

2nd PBSS Colloquium
21-23 May 2007
Helsinki, Finland

Topic C. Actuarial Valuation Methods and Assumptions

Actuarial Valuation methods and Assumptions: Experience from Developing Countries

Alvaro Castro-Gutierrez

The paper is aimed at providing insights into past and current experience on actuarial approaches, mainly based on the work of social security actuaries involved with the design and follow-up of new and current pension schemes in selected developing countries. In particular, practical problems relating to lack of national specific demographic and economic data, mortality, disability and survivors' experience and the ways these aspects have been and are tackled by actuaries are illustrated in a number of specific cases.

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Implementing a pension plan along with the age increase of the plan participants

Maria Economou and Steven Haberman

In general, in order for the actuary to communicate the contribution amount to the employer, and/or the employees, it is normal to refer to a percentage applied to the salaries of the plan participants.

However, not all of the plan participants are in the same age groups; for some the future working life is expected to be short, while for others it is expected to be longer. As a consequence, a proportion of the pension benefit for the older members will be funded from the younger age groups. In this case there is an issue of fairness, in a funded plan, that needs to be addressed.

On the other hand, and according to the living standards of the individuals, some may wish to have the flexibility to buy either higher or lower portions of their benefits as they get older. This may be an option that may be worth examining. We have approached the above issue by introducing the pension accrual density function, $m(x)$, to the funding of defined benefit occupational pension schemes. We compare different approaches to the Normal Cost and Actuarial Liability from the viewpoint of the different accrual density functions. This leads to a discussion of which accrual density function should be chosen, and the criteria that should be used from choosing the most appropriate accrual function for the plan, taking into account the relationship between the level of the contribution rates and the age of the plan members.

Keywords: defined benefit pension plans; pension accrual density function; accrual function

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Legal funding rules on DB plans in Japan and in the US

Yosuke Fujisawa

In this paper, I look into the legal minimum funding standards of defined-benefit corporate pension plans (henceforth "DB plans") in Japanese Defined Benefit Corporate Pension Law and in the US. brand-new Pension Protection Act of 2006. I also compare these minimum funding standards for considering the desirable minimum funding standard in Japanese DB plans.

In Japan, the Defined Benefit Corporate Pension Law was enforced in April, 2002, and it is almost 5 years since then. In the rider of the Defined Benefit Corporate Pension Law, reviewing and provision in 5 years are stated. Recently we are considering them thoroughly.

In the US, "Pension Protection Act of 2006" was enforced in August, 2006. It was approved because of the financial crisis of the PBGC, and it includes the provisions for the purpose of strengthening the funding rules of DB plans.

The Defined Benefit Corporate Pension Law doesn't have the pension benefit guarantee system like the PBGC. In the supplementary resolution of the National Diet at the Defined Benefit Corporate Pension Law enactment, it is said that "From the aspect of the protection of the right of participants and beneficiaries, we must consider the installation of the pension benefit guarantee system which has a function as a safety net with avoiding the moral hazard." At the same time of the amendment of the law, we consider whether we introduce the pension benefit guarantee system or not. I think there is no probability that the pension benefit guarantee system will be introduced in Japan.

Under the circumstances of no pension benefit guarantee system, the legal funding rules are essential for the protection of the right of participants and beneficiaries and early full funding of pension assets. However, too strict legal funding rules lead to the impediment of the spread of the DB plans, therefore we cannot generalize that we should strengthen the legal funding rules. Actually in Japan, many tax qualified pension plans*, which plays an important role in the corporate pension plans, are terminating without transition the other pension plan. I am afraid of the issues of decreasing the number of corporate pension plans in Japan.

*With the enforcement of the Defined Benefit Corporate Pension Law, the tax qualified pension plan has been decided to abolish by 2012. The legal funding rules of tax qualified pension plan is loose compared with the ones of the Defined Benefit Corporate Pension Plan.

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Employee's participation (contributions) to the funding of pension benefits : how to best incorporate it in the actuarial valuation of pension obligations ?

Jean-François Gavanou

This paper intends to illustrate that allowance for future employee contributions if introduced in actuarial methods to be used to calculate the employer's periodic benefit (pension) cost and liability would achieve more consistency inside current accounting / actuarial pension frameworks and thus improve the reporting on benefit (pension) costs.

The fundamentals of pension actuarial and accounting standards are being thoroughly revisited on both side of Atlantic.

Keywords : Actuarial valuation methods, funding of pension plans.

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The consideration of the characteristics of the pension liabilities and measurement methods

Iizuka Hiroshi and Uemura Tomokazu

Nowadays, the pension plans recognize several different liabilities for one plan, because the pension liabilities are evaluated with several standards, one for the accounting purpose and others for the funding regulations. Therefore, the implication of understanding the funding status or the result of the plan amendment decision will change due to the selection of the liability to focus in.

In this paper, we will sort out the characteristics of the pension liabilities, and suggest the conditions of the measurement methods (mainly how to determine the discount rates) to meet those characteristics. We will start with the review of the pension liabilities based on the accounting standards and the pension funding regulations in Japan, which covers the historical introductory process of those measurement rules with the detailed analysis.

Through these considerations about Japanese post-retirement plan, we hope to provide some suggestions which are useful for the future discussions about accounting standards for pension and post-retirement benefits.

Keywords: Accounting standards (Japan), Pension liability, Measurement method, Discount rates

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Modelling and predicting individual salaries

Lasse Koskinen, J Salonen and T Nummi

This paper models wages by exploiting a unique Finnish dataset. For both genders the data is divided into four income quartiles. A panel data model is estimated with the three degree polynomials of age, the duration of employment, and GDP growth as explanatory variables. Individual variation within a wage quartile is shown to be large and an important risk factor. The model provides predictors also for individual wages. Note that common salary models permit analysis only of average levels. The estimation period is 1975-1985. Genuine out-of-sample predictions are made first assuming a normal growth in 1986-1990, then a deep recession in 1991-1994.

