

Division of Roles between Private and Public Retirement Insurance Plan for an Aging Global Society

Abstract

This research aims to develop a framework for optimally coordinating between public and private retirement insurance plans for an aging global society. The combining effect of increasing life expectancy and decreasing fertility rates causes population aging in not only developed markets but also many of growing economies. This results in an increasing expectation for private insurance to contribute to the retirement insurance system collaborating with public sector. The literature, however, has not fully investigated how the public and private sectors cooperate for a viable retirement plan. This research relies on the insurance market equilibrium model and extends it to the pension insurance sector. The results are expected to demonstrate how policymakers should design a private-public collaboration for a retirement plan to minimize the adverse effects from macro-economic factors and demographic transformations.

Keywords: Retirement Insurance, Population Aging, Private-Public Collaboration

1. Purpose and Contribution of the Study

The global society is today witnessing a rapid demographic transformation. This results from the combination of rising longevity and falling fertility rates. Increasing longevity and decreasing fertility rates are both associated with economic growth and urbanization in developed and growing markets. Economic development, in general, increase personal incomes resulting in that people have access to better healthcare and live in hygienic conditions. Urbanization can discourage people from having many children, because they spend retirement period without children's attendant.¹

The combining effect of increasing life expectancy and decreasing fertility rates causes population aging. In 20th century governments of developed countries decided to expand public pension in order to minimize the problem of societal risk, i.e. problems of economic insecurity and social unrest occasioned by expanding unemployment and poverty. Public pension system was designed to be funded on pay-as-you-go basis. Pay-as-you-go system appeared to be affordable, as it did not need pre-funding for those who had already retired and were eligible for pension benefits and the number of contributing workers was relatively larger than that of retired beneficiaries. The situation has, however,

¹ Skipper and Kwon (2007), pp.154-156.

totally changed and the original expectations are proved to be illusory. Population aging negatively effects the funding of public pension plans because the actual ration of contributing workers to retired beneficiaries is lower and is expected to drop further. The percentage of the global population aged 60 years or increased from 8.6 percent in 1980 to 12 percent in 2050. Out of 233 markets, 190 experienced increases in the population of older persons between 1980 and 2014. 99 percent of countries worldwide are expected to see an increase in the proportion aged 60 or over between 2014 and 2050.² Population aging is most advanced in the developed, industrialized markets but it will also start soon and proceed rapidly in emerging market in Asia, Latin America, etc. In many those markets, the share of the working-age population is just now reaching a peak. In the coming decades, these countries will experience the population aging that high-income countries are already confronting.³

Considering this undesirable effect of demographic transformation, it will not a rational decision to rely solely on public pension plans for many markets. Policy makers may have to consider reducing the public pension benefits and actively introducing private retirement insurance plans to complement the gap. Some have suggested that insurers, in cooperation with governments, have a role in creating a resilient system to fund emerging perils, including those from the undesirable effects of population aging. The suggestions of these authors are similar to actions insurers are urged to take in compliance with the Principles for Sustainable Insurance (PSI).⁴ The PSI were launched at the 2012 United Nations Conference on Sustainable Development. They include suggestion on how insurers can contribute to the resiliency of global society in the face of population aging. Even so, the insurance industry by itself cannot finance all retirement risk. There are issues of capacity, of highly correlated losses caused on inflation and other macro-economic factors, and of parameter uncertainty attributable to the rapid progression of healthcare technology.

Is there any rationality in collaboration between private insurers and the public entities to efficiently finance retirement risk? Indeed we are now observing an increasing number of collaborations between insurers and governments in retirement plans in some markets. We do not observe, however, any literature on how such private-public collaborations ought to look like. This research addresses the absence of a framework for linking government and insurance industry efforts (including the PSI) to finance retirement risk. This research will present perspectives of a cooperative framework for the designer of a pension plans in the aging global society.

2. Literature Motivating the Study

² UN Department of Economic and Social Affairs (2014), pp.1-4.

³ Lee and Mason (2011), pp.8-9.

⁴ UNEP Finance Initiative (2012), pp.3-9.

