comparability of Italy's accounts with those of the other countries in the European Union.

The basic statistical sources used for the construction of Public Administrations' consolidated financial statements are represented by the statistical statements on budget flows or accounting documents (final or preliminary balance sheets) of the following Institutions that form part of it:

- Central government institutions, whose data are for the most part collected by the Ministry of Economy and Finance – State General Accounting Department (Ragioneria Generale dello Stato - RGS);

- Local government institutions (Regions, Provinces, Municipalities and the Ministry of Health which collects the budget flows of the local health authorities, hospitals, etc);

- Social security institutions, especially the INPS (National Institute for Social Security) and INAIL (National Institute for Insurance against Accidents at Work).

Social protection benefits are differentiated into social benefits in cash (pensions, income, social assistance, etc.) and social benefits in kind (especially health care expenditure).

Social expenditure forecasts contained in public finance documents are carried out by the Ministry of Economy and Finance (MEF) and may provide a logical aggregation of social protection benefits in cash and in kind, as in the case of public expenditure for Long Term Care (LTC), better specified below.

Social benefits in cash

In public finance documents, expenditure on social benefits in cash is, in turn, divided between (i) expenditure on pensions and (ii) expenditure on other social benefits in cash.

The definition of public expenditure on pensions is the same as that considered in the European context by the Economic Policy Committee of the Ecofin Council EPC-WGA (*Economic Policy Committee - Working Group on Ageing*). The aggregate includes the entire mandatory pension system and expenditure on social assistance.

The first of these components relates to invalidity, old-age and survivors' pensions granted on the basis of the contributions paid during the working life.

The second component, that is, expenditure on social assistance, relates instead to services of a welfare nature granted in the absence of work contributions. It is intended for vulnerable low income persons and is included in public expenditure on pensions due to its close relationship with the aging of the population; in fact, it cannot be collected before old-age.

Expenditure on other social benefits in cash, which represents the second aggregate of expenditure forecasts for social benefits, gathers a heterogeneous set of benefits that have different purposes and address different types of needs[66]; the only thing they have in common is that of being monetary benefits other than pensions.

In Italy, pension expenditure is almost entirely covered by the INPS, as well as a large part of the expenditure for other social benefits in cash. The exceptions are annuities for accidents at work and occupational diseases which are paid by the INAIL.

Social benefits in kind

Social benefits in kind are mainly related to expenditure on health care, such as hospital care, general medical care and specialized medical care, medication, etc.

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[66] Expenditure on other social benefits in cash includes benefits provided to civilian invalids, blind and deaf and dumb persons, social safety nets, severance pay, family allowances, maternity benefits, accident annuities, war pensions and other assistance, etc.

These benefits include individual services provided directly by public administrations (especially hospital care) and those services acquired by them from market producers and transferred directly to families (basic medical care, hospital care in partner private health care institutions, reimbursable medicines, etc.).

In the forecasts of social protection accounts, public health care expenditure includes both the current health care expenditure in the strictest sense and an estimate of the amortization related to public investment in health care made over time. It also considers the aggregate of public expenditure for Long Term Care (LTC) which is defined in line with the methodological indications contained in the guidelines drawn up by the OECD, on the basis of the System of Health Accounts (SHA) classification criteria.

According to these criteria, public expenditure for LTC includes social and welfare services provided in any form and at any government level. In Italy's case, it includes the following three components: health care expenditure on LTC, indemnity in cash ("accompaniment" indemnity) and social and welfare services, provided at the local level for disabled persons and dependent elderly people.

Public Expenditure Forecasting in Italy

Public bodies in Italy which engage in analyses and forecasting in the area of social protection through the use of the models and forecasting methodologies are essentially two in number:

- The State General Accounting Department (Ragioneria Generale dello Stato - RGS) of the Ministry of Economy and Finance (MEF);
- The National Institute for Social Security (INPS).

The forecasts prepared by the two mentioned bodies have different purposes and thus, use different methodologies and models.

The State General Accounting Office monitors and forecasts public expenditure on pensions, health care and social assistance to dependent persons (Long Term Care LTC), described in the previous chapter. These forecasts are functional to the analysis of the long-term sustainability of public finances.

The INPS performs, for each of the over 60 Pension and Management Funds it administers[67], estimates of the financial effects arising from any regulatory changes, and holds regular studies to evaluate, in actuarial terms, the evolution of the financial and asset components in the balance sheets.

Forecasts by the State General Accounting Department (RGS)

Between late 1998 and early 1999, the State General Accounting Department (RGS) set up a structure (General Inspectorate for Social Expenditure - IGESPES) which, over time, has developed a complex architecture of analytical monitoring and forecasting models.

These models are aimed at assessing, both at national level and at international institutional venues, the impact of complex processes, such as the aging population, on public finances.

Pension and health care expenditure forecasts carried out by the RGS have particular institutional importance because they allow:

✓ The processing of the section relating to the sustainability of the Document on the Update of Italy's Stability Programme;

✓ The forecasts made by the abovementioned Economic Policy Committee of the Ecofin Council EPC-WGA (*Economic Policy Committee - Working Group on Ageing*);

✓ The preparation of the annual report on the Ministry of Economy and Finance's medium to long-term forecasts.

Forecasting models for social expenditure are for both the short and the medium to long-term period and are carried out every year. These models are different but mutually coherent in the parameters and results. They ensure an accurate reproduction of current legislation and are able to simulate the effects of regulatory changes. The long-term models provide forecasts for a time period of about 50 years.

They are composed of a specific regulatory and institutional module for each expenditure function (pensions, health care and other social benefits in cash) and share the same demographic and

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[67] Management is divided into pensions and welfare for the provision, for example, of indemnities for family support or unemployment indemnities for loss of work.

macroeconomic module. The sharing of the demographic and macroeconomic module makes these models perfectly coherent and integrable.

The regulatory and institutional module is designed in such a way as to manage the available information with a high level of analyticity. This allows:

a) An accurate reproduction of the rules laid down by the legislation in force;

b) The possibility of simulating a wide range of regulatory changes;

c) Full integration with the corresponding short-term models.

The demographic module is able to make forecasts on the basis of different demographic parameter assumptions (fecundity, mortality and migration flows). Moreover, it is capable of making forecasts that are perfectly coherent with those demographic forecasts officially produced by Istat (used in national assumptions) and by Eurostat (used in forecasting exercises developed in a European context), if the underlying demographic parameters below are available with a suitable level of analyticity.

The labour market module adopts a generational approach in the projection of activity rates. It is designed in such a way as to integrate the dynamic trends (inertial component) with hypothetical assumptions defined exogenously on national and European levels.

The different modules are interrelated and establish significant endogenous dynamics. Among the endogenous variables generated by the various modules, it is worth mentioning:

✓ The review of the processing coefficients of the contributory pension scheme based on the probability of death underlying the demographic dynamics;

✓ The interrelation of activity rates with:

- Requirements for pension access;

- The ratio between age and length of service contributions of the insured in the pension system;

- The rates of schooling;

- The evolution of the working age population.

Health care forecasts used in public finance documents are prepared from the date of the health care expenditure reported in the consolidated health care profit and loss statements drafted by ISTAT.

Starting from the accounting data relating to the last year (year t) of the abovementioned financial statements, health care expenditure forecasts for year t+1 and thereafter, are constructed on the basis of regulatory and institutional parameters and the macroeconomic framework drawn up for the reference period.

The update of the healthcare expenditure forecast is preceded by an estimate review of the consumption profile, by age and gender, relating to the different types of performance based on the updated data.

A "pure aging scenario" base assumption is developed that gives the variations of the health care expenditure/GDP dependent ratio only by modifying the population structure. This approach assumes that:

- The structure of specific consumption by age, gender and type of benefit remains constant for the entire forecast period

- The dynamic of the Standardized Per-capita Consumption (SPC), which expresses the variation of health care consumption on the same demographic structure, is modified in line with GDP per capita.

Different health care evolution scenarios, "*reference scenarios*", are also adopted which reflect:

1. The improvement of health conditions correlated to the increase in life expectancy;

2. Price variations between health care and non-health care products, also due to the different technological content;

3. The effect on costs exerted by the labour factor.

Forecasts by the National Institute for Social Security (INPS)

The INPS manages almost all public social security, welfare and social assistance; only some occupational schemes, such as the Provident Fund for lawyers or doctors, do not fall under the INPS.

However, several distinct social security funds continue to be administered by the INPS, even if a universal method of calculating contributions was adopted in 2012 and, more generally, the Notional Defined Contribution model (NDC).

The management fragmentation still characterizes many categories of insured persons: employees in the private sector, civil servants, traders, craftsmen, employees of electricity companies, railway employees, etc. These categories are recognized for past rules of diversified pensions and for some of them, such as the self-employed, different levels of contributions are in force compared to the majority of workers.

Actuarial activity in the INPS is carried out by a team composed of 40 actuaries who are also engaged in purely statistical aspects, such as the provision of appropriate online observers for the analysis and monitoring of events and the various groups of insured persons and beneficiaries.

