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Abstract

In the next fifty years, according to the United Nations Population Prospect (2004), an ageing population is expected in Vietnam. The operation of a pay-as-you-go defined benefit pension scheme will inevitably elevate pension liabilities. These liabilities, in turn, threaten the financial sustainability of the scheme, and affect generational relations.

This paper estimates the size of pension liabilities of the current pension scheme in Vietnam, and analyzes generational relations under various economic scenarios. Pension liabilities are considered by a closed-group approach. The estimated results show that pension liabilities account for a small part of 2002 GDP, and this is partially explained by two primary factors: (i) the method of estimation currently employed by the scheme, and (ii) the fact that currently the scheme covers only a small portion of the total population and labour force. It is, however, obvious that the government will have to pay existing pension liabilities, which will affect generational relations in the longer term, particularly from an economic point of view. Whether the impacts on generational relations will be serious or not depends upon payment settings and reforms of the scheme.

Key words: ageing, inter (intra)generational relations, pension liabilities/debts, Vietnam

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"The extent of intergenerational transfers is related to the financial systems in use. The PAYG system is the one that leads to the majority of such transfers"

Plamondon et al. (2002), p.33

1. Introduction

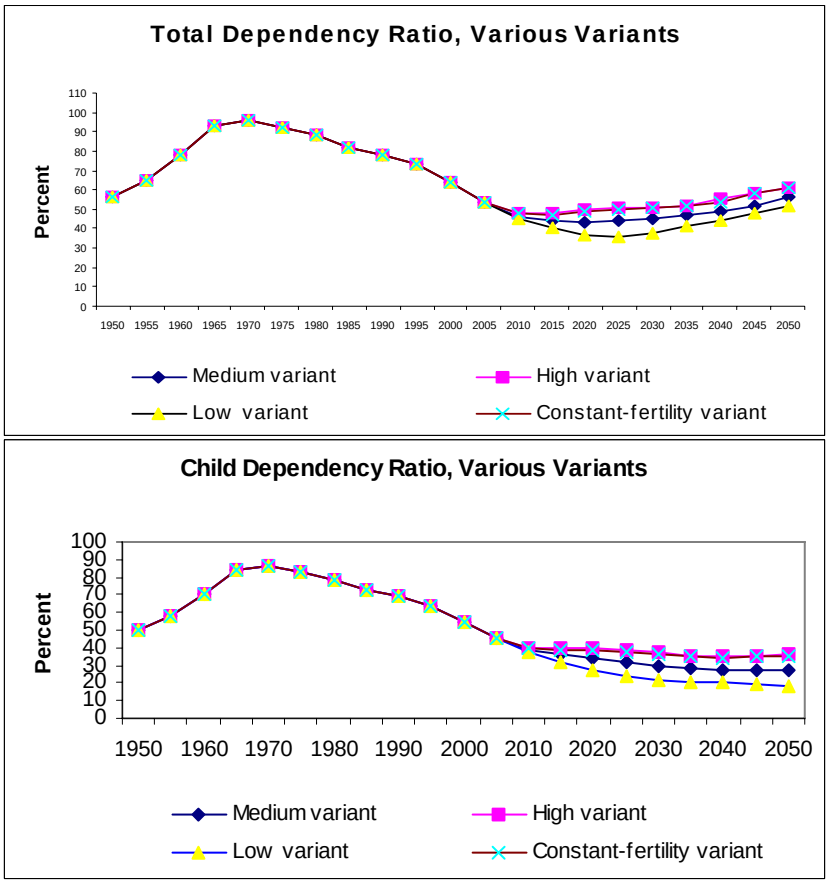
Populations are now ageing rapidly not only in the developed countries, but in the highly-performing developing ones. This demographic trend is placing high pressures on social security schemes, since their financial sustainability depends heavily on the labour of future generations. There has also been a widespread recognition that the financial viability of the most common public pension scheme, i.e. pay-as-you-go defined benefit (PAYG DB), will deteriorate in an aging society since it is unfunded. Further, it is also well known that PAYG DB schemes also lead both to intergenerational and intra-generational inequity with different economic levels (see, for example, World Bank 1994, Kunieda 2002). Thus, governments in countries with such pension schemes are seeking ways to reform their social security systems.