(1) Private Insurance for a Sustainable Society

A number of previous studies have discussed in theory how insurance facilitates the development and stability of a society, and have also empirically showed the causal relationship between insurance activities and economy. Much of the literature elaborates on the two ways that insurance activities facilitate social sustainability. The first way is through the primary operation of insurance—the insurance industry is capable of generating significant productive impact in the global society by providing risk transfer and indemnification schemes as Skipper (1997) discusses.⁵ Skipper and Kwon (2007) also point out the second way is thought insurers operating in the economy as key institutional investors in capital market worldwide, and supply for investment the funds they generate between the time they collect premiums and the time they need to pay losses on those premiums.⁶ Ward and Zurbruegg (2000) and Curack et al. (2009) discuss more specifically by pointing out that the financial intermediation of private insurance improving resource accumulation and allocation, as well as enhancing innovation.⁷

Comparing these two contributions, the transfer of risk is the important function in private insurance activities to finance retirement risk. Major contribution of the risk transfer and indemnification function of insurance is promoting financial stability of economic units. This results in derivative effects of sustaining consumption and increasing capital productivity. Promoting financial stability of business entities can enhance innovation, and loss mitigation. Curack et al. (2009) focuses on social security system and elaborate that the maintaining availability of private insurance complements the social security system.⁸ Positive effect on the social and economic sustainability could be realized by relieving the burden of social welfare system and allocating of resources more efficiently. It is not only the case for growing economies but also for developed markets facing the new demographic situation of increasing life expectancy and decreasing birth rate. Private insurers could give their contribution in solving this social security problem, as they provide protection from financial consequence of illness and injury, unemployment and retirement (Curack et al., 2009). Availability of insurance coverage for individuals can substitute for government security programs and alleviate the burden of taxpayers.

The idea of the insurance contribution to the sustainability in the literature is consistent with the core of PSI. Recognizing the impact of population aging the global society faces, PSI highlights the insurance contribution to retirement risk, developing innovative solutions, improving business performance, and facilitating social and

⁵ Skipper (1997), pp.2-7 provides an overview of the various means by which insurers may contribute to the economy, including allowing risks to be managed more efficiently, encouraging loss mitigation.

⁶ Skipper and Kwon (2007), p.505.

⁷ Ward and Zurbruegg (2000), pp.489-506, Curack et al. (2009), pp.29-41.

⁸ Curack et al. (2009), p.32.

economic sustainability. PSI call on insurers to embed in their decision-making environmental, social and governance issues relevant to their business (Principle 1), to work with clients and business partners to raise awareness of these issues (Principle 2), to work together with government, regulators and other key stakeholders to promote action across these issues (Principle 3), as well as to demonstrate accountability and transparency in disclosing publicly their progress in implementing PSI (Principle 4).

(2) Private and Public Partnership for a Sustainable Society

Some theoretical works have discussed the economic rationale of private-public insurance collaboration. Santerre and Neun (2007) focus on the health insurance as a part of social security system and analyze economic rationale of the combination of compulsory public insurance and voluntary personal insurance.⁹ They discuss that the government would produce insurance coverage only to the extent that consumers cannot resolve the information problem efficiently, but simultaneously point that, when the costs to operate public insurance is too high, an alternative scheme including for-profit private insurance may substitute it.

As one of the important works that attempt to theoretically analyze the double-layered structure of insurance, Zweifel (2000) reviews the reasons for the existence and growth of social insurance and discusses efficiency reasons for a division of labor between private and social insurance.¹⁰ He extends the Separating Nash Equilibrium Model of Rothschild and Stiglitz (1976)¹¹ and demonstrates that the partial mandatory insurance can alleviate adverse selection problems and enhance a Pareto improvement for both low- and high-risk individuals. In addition, he illustrates that private insurers' inability to precisely estimate the probability of loss of individual exposure may constitute an efficiency reason for mandatory insurance with partial coverage.

Suzawa (2011) investigates the roles of private insurance in the healthcare insurance market by expanding the discussions by Crocker and Snow (1986) and Zweifel (2000) and develops an analytic model on the division of labor between social and private healthcare insurance. According to the results of the analysis, the double-layered insurance system is cost-effective in minimizing adverse selection and preserving insurance availability only when the compulsory public insurance is provided at the contact point between the fair-price line of the pooled premium and the indifference curve of low-risk individuals, and simultaneously the voluntary private insurance is offered in the exceeding area of compulsory insurance on the risk-differentiated base.

Suzawa and Scordis (2013) investigate whether the public-private insurance partnership can contribute to the sustainability of the global society focusing on social

⁹ Santerre and Neun (2007), pp.229-292.

¹⁰ Zweifel (2000), pp.933-966.

¹¹ Rothschild and Stiglitz (1976), pp.629-649.

security, natural disaster and liability insurance programs.¹² The analysis reveals that the double-layered insurance scheme consisting of public and private insurances can be cost-effective in minimizing moral hazard and adverse selection in the social security system. They also find common features identified in natural disaster insurance such as coverage limitations, government-sponsored reinsurance and strict rate regulation are expected to preserve the insurance availability while they may exacerbate moral hazard including excessive property development in disaster prone areas. Strict liability or presumption of negligence in product liability and automobile liability insurance programs can facilitate the social safety while mandatory insuring and rate regulation possibly deteriorate moral hazard and adverse selection.