The law entrusts the Ministry of Labour and the Ministry of Economy and Finance with the task of supervising the mandatory social security management institutions and, therefore, the INPS in particular.

Every year, for each Pension Fund and Welfare Management, the INPS must submit to the abovementioned supervisory Ministries a proposed budget of their revenue and expenditure for the coming year for which the actuaries prepare short-term projections of contributions, benefits and administrative expenditure.

Every 3 years, the actuaries prepare the long-term actuarial valuations for these same Pension and Welfare Management Funds, which differ substantially from short-term projections in terms of methodology and assumption refinements.

The purpose of the periodic review is to verify the actuarial equilibrium in the long-term for each Fund or Welfare Management through the forecasting of active and passive elements of the balance sheet. Actuarial valuations cover a span of thirty years for pension funds and ten years for management funds which provide welfare-type benefits.

Actuarial Office also performs an overall actuarial valuation which provides an INPS trend forecast for a period of ten years. To this end, the assumptions and methodologies adopted for each Fund and Management are as homogeneous as possible.

Actuarial valuations are carried out at constant legislation so as to allow the necessary adjustment initiatives by the Government, especially in the presence of the pay-as-you-go system used in Italy.

The Ministry of Labour establishes that the assumptions on which projections are based must be prudent. For example, an annual interest rate must be adopted for discounting purposes of not more than two % points of the programmed cost of living index. Moreover, assumptions concerning mortality rates shall be those drawn up and published by the ISTAT for the Italian population, except in the case where for specific experience in the sector subject to assessment, it is not able to provide for different mortality rates of insured persons and/or increased life expectancy of the beneficiaries of the performance.

The actuarial team working in the INPS may be asked to advise, on an ad hoc basis, on the effects of various modifications related to benefit and financing provisions. These requests may come from the supervisory Ministries or from the government. The flexible actuarial projection models are available and readily adaptable for this purpose.

Long-term Actuarial Valuations

Actuarial projections on the volume of pensions and other social transfers are difficult but vital. Notably, pension schemes (where actuarial work is most relevant) are long-term societal commitments, many of which have to be honored by future generations.

There may be a considerable delay between the promise to pay benefits being given and the actual payment of benefits. It is, therefore, necessary to have information on the benefits promised before they are actually paid. In particular, the actuary is involved in making assumptions about future events in order to define:

a) Demographic projections (when benefit payments are to be made);
b) Economic projections (the level of benefits to be paid).

A model is a simplified representation of the reality. The actuarial model is implemented through a set of mathematical formulae and algorithms, and created by using a set of inputs (data and assumptions) to produce a set of outputs.

Actuarial valuation steps

The actuarial valuation of a pension scheme is usually organized in a series of fundamental steps that can be summarized as follows:

1. Preparatory work
a. Analysis of the rules of the pension fund and definition of the outputs;
b. An examination of the type and quality of information contained on the scheme's administrative files or from other sources

2. Choice of methodology:
a.   Average values for aggregations or for individuals (use of probabilities in a direct way);
b. Stochastic simulation or "Montecarlo" method (use of probabilities in an indirect way).

3. Definition of the model's inputs:
a. Data collection and trace input records;
b. Selection of assumptions;
c. Alignment of the archives in line with financial statements and additional data collected on the various components of revenue and expenditure and the creation of possible ad hoc assumptions.

4. Base run and results analysis (including validation checks).

Some of the steps just described and adopted in the preparation of evaluations on pensions in Italy will be studied below.

Social security rules in Italy

Actuarial models must be adapted to the current law and regulations (eligibility conditions for entitlement to benefits, benefit formulae, indexing provisions, definition on insurable earnings,

contribution rates and financing rules) for the purpose of projecting future demographic and financial outcomes.

In particular, as is well known, the pension formula determines the level of the pension at the time of entitlement benefits.

In Italy, the rules on social security have been standardized for all public administrations. In fact, the compulsory pensions system, disciplined as a result of the reforms of 1995[68] and 2011[69], provides for the gradual transition from the system of calculating remuneration to the contributory one. In particular:

A. Workers with at least 18 years of contributions up to 31 December 1995 and who are not yet retired by the end of 2011, receive up to that date of the salary method and for the contributory pension acquired from 01 January 2012, of the method of calculating contributions;

B. Workers with pension contributions of less than 18 years up to 31 December 1995 are subject to the contributory method pro-rata for the contributory pension acquired after 1995;

C. Only workers registered in the pension system for the first time by the year 1996 are entirely subject to the contributory method.

This means that, in the presence of contributory pensions equal to or higher than 35 years, the new method of calculation will begin to apply in full from the streams of retirement with effect from subsequent to 2030, and it will take on average another 30 years before the entire stock of pensions in payment can be said to be almost exclusively composed of pensions calculated entirely with the contributory method.

Below is the formulae for the calculation of future pensions relating to the preceding three types of workers used by the RGS for the calculation of the replacement rates:

$$p_x^A = \rho \left[\frac{a_{1992}}{z} \sum_{j=0}^{z-1} (1+\omega)^{-j}(1+\sigma)^j + \frac{(\alpha_{2011} - \alpha_{1992})}{n} \sum_{j=0}^{n-1} (1+\omega)^{-j}(1+\sigma)^j (1+0,01j) \right] +$$

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[68] Law No. 335 of 1995

[69] Law No. 214 of 2011

$$+ct_x\varepsilon \sum_{j=0}^{\alpha-\alpha_{2011}} (1+\omega)^{-j}(1+g)^j$$

$$p_x^B = \rho\left[\frac{a_{1992}}{z}\sum_{j=z}^{z-1}(1+\omega)^{-j}(1+\sigma)^j + \frac{3}{n}\sum_{j=0}^{n-1}(1+\omega)^{-j}(1+\sigma)^j(1+0{,}01j)\right]+$$

$$+ct_x\varepsilon \sum_{j=0}^{\alpha-\alpha_{1992}-3} (1+\omega)^{-j}(1+g)^j$$

$$p_x^C = ct_x\varepsilon \sum_{j=0}^{\alpha-1}(1+\omega)^{-j}(1+g)^j$$

Where: α is the contributory pension generally gained, a_{1992} and α_{2011} indicate the contributory pension acquired respectively until the years 1992 and 2011, ω is the annual rate of change of the individual remuneration, σ is the rate of annual inflation, ρ is the coefficient of proportionality (percentage of remuneration of retirement for year of contribution), z is the reference period for the calculation of the average wage of retirement in relation to the pension contributions accrued up to 1992 (5 years for private employees and 10 years for the self-employed), n is the reference period for the calculation of the average wage of retirement in relation to seniority contributory matured after 1992, ε is the contribution rate calculation, ct_x is the processing coefficient of contributory mast in annuity at age x, g is the five-year moving average of the rate of variation of GDP.

The parameter n is increasing in time and assumes different values for speed and by category of workers. The pay system reaches 10 years for private employees and 15 years for the self-employed from 2001 onwards. The mixed system is gradually extended to the entire working life even if the retirement remuneration thus calculated shall apply only to contributions accrued in the period 1993-1995. The calculation of the pension amounts is carried out taking into account the ceilings of pensionable salary provided for in the scheme for remuneration and in the mixed (for the share of wages).

The current compulsory pensions system also provides for the pension in the event of the disability of the insured and the pension for those surviving in the event of the death of the active or retired person, equal to 60 % of the pension amount is received by the pensioner or is gained by the active person. The percentage is gradually reduced in dependence of the total income of those surviving.

Statistical information

The database as of the valuation date includes the current insured population and the pensions in payment.

The insured population includes present contributors and inactive insured persons registered in the past but not having contributed during the last financial year. Due to the fact that participation is mandatory, some workers will leave and then re-enter the social security scheme during the course of their careers. The model has to take into account the evolution of the total population and that of the total workforce.

The quantity, quality and degree of detail of the information available determine the choice of the type of forecasting method to be used.

The projections of the RGS, for example, have need of information from multiple management bodies, each characterized by different levels of detail and quality of information available. The RGS model is therefore based on average values.

Specific methodologies for each pension fund are adopted for the projections made by the INPS on the basis of the level of detail and the degree of updating of information on active and retired persons.

Moreover, the database can be sample-based or can include the entire community. For example, for the forecasting model of the main pension funds (private employees and self-employed persons), a sample is used that is equivalent to about 10 % of the universal base, which considers those born on days 9, 10 and 11 of every month.

Actuarial assumptions

Actuarial assumptions required in the valuation of retirement benefits can be broken down into two main categories:

✓ Economic assumptions, which are required to project the amount of benefits that will be payable (i.e. rate of price inflation, rate of increase in salaries, rate of increase in pensions in payment, economic growth of GDP, etc.).

✓ Demographic assumptions, which are used to project the development of the population of the pension scheme and hence when the benefits to be provided will be paid (i.e. mortality, disability, proportion married, age difference with spouse, number of orphans, orphans' mortality, etc).

There are a number of exogenous assumptions that must be determined with economists and other experts and the specialists of the ministries responsible for labour and finance.