According to the models, the wage formation seems to be essentially different in different wage quartiles. GDP is statistically significant only for one wage group, but still the prediction accuracy is remarkably worse during the recession period when GDP drops. The prediction errors for the middle-wage quarters seem to be considerably smaller than for the low and high-wage groups. There is some indication that the middle quarters can be predicted quite accurately several years ahead. The results show that individual aspects and the wage group play a significant role in modeling and prediction. This is potentially useful information when designing and developing pension schemes.

Keywords: Macroeconomic Risk, Mixture Model, Planning Schemes, Projection Method, Salary Risk.

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Funding Standards and Protection of Benefit Rights

Ryo Matsubara

In advanced countries in corporate pensions, minimum funding standards are introduced to protect pension rights. It was 1997 when the minimum funding standard for Employee Pension Funds was introduced in Japan. In this paper, I compare the minimum funding standards in Japan with ones in US and UK, and discuss the effectiveness of the minimum funding standard of Japan in terms of protection of benefit rights.

I believe the basic principal for protection of benefit rights is that participants are always provided enough information about the funding situation of the plan to make the relevant judgement. I would like to propose more flexible funding standard than the current funding standards.

Keywords: Defined Benefit Plan, Lump-sum Benefit, Funding Standard, Protection of Benefit Rights

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Role of the Actuary in the process of unifying the social security pension schemes

Junichi Sakamoto

In Japan the discussion of unifying the social security pension schemes is going on. It has been a continued discussion since 1970's.

For historical reasons, there were 10 separate schemes in 1970's. Apart from the general schemes like the Employees' Pension Insurance (EPI) scheme covering the private employees and the old National Pension (o-NP) scheme covering the farmers and the self-employed people, there were 8 schemes for specific occupations like government employees, local government employees, seamen, National Railway Company employees, etc. The benefit levels and the contribution rates varied from scheme to scheme though, as the government declared in 1961, everyone had come to be compulsorily covered by one of these schemes depending upon his/her occupation by then.

There were two main driving forces that caused the discussion of unifying these schemes to be on the policy agenda. One was the disparity of benefits and contributions between the schemes. The other was the change in industrial structure that increased young active members for some industrial sectors while decreasing them for others. These forces gave rise to the discussion that the benefits and the contributions should be made equal for everyone by unifying the schemes.

It is often said that Japan is a society where people do not care if they are poor but do mind if they are unequal. This sort of sentiment has certainly supported the argument that the social security pension schemes should be equalized. This may be a sort of 'pension jealousy' discussion.

At the same time real problems became clear in 1970's. In those days the ageing of population was hardly felt, but some schemes encountered financial difficulties due to the real or prospective decrease of active members. They were the o-NP scheme, the Seamen's Insurance and the Mutual Aid Association for National Railway Company Employees. Later the Mutual Aid Association for Japan Tobacco Company Employees joined them. The main cause common to all of these financial difficulties was the decrease of the active members due to changes in industrial structure.

In the end the o-NP scheme extended its coverage to the whole nation in 1986 and started to provide the flat-rate basic pensions to them. Meanwhile the schemes for employees were changed into the schemes that should provide earnings-related benefits. When this was enacted, there were 8 schemes for employees as the Seamen's Insurance was merged with the EPI scheme by the same legislation.

In the wake of the framework reform in 1986, the government set about tackling the financial problem of the Mutual Aid Association for National Railway Company Employees. After several temporary measures were taken, it was finally merged with the EPI scheme in 1997. At the same time, the Mutual Aid Association for Japan Tobacco Company Employees was merged with the EPI scheme. It had already been in financial difficulty in late 1980's. Furthermore the Mutual Aid Association for Nippon Telegraph and Telecommunication Employees was merged with the EPI scheme by the same legislation. It was not in financial difficulty but was one of the three government-owned companies that

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had been privatized in late 1980's, the rest being National Railway Company and Japan Tobacco Company. The idea was that the employees of privatized companies should be covered by the EPI scheme.

In addition to these, the Mutual Aid Association for Agricultural, Fishery and Forestry Cooperative Employees encountered financial difficulty due to restructuring of the cooperatives and was merged with the EPI scheme in 2002. As a result of these mergers 4 schemes for employees are remaining. They are the EPI scheme and three Mutual Aid Associations for Government Employees, Local Government Employees and Private School Employees. The government parties are now discussing their unification.

In the process of these mergers and unifying discussions, actuaries working for the government have deeply been involved in the task. The roles they have played can be classified into two categories. One is the role as actuarial supervisor of the social security pension schemes. The other is the role as actuarial adviser for constructing the financial framework of mergers.

In 1980 the Actuarial Subcommittee of the Social Security Council¹ was set up and given the function to survey the actuarial valuation methods and assumptions the social security pension schemes adopted for their financing programmes and evaluate them. This supervisory role has continued up to now.

The actuarial advice for constructing financial framework of mergers has been provided mainly by the Actuarial Affairs Division of the Pension Bureau, Ministry of Health, Labour and Welfare.

In this paper the author would like to describe the two roles of the actuary in the process of unifying the social security pension schemes, going into the technical details of the financial framework of the mergers. At the same time he would like to extend the experiences to the future perspective and draw some lessons for the future actuarial work.

Keywords: Unification of social security pension schemes, role of the actuary, the Actuarial Subcommittee of the Social Security Council, the Actuarial Affairs Division of Pension Bureau, financial framework of mergers, pension jealousy, equity, change in industrial structure, broader financial basis