Yet, there is not many existing works, specific to public-private partnership in the retirement insurance plan, which analyses an optimal division of functions between a government and the industry.

3. Risk Factor of Retirement Insurance Plan

(1) Risk Factors of Healthcare Insurance Market

The previous section discusses how insurance contributes to the sustainability of the global economy through its risk transfer and investment functions. The discussions, however, ignore the costs of providing insurance. In the private, voluntary market, risks are not always covered by insurance. As Harrington and Niehaus (2003) point out, insurability of risk is limited by such factors as premium loadings influenced by administrative costs and capital costs of insurers, as well as incentive problems.¹³

There are some precedent works investigating the risk factors that generate additional transaction costs in the healthcare insurance, adjunct to the retirement plan and another major sector of social security. The insurability of healthcare risk is significantly limited by incentive problems known as moral hazard and adverse selection that are caused by information asymmetry among parties involved in an insurance transaction. Moral hazard arises because insurance changes a policyholder/insured's incentive to take precautions. Policyholders, assuming that they are economic-rational, tend to weaken their incentive to reduce expected losses when they are protected against possible losses by insurance coverage. Adverse selection arises when a potential policyholder is better informed about expected claims costs than an insurer. In the case where the pooled, subsidized premiums are applied to all exposures regardless of their risk characteristics, policyholders with high-risk exposures are willing to purchase insurance coverage while those with lower-risk tend to restrain from doing so because the premium is too high compared with their risk level.

¹² Suzawa and Scordis (2013), pp.55-70.

¹³ Harrington and Niehaus (2003), pp.179-187.

The private healthcare insurance market responds to moral hazard by building contractual provisions that limit coverage such as deductibles, coinsurance and policy limits instead of providing full coverage. Providing limited coverage can impair the insurance availability, which results in the undermining of the social sustainability. Risk classification, the calculation of separate premium rates based on expected claim costs, partly reduces adverse selection although it is not costless in practice, and it is too costly to classify exposures perfectly as Harrington and Doepinghaus (1993) discuss.¹⁴ The public sector, on the other hands, responds to those problems by mandating individuals to participate in the public healthcare insurance program but additional costs of screening uninsureds and forcing them to be insured are needed. Recognizing that both private and public healthcare insurance sectors cannot completely eliminate incentive problems in a costless manner, the rationality may exist in the private-public partnership in the healthcare insurance program.

(2) Risk Factors of Pension Insurance Market

Information asymmetry also exists in the pension insurance market with respect to the solvency of an insurer, price and coverage of the pension products, etc. The sustainability of a retirement plan is more significantly influenced by external factors such as macro-economic factors and demographic transformation.

Inflation. One of the important macro-economic factors is inflation. The retirement plan faces a substantial long-term deficit in times of high inflation, because the expenditure for payments to retired beneficiary may exceed the fund accumulated through their contributions. The public sector in many jurisdictions responds to the unfavorable macro-economic change by designing the public pension plan based on a pay-as-you-go approach. Under the pay-as-go system, benefits for current recipients are paid from the contributions made by the currently working population. The pay-as-you-go system of financing retirement benefits is politically easy to implement as it places the least burden on the initial generation of workers and almost all OECD countries have pay-as-you-go retirement income security plans.¹⁵ Meanwhile, the private pension market attempts to minimize the inflation problem by increasing the percentage of investment assets that are highly correlated with the price index but an insurer has to limit such investment to ensure the safety and to fulfill the future obligations.

Population Aging. A pension plan is susceptible to the demographic transformation. Many of developed and developing markets are experiencing population aging which results from the combination of rising longevity and falling fertility rates as discussed earlier. Increasing longevity increases the relative number of elderly, retired beneficiaries, which also increases the burden of current workers. Decreasing fertility rate decreases the

¹⁴ Harrington and Doepinghaus (1993), pp.59-84.

¹⁵ Skipper and Kwon (2007), p.204.

population of younger generation, which will decrease the number of future workers and thus contributions to a retirement plan. Most private pension plans are operated under the fully-funded approach to minimize the unfavorable effect of demographic change. An insurer funds individual retirement benefits through contributions made over the insureds. In the fully-funded pension system, the necessary funds are secured presently to pay for the accrued benefits for current participants. The public sector in many developed countries, on the other hand, traditionally have cut the benefits of retirement plan, raised contributions or taxes, and issued government bond to borrow from the public. These traditional strategy alone likely will not resolve the unfavorable effect of population aging that is expected to continue, because cutting benefits exposes elderly to poverty risk, tax rates are already high in most jurisdiction, and government deficits have already reached to the maximum in many countries.