The economic assumptions and demographic information for use in the forecasts are partly indicated by special regulations and directives, as already specified. In every case the actuarial assumptions must comply with the general accounting principles, namely the principles of:

- Prudence
- Internal consistency (logical link without contradictions and homogeneity in the analysis of the phenomena considered)
- External coherence (connection with the economic and financial planning of the country)

In particular, the amount of taxpayers and the average taxable income curves which apply contribution rates must evolve in line with the rate of growth of total employment and with that of average productivity of work at national level.

The probability of death must be updated over time as a function of the expected increase in life expectancy in line with the most recent forecasts of the Italian population drawn up by the ISTAT. In Italy, the triennial life expectancy revision (biennial from 2021) represents an important automation aimed at preserving the conditions of the pension system's financial equilibrium.

The rate of profitability of assets accumulated by the Pension Fund, net of tax and management, is determined as a function of the average yield of the activities of the social security institution made in the last five years. The profitability rate may not exceed the rate of interest adopted for the projection of public debt in the medium and long-term.

Choice of methodology

As already discussed, the purpose of a projection on a pension fund, whatever the methodology applied, is that of obtaining, year by year, the value of the most significant quantities reported:

- The insured and retired population
- The amount of wages and incomes available
- The burden for performance.

The exact nature of the required results and their level of disaggregation depends on the purpose of the projection to be attained and the choice of the forecasting model to be adopted is carried out on the basis of:

a. The level of detail of the information available on the collective individual components
b. The numerosity of collectives
c. The output's analytical detail
d. The hardware and software available

The methodology for the projection of a pension scheme's essential data (number of pensioners, charges income subject to contribution, etc.) goes under the name of "method of years of management" and, in Italy, took the form undertaken after the Second World War.

As indicated in the existing literature, the traditional projections for average values are made by applying the relative frequencies of various events that affect the evolution of management to the insured and retired population, classified in relation to some of its most significant characteristics (gender, age, seniority): this thus determines, year by year, the input and output flows in the various groups, each of which shall apply appropriate average values of wages and performance. This method is well suited where the purpose of the projection is to annually evaluate the total amount of the main quantities of management.

The use of stochastic simulation in the sphere of social security has developed in the last decades of the twentieth century, with the crucial contribution of Italian actuaries and of the INPS in particular. In fact, the INPS Actuarial Office has designed a stochastic model based on the method of random-

simulation of individual Life Event (Method of years of management on an individual basis to draw) - MAGIS.

This method has the aim of guaranteeing the maximum reliability of results and the use of all available information at the individual level, without proceeding to any grouping.

The history of individuals is then followed, where all characteristics (age, sex, seniority, pay history, sector of activity and professional qualifications, family situation, etc.) are taken into account for each individual.

On the basis of these characteristics, each of the subjects belong to a particular "status", which may be that of an insured person, a "silent" person or a pensioner. On the occurrence of particular events (steps of qualification, death, reaching particular age limits, etc.) the subject passes from one state to another.

Each of the parties will, therefore, follow in the period covered by the projection of a series of possible paths between the various "members", which represent the set of "fates possible".

In the context of this set, the projection method identifies the "actual fate" of each examined subject, simulating the occurrence of various events that give rise to changes in state by means of a draw that takes account of the probability of the event itself. The "history" of each individual is finally replicated to ensure the stability of results.

The process – which uses software created with the Delphi programming language – therefore creates a simulation of the actual management of the pension scheme, updating insurance positions, liquidating new pensions and periodically re-evaluating the amount. In this way, for each year of projection, a complete archive of insured persons and pensioners is obtained, updated with all the individual data; both the global results of this projection and the analytical indications at any level of detail can be obtained from this archive through appropriate data aggregation.

For simplicity, only the main module of the MAGIS model is being shown hereunder:

Fig . 1 – The MAGIS model's simplified main module

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┌─────────────────────────────────┐
│ Module reading of macroeconomic │
│   assumptions and probabilities │        ┌─────────────────────┐
└─────────────────────────────────┘        │    Actives module   │
                 │                          └─────────────────────┘
                 ▼
        ┌─────────────────┐                 ┌─────────────────────┐
        │      Cycle      │                 │ Retirees who are still │
        └─────────────────┘                 │    working module    │
                 │                          └─────────────────────┘
                 ▼
 ┌─────────────────────────────────┐        ┌─────────────────────┐
 │ Record reading and selection:   │        │   Direct retirees   │
 │ active, former contributor and  │        │       module        │
 │            retired              │        └─────────────────────┘
 └─────────────────────────────────┘
                 │                          ┌─────────────────────┐
                 ▼                          │   Indirect retirees │
 ┌─────────────────────────────────┐        │       module        │
 │ Creation of the new contributors│        └─────────────────────┘
 │          generation             │
 └─────────────────────────────────┘        ┌─────────────────────┐
                 │                          │ Former contributors │
                 ▼                          │       module        │
        ┌─────────────────┐                 └─────────────────────┘
        │   Cycle's end   │
        └─────────────────┘                 ┌─────────────────────┐
                 │                          │    Actives module   │
                 ▼                          └─────────────────────┘
 ┌─────────────────────────────────┐
 │ Output: determination of sample │
 │       means, variances, ..      │
 └─────────────────────────────────┘
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Microeconomic and Macroeconomic Models to Monitor and Assess the Sustainability and the Adequacy of the Welfare System

Carlo Mazzaferro, EU-China SPRP Expert

Contents

Document Scope

Social security systems are an important pillar of the Welfare State in a large number of developed and developing countries. At the same time the ageing of the population in a large number of these countries raises financial and distributive pressures, especially as far as the long term perspectives are concerned. As population grows older the ability of a social security system to maintain a balanced long term financial position come into conflict with the aim of allocating adequate benefits to insured individuals when they reach retirement age. Accordingly a number of reforms have been enacted in last decades in order to face this complex trade-off.

Models that are capable to represent and discuss long term financial and distributive scenarios of an economy and of its social security system are important tools as they can improve the ability of the policy maker to decide now reforms that can improve the long term structure of the welfare system. They also can be used to measure costs and gains of these reforms, both in the short and in the long period.

In this paper I will first present the general background under which social security systems interact with the rest of the economy. I will then move to the presentation of main indicators used in the economic literature to evaluate financial and distributive features of a social security system and of models that are currently used to compute them. In the second part of the paper I will present results of one of these models.

Social security systems: economic effects, indicators and models

The economic literature has pointed out that social security systems have different effects both in terms of allocation of resources and from a distributive point of view. In particular:

1. <u>The introduction of a social security system affects individuals' consumption and saving decisions</u>. Contributions paid by workers to their pension scheme are perceived (at least partially in the case of PAYGO systems) as a form of saving that will be used to finance consumption during their old age. Accordingly (rational) individuals will, at least partially, substitute private saving with pension contributions. The net effect on consumption, national saving, capital accumulation and growth is mainly an empirical question and it will depend on the financing method, the mandatory nature of the system and on the relative rate of return and risk of the social security system with respect to those of the market.

2. <u>A social security system affects labour supply</u>. In particular the economic literature highlights two different kind of effects. Firstly, the seniority at retirement and the introduction of the statutory retirement age have to be taken into account. Broadly speaking a higher retirement age and/or a longer contributory period imply more years spent in the labour market, which in turn increase of lifetime resources disposable for consumption. Secondly the computational rule adopted by the social security system to determine pension benefits can influence, at the margin, the decision to work or not. In particular an actuarially neutral rule is supposed not to influence the marginal decision to work, while the opposite holds in case of computational rules that do not respect the condition of equality between the present value of contributions and the present value of pension benefits paid and received by an individual during his/her lifetime.

3. Any kind of social security system is an institution that regulates a <u>number of important redistributive effects</u> among individuals and generations. Independently from the financing mechanism a social security system is an institution that regulates the transfer of a part of the national product from young to old generations. There are however other kinds of redistributions embedded in a social security system: among them the most important are those that may favor lifetime poor individuals or households and those that may favor couples with respect to singles. Finally social security systems, or at least part of them, can be used to contrast poverty among old aged individuals.

4. <u>A pension contract lasts many decades</u>. During this (rather long) period of time a large amount of uncertainty could going on in the economy, that makes difficult (if not impossible) to determine ex-ante all the parameters that determine the level of social security contributions and the level of pension benefits. Consequently the definition of the contract to be adopted by the social security system determines different risks spreading among individuals and generations. In particular systems based on a defined benefit rule tend to fix the level of the future pension benefits (or at least the ratio between the pension benefit and the wage earned before retirement) and to leave undetermined the level of social security contributions. The opposite gilt for defined contribution rules. Accordingly choosing a rule (not only a financing method) for the computation of contributions and benefits implies that demographic, economic and political risks may be differently spread among workers and pensioners.

5. <u>Social security and pension systems are usually complex and information about them is not widespread</u>. Even countries where the social security has a long tradition show low level of literacy of citizens. This might affect the effectiveness of the system, since individuals need to correctly know their contributions and level of the pension benefits in order to decide correctly about their consumption and labour supply.

The ageing of the population, driven by increasing lifetime expectations and decreasing fertility rates, entails financial and distributive stresses for the social security system. In order to design systems that can be able to cope with the ageing of the population as well as with changes expected in the structure of societies and economies in the future, a series of objectives have been defined. In a very general term it is agreed among scholars that an effective social security system must be, at the same time:

1. Financially sustainable
2. Adequate
3. Flexible
4. Neutral with respect to labour supply

Financial sustainability can be declined in different ways (see for example Robalino and Bador, Oecd working paper). A sufficient inclusively definition says that this condition is respected if the ratio between pension expenditure and the national GDP is not continuously increasing in the

medium-long term. This first and important condition however might be conflicting with the second, adequacy of the pension benefits, in particular when the ratio between retired and working population of a country is expected to grow continuously through time.

At the same time the idea of adequacy is also not univocally determined. Basically adequacy means that the level of welfare of a pensioners should not be too different from the level that he/she reached before retirement. From this point of view a first and widely used measure of the adequacy of a pension system is the ratio between pension benefits and earnings of a single individual. However it should be taken into account the fact that pension benefits are only a component (even if usually the most important) of the households' income. So in a more general sense adequacy should be measured taking into account of the household income i.e. measuring also other members' revenues. Moreover adequacy should be measured net of taxes and also in a more dynamic dimension, for example not only the first year after retirement.

Beside the trade-off between sustainability and adequacy, other important characteristics should be fulfilled by an effective and efficient social security system. It should be able to cope with changes in society, as for example modifications in the share of women participating in the labour market and modifications occurred in the labour market itself and finally it should be more neutral on the marginal decision to work.

The economic literature has stressed that no first best solution for the optimal design of a social security system is available (see for example Barr and Diamond: Reforming Pension: Principles, Analytical Errors and policy directions, disposable at http://economics.mit.edu/files/4025) . Rather a pragmatic approach is sustained both at the academic level and from international institutions. The idea is that a Government should choose the kind of social security system that best fits with the countries' economic, demographic and societal characteristics. The number of objectives, the interrelation between social security systems and economic behavior are too complex to think that a single receipt can work effectively everywhere. Think for example at the degree of development of the capital market in relation to the choice about the financing mechanism, or at the decision about the pension rule in relation to the different degree of risk aversion in different countries. We do not enter in more detail about this topic, which in not the central one of this report.

Rather we concentrate now on a description of the set of microeconomic and macroeconomic indicators that have been developed in the policy oriented and in the empirical literature in order to describe and to analyze the features of a specific social security system. Therefore our attention is directed towards indicators that are used to measure the features of the social security system.

The following table reports the most used indicators of a social security system used in the economic literature, their definition and an attempt to define at which aspect of the system are they more suited to be applied.

Table 1

Most used indicators of social security systems

Indicator	*Definition*	*Used for*
$(P / Y)_t$	Ratio between pension expenditure and GDP over time	Sustainability analysis
$(IPD)_t$	Implicit Pension Debt: amount at time (t) of the sum of promised pension payment accrued according the current pension rule	Sustainability analysis, Intergenerational distribution
(IRR)	Internal rate of return of a pension scheme. Rate of discount that equalize the total amount of pension benefits received and the total amount of social security contributions paid during lifetime.	Sustainability, intergenerational distribution, convenience with respect to alternative investments, lifetime distribution of resources
(NPVR)	Net Present Value Ratio: the ratio between the present value of pension benefits and the present value of contributions, both discounted with a predefined rate.	Sustainability, intergenerational distribution,
RR	Replacement rate: ratio between the first year pension benefit and last year(s) earning. Can be	Adequacy

	measured net of gross of income tax and contributions. Can be measured after t years.	
(PA / WA)	Average pension benefits over average earnings.	Adequacy, intergenerational distribution
Gini index	Gini index among pensioners and among workers	Redistributive feature of a pension system and lifetime distribution.
Accrual	Changes in the Net Social Security Wealth from working one year more	Neutrality of the pension rule with respect to labor supply
Tax Rate	Ratio between the accrual and wage	Neutrality of the pension rule with respect to labor supply

In order to describe different features of the system researchers and policy makers need different indicators. A first consequence is that researchers and policy makers should use different models in order to estimate these indicators. A usual way to estimate these indicators is through the building of a "model" of the social security system.

Broadly speaking models used to evaluate the financial and distributive features of a social security system can be classified as follows:

1. Models based on representative individuals
2. Models based on cells of individuals or "macro" models
3. Models based on heterogeneous populations or "micro" models

Each of these model has pros and cons, that we will shortly analyze. From an economic policy's point of view it is however important to stress that it would be advisable to use all of them in order to have an effective and complete discussion on the characteristics of a pension system and of its economic and distributive effects.

The first kind of model is the less data requiring with respect to the other two. The most notable example is the World Bank model for the measurement of pension performances (see at http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTSOCIALPROTECTION/EXTPENSI

ONS/0,,contentMDK:20579507~menuPK:396273~pagePK:148956~piPK:216618~theSitePK:39625 3,00.html). This kind of models consider the evolution of one (or more) representative individual(s) from the beginning of the work carrier to retirement and then to death. The model can be deterministic or alternatively state transitions can be modelled probabilistically. Usually the model computes both adequacy and sustainability indicators. The main advantage of this approach reside in the possibility to describe in great detail the normative position of the individual. At the same time since the model does not consider behavioral rules, nor takes into account possible interactions between individuals the realism of future pension benefits and its related indicators results weak or at least not complete. The approach is particularly suited when international comparison are needed because the relative simple structure of the model allows the research to be more concentrated on differences of rules of the systems.

The macro models are widely used to evaluate the financial long term sustainability of social security systems around the world. The most important example of these kind of models are those developed within the Ageing Working Group by the European Commission (see http://europa.eu/epc/working_groups/ageing_en.htm). These models have been developed in order to forecast the medium and long term evolution of the ratio between pension expenditure and national GDP. A macro based models starts from a decomposition of the above mentioned ratio into its economic and demographic components. Each demographic and economic component of the ratio follows then an evolution that can be either deterministic or probabilistic and that usually is obtained using a wide range of statistical macro and micro data. These models seem particularly appropriate when the focus of the analysis is the judgment of the financial sustainability of the pension system (or more generally of the age related public expenditure), while they are less able to furnish reliable prediction of the medium and long term distributive features of the system since they are mainly based on cells of individuals and not on single observations.

The third group of models are based on a complete heterogeneous cross sectional population. The population can be either based on survey or on administrative data. In both cases it is necessary that the population assures a certain degree of representativeness with respect to the universe, i.e. the general population. This kind of model is also widely used in a number of European countries (also in the AWG), in the Us, in Canada and in Australia (see www.microsimulation.org). Population based dynamic microsimulation model can be either behavioral or non-behavioral. In the second, most used approach, they project probabilistically a base year representative and heterogeneous population forward simulating a large number of demographic and economic events (like birth,

marriage, death, education, labour market participation etc.). The main advantage of this approach is the possibility they offer to compute at the same time both sustainability, adequacy and distributive indicators of the social security system. In order to produce reliable results however the model's medium and long term evolution shall be continuously compared with some external macroeconomic projections and the characteristic of the model's population should be adjusted accordingly. Together with this precaution one has also to take into account that, from a distributive point of view, it is always appropriate, even if it is not always easy, to distinguish between "noise" that are always present in the microdata and the real heterogeneity produced by the labour market and/of by the pension system.

A general point has to be made at this point. Are we talking about forecasts or about projections? In order to answer to this question it is important to stress that even if differences between the three kind of models above presented are important, they also share important common methodological features and data requirements. Starting from this last point all models, but especially the second and the third kind, need a wide amount of micro and macroeconomic data to predict the future evolution of demographic and economic variables. These data regard information on fertility, mortality, net migration, health status, labour market participation, lifetime earnings, educational choices, etc.

In particular, starting from historical data these models estimate "cohort effects" that are used to predict or better to project the future evolution of economic and demographic variables into the future. In fact cohort effects are a way to differentiate future evolution of a variable (say for example the labour market participation) controlling by the date of birth of individuals or generations and implying that the evolution of not already born generations will behave as the younger living generation. This choice is widely used because behavioral models are complex and it is particularly difficult to insert such kind of rules in a model were (in the case of the population based models), thousands of observations are present. Even if computer technology allows, even with a certain difficulty, to introduce at the same time intertemporal maximization and the recursive approach necessary to develop a dynamic model, results cannot be easily interpreted (see for example http://www.niesr.ac.uk/publications/linda-dynamic-microsimulation-model-analysing-policy-effects-evolving-population-cross#.V5YRDaJrOao). Considering all these aspects we conclude that results of the three kind of models above succinctly described can be better interpreted as projections rather than forecasts. Being conscious of this limit it is important to stress why are these models useful. The most important reason, at least from a policy point of view, is that they offer the policy maker an

instrument that can be used to modify today a system that will have important allocative and distributive effects on future resources and welfare. It is also important to remember that these models not always work well. In particular, at least from the European point of view, their recent performances are not particularly satisfying as with respect to net migration predictions and to the impact of the recent macroeconomic turmoil. However they offer the policy maker a tool to evaluate if, given current policy stance and economic and demographic behaviour, a social security system is adequate and sustainable.