Recognizing that either of the private or public pension system alone cannot efficiently respond to both of the inflation and population aging, a private-public retirement plan can be a possible solution. In many countries, there actually are multiple sources of retirement plan combined with government pension system as a part of social security, employer-sponsored pension or profit-sharing plan to supplement the benefits paid by the social security, and personal pension insurance provided by private insurers. However, despite the fact that multi-layered retirement plan are actually conducted worldwide, the literature has not fully developed a framework of optimal divisions of roles between private and public sectors in a retirement plan.

4. Analytical Methodology

(1) Equilibrium Model for Insurance

In order to construct an analytical model for the division of roles between private and public insurance, this study expands the discussion by Doherty (2000) as illustrated in Figure 1.¹⁶ The axes in the (W_1, W_2) -space show the wealth of an individual under two circumstances: one with a loss incurred and the other with no loss. For simplification, it is assumed that an equal number of only two risk types, low- and high-risk individuals, exist and have the same endowment level at Point A, where both types of risks are uninsured. Line F traces out equal values on both axes, indicating a state of full insurance coverage (i.e., $W_1 = W_2$). In a public insurance market where contributions from participants are based on pooled premiums, a risk-neutral insurer charges the pooled fair contributions from all participants along Line P: $p/(1 - p)$, where p denotes the average probability of payments to beneficiaries. In a private insurance market where the separated premiums are charged based on the coverage and risk level, an insurer can exchange wealth from the loss-free state: W_1 to the loss state: W_2 along Line PL: $pL/(1 -$

¹⁶ Doherty (2000), pp.76-86.

p_L) for low-premium policyholders and Line P_H : $p_H/(1 - p_H)$ for high-premium ones. p_L and p_H denote the probability of benefit payments for low- and high-premium individual, respectively, and are characterized by $p_L < p_H$. Line P_L is thus steeper than Line P_H .

Meanwhile, the slope of the indifference curve for low-premium participants is given by the ratio of probability-weighted marginal utilities as follows:

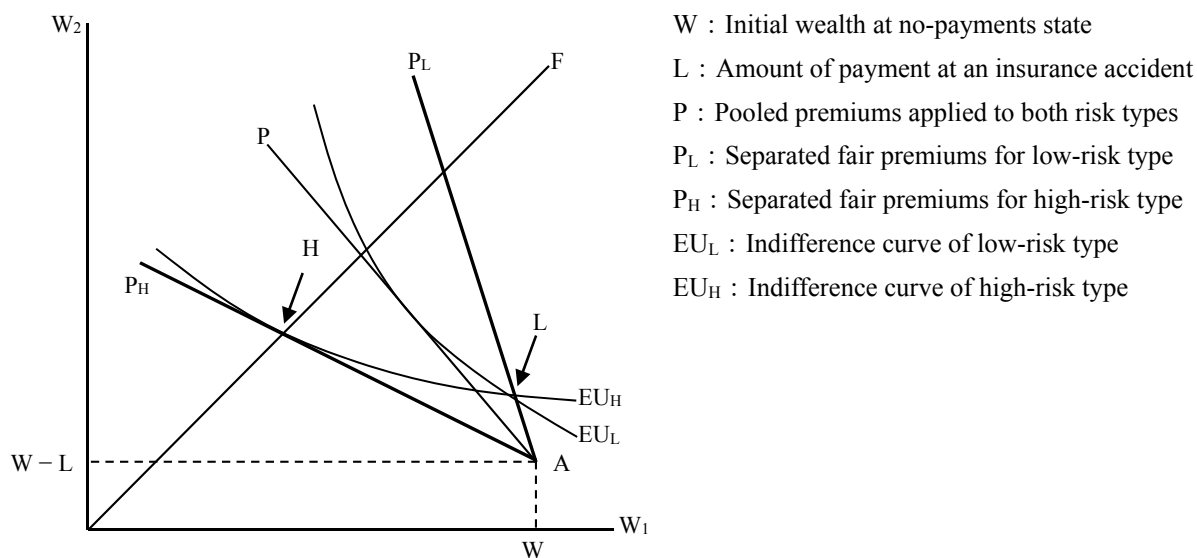
$$EU_L: \partial W_1 / \partial W_2 = - (p_L \partial U / \partial W_1) / [(1 - p_L) \partial U / \partial W_2]$$

Similarly, the indifference curve for high-premium participants is illustrated by the following equation:

$$EU_H: \partial W_1 / \partial W_2 = - (p_H \partial U / \partial W_1) / [(1 - p_H) \partial U / \partial W_2]$$

Since $W_1 = W_2$ on the security line implying $\partial U / \partial W_1 = \partial U / \partial W_2$, this slope becomes $p_H / (1 - p_H)$. The equality of the slopes indicates that the optimum must lie on the security line, such as Point H for high risks and Point L for low risks. If recognized as such, the high risks are, therefore, offered a contract at rather unfavorable terms that still induces them to purchase full coverage.