Models for the evaluation of the long term effects of public policies

The main aim of a model for the evaluation of the long term effect of public policies should be to improve knowledge about their financial, quantitative and distributive impact on both the public budget and on individual welfare. There are a minimum number of desirable characteristics that such a kind of model should fulfil. Firstly the model should be able to characterize the starting simulation and to simulate reforms. Accordingly, the base year population used to run simulations must be as much as possible representative of the universe that it represent. Secondly input data have to be reliable and as much as possible reciprocally consistent. Thirdly the model should offer an interface that makes it possible to non technical readers to understand how it works and how results are produced.

Broadly speaking we envisage some crucial step that should always be respected in the building of a model that estimates long term effects of public policies.

- The initial dataset: data can be derived either from survey or from administrative archives. In both cases what really matter is their representativeness. This is a real crucial point if one consider the dynamic nature of these models. A "negligible" error in the first year populations' frequency distribution can produce much larger errors in the long term if it is not corrected before the dynamic simulation starts. A careful and patient validation of the base year population against "official" data should therefore come first in order to be sure that long term evaluation is based on a correct starting point. Adjustments are usually necessary and complex. Typically the way in which they work is via reweighing procedures that modify the relative share of observations in the base year. At this stage

also two important problems have to be taken into account, in particular when survey data are used: underreporting and missreporting. Again adjustment should be made through reweighting procedures that allow the population to gain representativeness (see for example Brandolini).

- Data: usually a large number of different data set are necessary to build these kind of models. Apart from the base year population, the most important are data that allow to analyze labour market position of individuals during lifetime, data for the estimation of their earnings lifetime profile, demographic data on fertility, mortality and net migration. It is normally impossible to gather such a wide amount of information from a single dataset. Therefore it is necessary to check the consistency of each dataset with the others. As already stressed the "usual" procedure consists in estimating from these data set dynamic behaviour from the past. These behaviour are then translated into the future taking into account of cohort effects.

- Tansitions: year (t) population is used to obtain year (t+1) population. Transitions in economic and demographic statuses are obtained through Monte Carlo rules imputing transitional probabilities from the above reported data set. The core of this dynamic procedure determines results of the model. In particular it is important to stress that, following this procedure, the model distance itself from a behavioral approach.

- Algorhitms: a central part of the model are procedures that allows researcher to describe how policies are implemented. We already stressed the fact that social security systems are complex. Accordingly algorhitms should as much as possible take into account of this complexity. However they also should be flexible enough to capture rules and weigh down computational procedures, that usually are already complex and time-consuming. This is not an easy to solve problem.

- Calibration: this step is particularly important in the population based models. Since they are not attached to macro data it is possible that the model endogenously produces incorrect or even "fuzzy" trajectories. In order to avoid such kind of results it is important to fix ex-ante the implicit aggregate dynamic of a (possibly) low number of variables.

- Validation: data produced by the model, i.e. the population in the future years estimated by the model have to be carefully validated. A useful quasi-natural experiment consists in checking the reliability of results of the models' results by comparing the populations' characteristic in year (t-n) with real data.

A population based dynamic microsimulation model: CAPP_DYN

Microsimulation models are a powerful tool in the analysis of the financial and (re)distributive effects of fiscal policies[70]. In particular dynamic population-based microsimulation models are the most suited instrument that can be used when policies deal with age-related expenditures such as pensions, health and LTC services. CAPP_DYN, a dynamic microsimulation model of the Italian economy, has been developed since 2004 and it is able to evaluate both the inter-generational and the intra-generational effects of reforms in the pension system and in the LTC services. The development of the model was funded initially (2003-2008) by the Italian Welfare Ministry and then (2009-2014) by the European Commission. The model has been used extensively in the evaluation of the distributive features of the Italian pension system in the medium and long term and also in academic environment. In this subsection I will present a very short description of the model. For an extensive description and discussion of the model itself see Mazzaferro and Morciano (2008), "A Dynamic Microsimulation Model for the Italian Social Security System", *CAPPaper n. 48* disposable at www.capp.unimore.it.

CAPP_DYN is a stochastic, dynamic microsimulation model which simulates the socio-demographic and economic evolution of a relative large and representative sample of the Italian population[71], over the period 2007-2050. The model takes a cross-section of the Italian population drawn from the 2007 wave of the Italian EU-SILC (IT-SILC) microdata and projects them forward through time to 2050. Each individual experiences the risk of incurring in a set of demographic and socio-economic events by means of finite and discrete Markovian processes and the use of Monte Carlo technique. Population path is modeled using the official demographic forecasts provided by ISTAT. Transition probabilities of the socio-economic circumstances depend on individual characteristics and are estimated using a wide set of data sources. Certain behavioural functions have been introduced, the main one being that governing retirement choices. The model is calibrated in order to follow official GDP and wage trends.

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[70] Zaidi and Rake (2001), "Dynamic Microsimulation Models: A Review and Some Lessons for SAGE", *SAGE Discussion Paper 2*, London School of Economics; Bourguignon and Spadaro (2006) "Microsimulation as a Tool for Evaluating Redistribution Policies", *Journal of Economic Inequality*, 4, 77 – 106.

[71] Currently, the base year population consists of about 270,000 sample members.

Once the population structure has been defined, and earnings have been generated, the model simulates the main social security benefits (old age, survival, invalidity pension benefits, social allowances and cash transfers for LTC) in considerable institutional detail. A module that estimates the number of disabled people has been embedded in the model, thus allowing the projection, over the whole period, of the number of impaired individuals and the related long term healthcare expenditure[72]. Finally, the model is able to assess the impact of differential mortality by individual's socio-economic status on lifetime resources distribution[73].

A description of the general structure of the model and its modules is reported in Figure 1 and Figure 2. CAPP_DYN is structured in five blocks. The base population block holds the procedures needed to generate the base year population (i.e. the representative sample of individuals of the first year of the simulation). Socioeconomic information for the sample units are drawn from the Italian component of the 2007 European survey Statistics on Income and Living Conditions (IT-SILC). IT-SILC collects annually a comprehensive set of socio-demographic and income information of respondents and it is considered the most suitable source of data for our purposes because of: i) its large sample size (52,772 individuals in 20,982 households were interviewed in the 2007-wave); ii) its longitudinal features; and iii) the integration of income information provided by interviewees with administrative records (ISTAT, 2009).

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[72] Baldini, Mazzaferro and Morciano (2008) "Assessing the implications of long term care policies in Italy: A microsimulation approach", *Politica Economica*, 1.

[73] Mazzaferro and Savegnago (2008) "Differential Mortality and Redistribution in the Italian Notional Defined Contribution System", CAPPaper n. 47.

Figure 1

The structure of CAPP_DYN

```
                        ┌─────────────┐
                        │    Start     │
                        └──────┬──────┘
                               ▼
                   ┌───────────────────────┐
                   │    BASE POPULATION    │
                   └───────────┬───────────┘
                               ▼
                   ┌───────────────────────┐
                   │    PAST HISTORY       │
                   └───────────┬───────────┘
                               ▼
                   ┌───────────────────────┐
                   │      SCENARIO         │
                   └───────────┬───────────┘
                               ▼
                   ┌───────────────────────┐
                   │       FUTURE          │◄──────┐
                   └───────────┬───────────┘       │
                               ▼                    │
       False            ◇─────────────────◇   True  │
         ◄──────────────  Simulation year  ─────────┘
         │                  <= 2050
         ▼
   ┌─────────────────┐
   │   AGGREGATION   │
   └────────┬────────┘
            ▼
      ┌──────────┐
      │   End    │
      └──────────┘
```
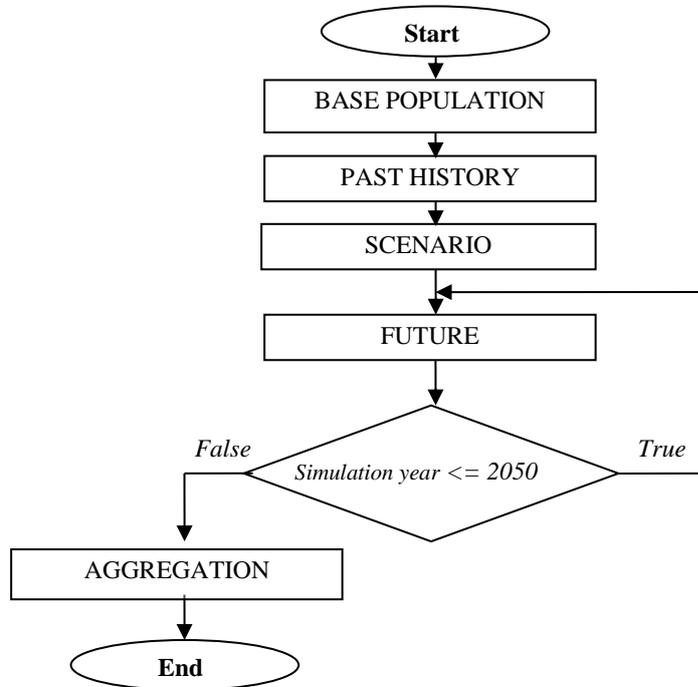
The CAPP DYN initial sample is drawn from cross-sectional data. In order to calculate future pension entitlements for those already in the labour market at the time were IT-SILC data were collected, we need to reconstruct the past working histories of those members with working experience, since his/her entry into the labour market. The back-casting of work histories is done in the working history block, using all the retrospective information collected in the IT-SILC.