Figure 1. Equilibrium under Separated Premiums



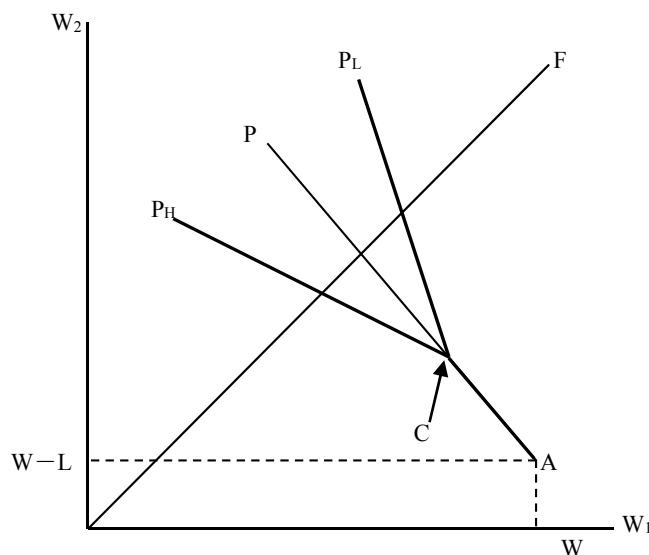
The insurer may actually determine Point H in a trial and error process, offering a high-premium contract and observing some individuals buying full coverage nevertheless. Again, by trial and error, the insurer may determine Point L, where another low-premium group purchases a policy featuring only partial coverage, but at a favorable premium. At the same time, the high risks will not give up their full coverage at Point H in favor of another insurance policy at Point L, where their indifference curve EU_H passes, showing

constant expected utility. Therefore, under certain conditions, the contract pair (H, L) may constitute a separating equilibrium.

(2) Analytical Model of Division Roles between Private and Public Insurance

In the analysis on the joint government-industry insurance, as referred previously, Zweifel (2000) demonstrates that the combination of partial mandatory insurance and exceeding voluntary insurance can alleviate incentive problems and enhance a Pareto improvement based on Equilibrium Model.¹⁷ Zweifel (2000) illustrates a model to elaborate the efficiency reasons for a private-public division of function as Figure 2. The government provides a partial coverage at a pooled premiums at Point C. If the amount of payment exceeds over the limitations of public insurance coverage, a private insurer offers coverage with separated premiums along Line P_L for low-premium policyholders and Line P_H for high-premium ones. The scope of the analysis by Zweifel (2000) mainly covers the healthcare insurance sector where incentive problems caused by information asymmetry are important risk factors, and the model is designed to efficiently minimize those problem. In the retirement pension sector, however, macro-economic change and demographic transformation are more important risk factors rather than information asymmetry. This study thus follows the approach of Zweifel (2000), but modifies the model to apply to the old age, retirement insurance sector.

Figure 2 Partial Public Insurance with Excess Private Coverage



5. Expected Contributions of the Study

This study attempts to construct a theoretical framework for the division of roles

¹⁷ Zweifel (2000), pp.933-966.

between private and public sector in the retirement pension insurance sector to minimize the negative influences made by external factors including increasing inflation rates and population aging. The results of our analyses are expected to provide policymakers and the insurance industry with beneficial implications to answer a number of questions:

- (1) How does a government-private partnership preserve the insurability of retirement risk that are limited by macro-economic factors and demographic transformations?
- (2) What is the optimal domain of public security and private insurance that efficiently ensures the risk transfer function of insurance scheme and contributes to the sustainable society?
- (3) What are the appropriate contribution base, i.e. pay-as-you-go, fully-funded premiums, or public taxation to fund the public and private pension plans for a long-term persisting?
- (4) What should be the regulatory structure over the management, investment and rate-making of public and private insurers?
- (5) Does the degree of development and maturity of individual markets influence on the effectiveness of the government-private partnership structure of pension plans?

By answering these questions, this study attempts to demonstrate an efficient model for an interplay between a government and the insurance industry that will contribute to the sustainability of the society facing the population aging, inflation, and other external factors.

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