CAPP DYN makes projections (and not forecasts) based on specific assumptions on the socio-demographic and economic trends expected for the future. In the scenario block user can define the exogenous parameters of the model. Specifically, this block allows the definition of the dynamic

paths of demographic (mortality, fertility and migration) and macroeconomic (GDP and earnings growth) under which projections are valid. The future block is the core of the model. It contains algorithms aiming at simulating yearly changes in the socio-economic characteristics of the micro-units. The set of events simulated can be grouped into four main modules, applied sequentially and recursively according the structure in Figure 2. At the end of each yearly process a cross-section is produced representing the population at a particular point in time. The set comprising T annual cross-sections is aggregated in the aggregation block, producing a synthetic panel containing the socio-economic information of interest for the entire sample population in the simulated period t=1...T.

Figure 2

The modules of CAPP_DYN
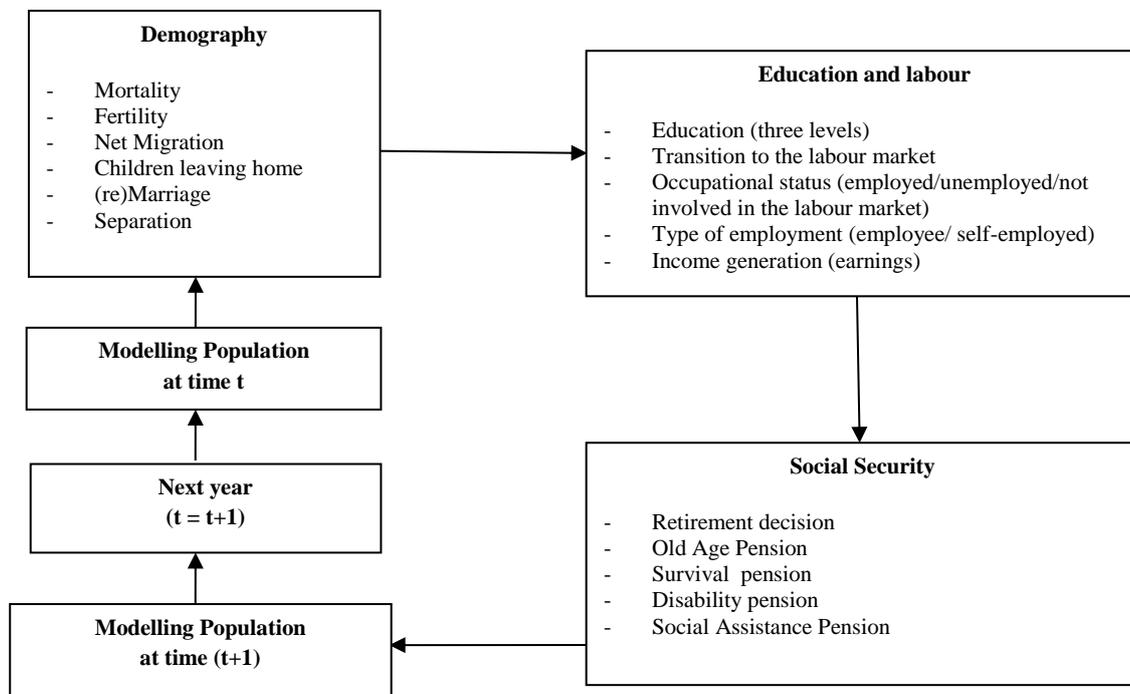
Economic and demographic transitions among states are simulated in discrete time (annual cycle) using event-specific Monte Carlo processes. Thus, to model a change in the socio-economic characteristic of a sample member from one year to the next we first fit to the data statistical models that capture all relevant aspects of the individual's transitions; then, we simulate change in the individual status by making random drawings from the estimated models. Transition probabilities

depend on a set of individual characteristics and are obtained from a range of available data source. Each annual cycle starts running a set of "demographic" modules (mortality, fertility, net migration) which, in line with the demographic projections of the National Statistics Institute (ISTAT), determines the size and structure of the population in each simulated year. Household formation/dissolution modules (parental house living decision, (re)marriage and divorce) allow the definition of the family structure in which each sample member is allocated[74]. The second set of modules allows the simulation of individuals' educational choices, job decisions and earnings. In each of the simulated year, individuals incur in the probability of changing occupational status (full-time, part-time, out of the labour market, unemployed). For employed people, gender and sector-specific earning equations are used to compute cross-sectional age-earning profiles, making some assumptions regarding the treatment of the unobservable individual effect and expected earnings growth rate over the simulated period.

A wide amount of statistical information is used to develop this part of the model. In particular death, and birth probabilities are derived from ISTAT (the National Statistica Institute) population projections, that use a Lee-Carter approach to estimate them. Labour force statistics for the period 1993-2009 are used to estimate a multinomial logit model that produces the transitions probabilities between occupational statuses. IT-SILC earnings data are used to produce lifetime earnings profile educational choices and ISTAT information on divorces and separation are used to enrich the demographic modules.

The third block of CAPP_DYN models Social Security and pension entitlements. Individual retirement choices and the computation of old age, seniority and survivors pension benefits, as well as of social allowances, social assistance increases (*maggiorazioni sociali*) and supplements *(integrazioni al minimo)* are simulated in this module.

The individual old-age pension depends on the following variables:

- the life-cycle profile of labour earnings;
- the total number of years he/she contributed contributed into his/her scheme;
- the contribution rate applied during the working life;

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[74] Health status and disabilities profiles are simulated using a procedure described elsewhere (Baldini, Mazzaferro and Morciano (2008) and Mazzaferro and Morciano (2008)). Health status is not a direct outcome of this paper but we recognize that indirectly affects other economic dimensions (i.e. labour market position, earnings and receipt of disability benefits).

- the - exogenous - macroeconomic growth experienced during the period of accruing pension rights;

- the pension scheme;

- the retirement age.

The first four variables are endogenously determined within the "demographic" and "education and labour market" modules. In particular, the individuals' life-cycle profile of gross earnings depends on how the set of socio-economic characteristics which acts as covariates in the earning regressions evolves over time and the exogenous assumption on the productivity over the whole working life (see appendix for details). The seniority at retirement depends on the total number of years individual accrued pension rights, assumed to be equal to the number of years the individual received a positive labour earnings. Due to the fact that individuals may transit to/from different employment/unemployment statuses during the working life, a share of sample members may incur in periods without contributions.

Retirement is simulated yearly following a two-stage procedure. In the first stage, all individuals fulfilling age and seniority conditions to claim a seniority pension are identified. For those eligible, the model checks the inter-temporal convenience of the retirement. In practice it compares two options: keep working another year or retiring immediately; if the net social security wealth is greater under the second option, the retirement choice is effectively simulated only if the replacement rate the individual would have in this option exceeds a certain threshold, set at 60%. Otherwise, the sample member will remains one more year at work[75].

Once the model has finished the run it can be used to produce both the intertemporal and the cross sectional indicators that have been described in subsection 2.

Some results of the model: how to use them in order to evaluate sustainability and adequacy of a social security system.

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[75] In practice, all those who retire with the DB formula respect this constraint. In the new NDC regime an individual will be "neutral" since the NDC insure quasi-actuarial equity between the present value of paid contributions and the present value of expected pension benefits (see later in the paragraph). It follows that all sample members cannot stay in a working condition after the age of 65.

In this subsection I will present a series of results of CAPP_DYN. The discussion will not be on the evaluation of the sustainability and of the adequacy of the Italian social security system, an objective that is outside the aims of these research project. Rather estimations will be presented and discussed in relation of the methodological considerations proposed in the first part of this paper.

In particular I will present some estimations of the model with respect to the evolution of the Italia population and its characteristics in the medium and long run. I will the move to indicators of sustainability, adequacy and neutrality, which have also been presented in subsection 2.

It is worthwhile noting that CAPP_DYN makes projections on the basis of specific assumptions about the evolution of a number of macroeconomic and demographic exogenous variables. Namely: i) the more recent demographic projections as for the mortality, fertility and net migration rates; ii) the government medium and long term GDP growth projections produced by the Ministry of Finance. Together with these hypotheses the socio-economic structure of the population grows taking into account cohort effects observed in the past, in particular as far as the labour market participation rate and educational choices are concerned. Real productivity growth is used as the residual variable that allows the model to produce consistent macroeconomic results: this means that, for a given real GDP growth and an endogenous employment dynamic, the rate of growth of labour productivity is yearly computed in such a way that the constraint $g = w + n$ is always respected, where g is the real growth of GDP, w is labour productivity and n is the growth in employment. We also take into account of all eligibility rules to retirement and moreover we allow individuals to retire when they fulfil eligibility conditions and have a financial incentive to retire from the labour market.

Figure 3 a) and b)
Demographic variables of the model in the simulation

a)   *b)*
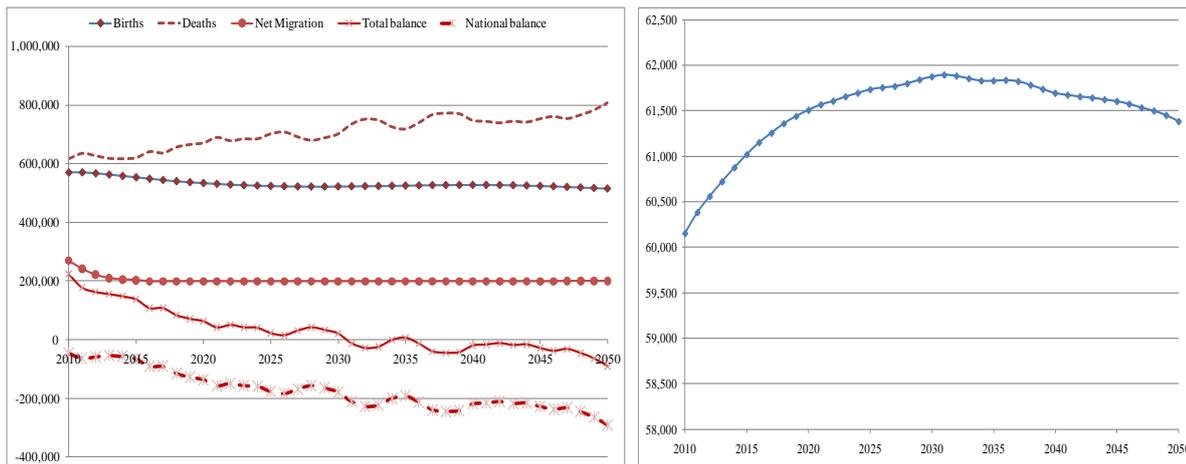
The first two graphs show how the model can produce reliable estimation of the demographic evolution of the population. The demographic modules are based on mortality, fertility and net migration hypotheses that are taken from the National Statistical Institute. These hypotheses are used to define death, birth and migration probabilities in the Monte Carlo routines. After an appropriate reweight of the observation the model reproduces quite accurately the dynamic of aggregate death, birth and net migration that can be found in official government documents (see http:\\demo.istat.it). Together with demographic modules an important aspect that makes results reliable is the fact that the base year population presents an age and sex distribution of the population statistically similar with that of ISTAT (on this point see Savegnago .:::::::).

The model produces a series of cross sectional population, from 2010 to 2050. Using also past information (1990) derived from ISTAT statistics, table 2 presents a series of traditional demographic indicators that are routinely used to evaluate the ageing process of a population.

Table 2

Demographic indicators in different years

Year	1990	2010	2030	2050
Average age total population	38.2	43.1	47.1	47.5
>=65 /Population	13.6%	21.0%	27.2%	30.3%
>=80 / >=65	23.1%	27.5%	34.1%	41.9%

<=15/>=65	119.0%	69.9%	52.0%	56.7%
Immigrants/whole population	0.6%	5.7%	11.8%	17.4%

As already stressed a crucial part of the model is the one that analyzes the labour market participation rate. In the Italian labour market two forces were at work in the past: a strong positive cohort effect among women that bring this part of the population to a sensible growth in the participation and a tightening trend in the eligibility conditions to retire, that started in the last decade and will increase further in the next decades. The following two graphs show how these two events can be represented. We propose separately for men and women, the age cross sectional profile of the labour market participation rate in different years of the simulation. Following this approach, and taking also into account what the same distribution was before the simulation starts (in 1990) graphs let the reader understand the relative strength of trends above described.

Figure 3 a) and b)

Labour market participation rate by age in different years of the simulation, among men a) and women b)

a)   *b)*
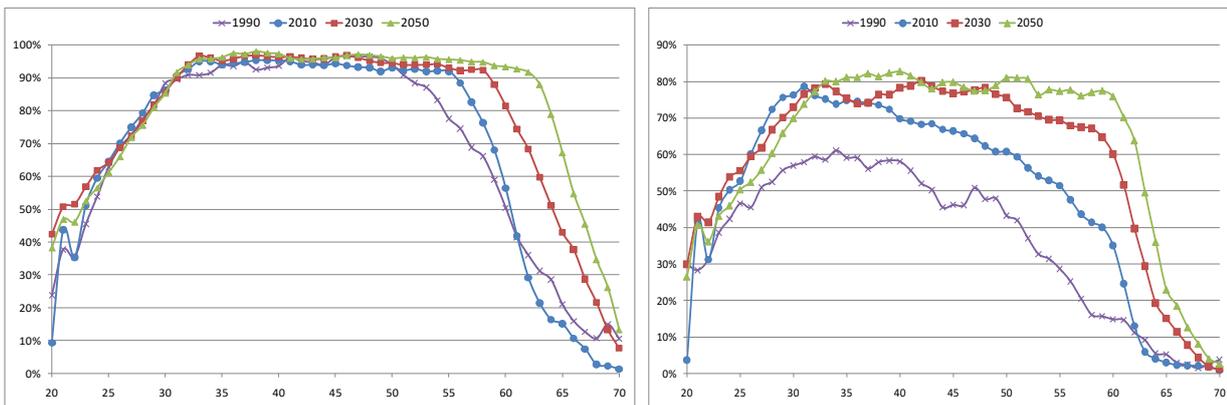

While men will maintain a high level of participation into the labour market in the central part of the age distribution, they will increase sensibly it after the age of 60 because of the tightening conditions imposed by the pension reform. For women a second important effect is the one that, estimated from the data and imposed in the labour market module, allows the model to estimate an impressive increase in the labour market participation rate also in the central part of the age distribution.

Again the model allows also other representation of what it produces in the labour market. For example the following graph shows the evolution of the share of workers according to their age class or according to their place of birth.

Figure 4 a) and b)

*Employed population by demographic characteristics. 2010 – 2050.*
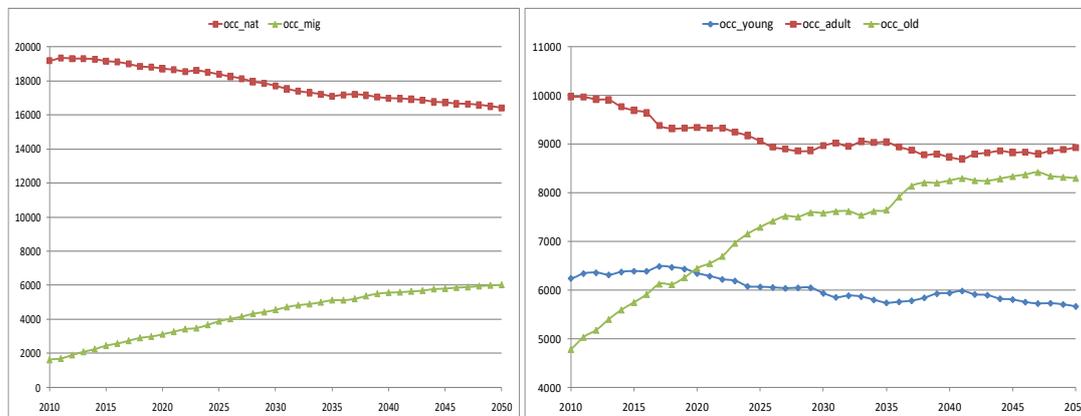
After having described demographic and labour markets results with some examples I will move to the estimation of social security variables. In what follows three kind of indicators are presented: i) sustainability; ii) adequacy; iii) redistributive. Most of them have been already presented in the first subsection, so I will not enter into detail as for their definition. The main advantage of calculating these indicators (especially the second and the third kind) with a microsimulation model resides in the fact that, around it average value, the model allows to estimate also the variability among the estimated population.

We take account of the majority of pension benefits paid by the Italian social security system: i) Old age pensions; ii) Survival pensions; iii) Disability benefits; iv) Social Assistance Pensions. We completely describe the transition from the Defined Benefit to the Notional Defined Contribution system. We compute lifetime earnings and contributions and conversion factors. As already mentioned above retirement decisions are based on eligibility criteria as well as on intertemporal and adequacy considerations.

CAPP_DYN estimates confirm AWG's results on the ability of the reform process of the Italian social security system to compress the dynamic of pension expenditure in the long run, although the rapid population ageing process expected for the coming decades.

Figure 5

Pension expenditure over wage mass. 2010-2050
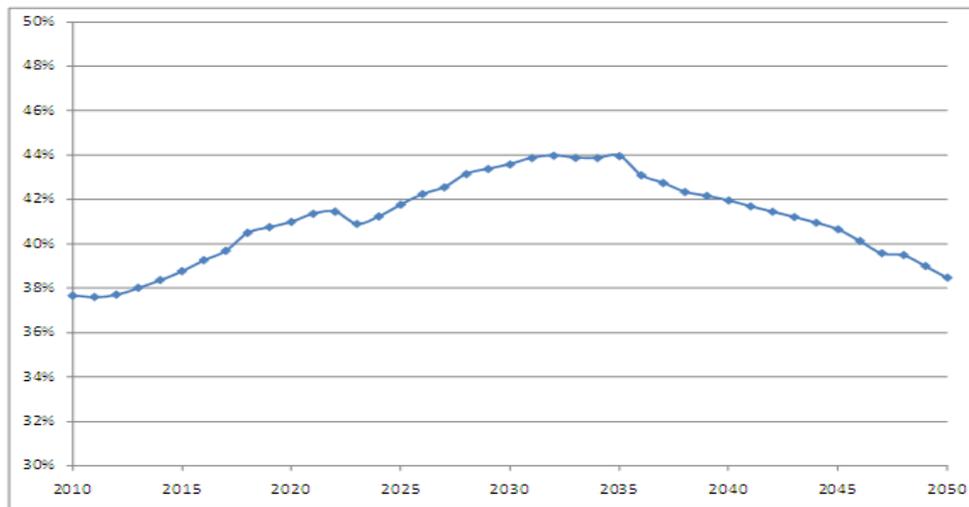
The first sustainability indicator presented is the ratio between (old age) pension expenditure and wage mass. This is quite similar to the ratio between pension expenditure and GDP if the long term constancy of the wage mass over GDP is assumed as a reasonable hypothesis. Accordingly, taking into account all the representativeness features of the model, figure 5 shows that also a microeconomic model can produce reliable macro projections. As a matter of fact the dynamic of the ratio is similar to those produced with macro models for the Italian pension systems (www.rgs.gov).

Other intertemporal indicators can be used to evaluate the sustainability and the intergenerational distributive effect of a social security system. A widely used index is the Net Present Value Ratio. Comparing the present value of pension benefits received with the present value of contributions paid, for a given discount rate, the distance of the estimated NPVR from the value of 1 measures if the system redistributes resources from future to current generations, a clear evidence of unsustainability and unfairness. The two figures below show the slow transitional path to intergenerational fairness of the Italian pension system and the degree of intergenerational redistribution already working in the system. It is also interesting to notice the presence of a measure of variability around the mean in the case of NPVR measured on different cohorts.

Figure 6

Net present value ratio by categories of workers and by cohorts
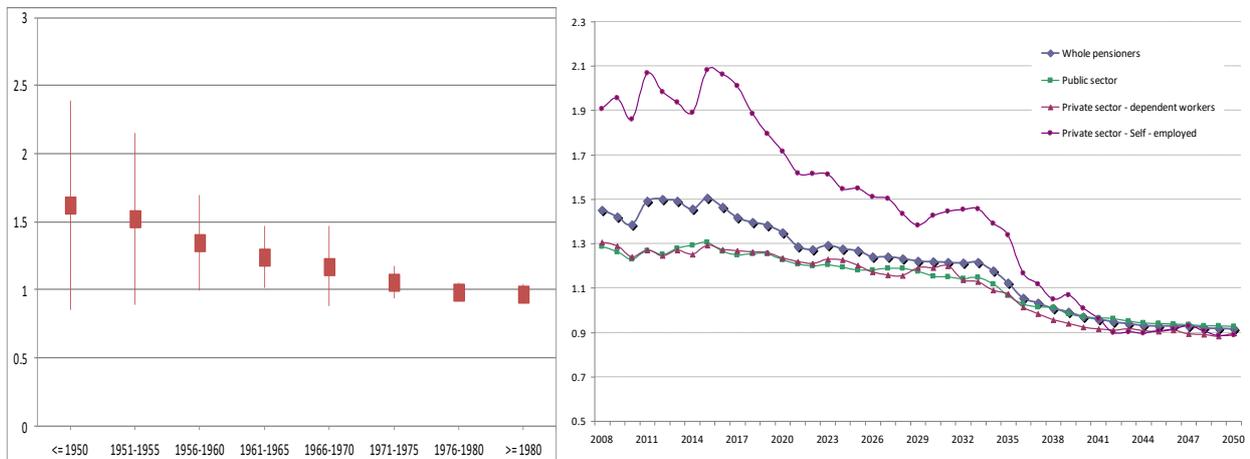
Moving now to the description of pension benefits table 3 and table 4 show a number of statistical information on pensioners and on pension benefits available from the panel estimated with the model in different years, from 1990 to 2050.

Table 3

Statistical information on pensioners distribution

Year	1990	2010	2030	2050
Share of NDC pensions	0.0%	5.4%	5.9%	59.4%
Share of men	54.0%	55.2%	50.9%	41.4%
Share of pensioners < 65 yrs old	37.6%	23.7%	10.2%	3.8%
Share of pensioners >= 80 yrs old	10.6%	16.9%	31.1%	40.3%
Average age of retirement of new pensioners	56.9	60.4	63.6	65.0
men	57.6	60.5	63.8	65.5
women	55.5	60.3	63.4	64.7
Average number of yearly contributions of n. p.		36.4	33.0	33.6
men	n.a.	37.2	36.5	39.1
women	n.a.	34.2	29.7	30.1

Table 4

Statistical information on old age pension benefits and earnings

| Year	Mean	CV	Mean / Median	p95 / p5	Gini index	% of procapita GDP
			Old age pensions			
2010	15,196	0.71	1.20	6.76	35.7%	68%
2030	20,120	0.76	1.18	12.36	37.4%	71%
2050	20,370	0.72	1.17	14.21	36.8%	60%
			Earnings			
2010	26,079	0.79	1.21	8.22	34.7%	116%
2030	32,575	0.73	1.18	6.91	32.3%	115%
2050	41,598	0.68	1.17	7.87	33.4%	123%

Figure 7 shows two distributive indicators: the ratio between the average pension benefit (in this case also assistance, survival and inability pensions are considered) and the average wage and the share of old age pension that are below a "minimum" level which in the represented case is the 60% of the median wage. Notice that all indicators are computed for every year of the simulation so that they can give evidence to the distributive trends that are working in the simulation itself.

Figure 7

Distributive trends: ratio between pension benefit and wages

a) *b)*
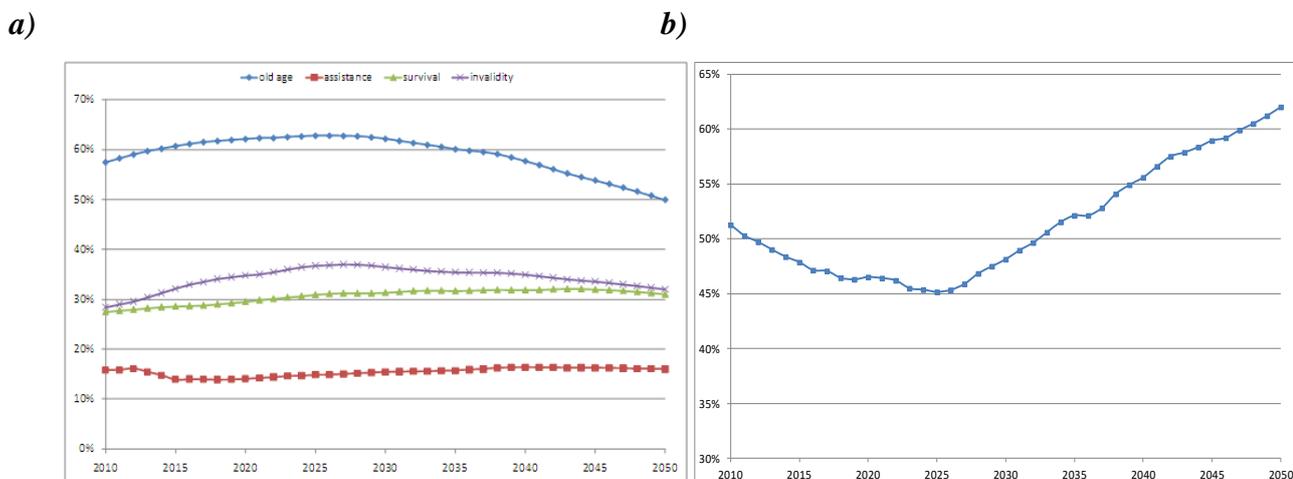
Finally the Figure 8 presents the most used adequacy indicator: the replacement ratio. In this case the model is able to compute, for the whole observed period, both the average value of the ratio for new pensioners and a measure of variability, an advantage that is possible only with a heterogeneous model.

Figure 8

The replacement ratio: average value and variability measures.

average computed among new pensioners by year with 95% CI