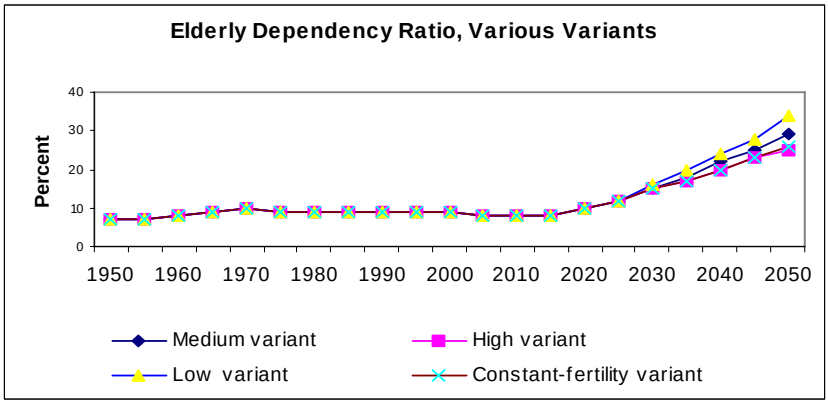
Among the various factors that need to be considered, the size of pension liabilities is the most important indicator, both of financial and generation-related deficiency. On the one hand, these liabilities are measured by the present values of pension rights to different generations in the pension scheme, but they are not recorded in the national balance sheet or elsewhere, where they are accumulating implicit liabilities for the government. Reforms, which would alter the current system from an unfunded to a funded scheme, will make these debts explicit. This, in turn, will impact negatively on inter-temporal budget balances, particularly in the context of the increasingly competitive economic environment of rapid globalization. On the other hand, financial problems become more severe when a PAYG DB scheme is operating in a dynamically efficient economy because contributors have to pay more heavily to cover

increasing costs of the scheme. "Generational battles" then become unavoidable.

Although Vietnam is still a young economy with about 9 percent of its total population aged 60 and over, and a median age of 24.9 (UN, 2004), it will face the same problems of ageing as other countries in the future. Recent demographic changes show that life expectancy at birth increased from 64.8 in 1990 to 70.3 in 2004, and fertility rates declined substantially from 3.4 children per woman in 1990 to 1.9 in 2004. UN population projections (2004) indicate that these trends will be changing dramatically in the next fifty years. For instance, the elderly population will increase significantly, reaching 25.5 percent in 2050, while the child population will increase at a slower pace. The demographic dependency ratio will be driven mostly by the elderly dependency ratio (Figure 1).

Figure 1. Dependency Ratios for Vietnamese Population, 1950-2050





Source: Author compiled from UN Population Prospects (2004)

Furthermore, the current publicly-managed PAYG DB scheme in Vietnam is inherently fragile in terms of its financial stability, due to limited coverage: low contributions are associated with relatively high replacement rates, and with increasing rates of maturation. Several reports foresee the deterioration of the scheme if no policy measures are taken (ILO 1998, Holzmann, Arthur, and Sinn 2000, and Giang 2004b). The crisis is imminent, so that policy options sustaining the scheme need to be addressed urgently.

This paper proposes to measure the size of liabilities facing Vietnam's pension scheme, and to evaluate the economic implications of this measure for generational relations. Section 2 reviews literatures on pension reform in both developed and developing countries. An analytical framework, an appropriate dataset, and projection assumptions, are presented in Section 3. Estimated results using status-quo projections, and inclusive of sensitivity tests and policy implications, are presented in Section 4. Concluding remarks are given in Section 5.

2. An Overview of Literature

Even though the idea of pension liabilities is straightforward, the subject is often still confusing to researchers since there are numerous definitions and measures of pension liabilities for the several types of pension scheme, and

these are used for various evaluation purposes[1]. In the context of PAYG pension schemes, studies have focused on three popular types: (i) the accrued-to-date approach, which describes the present value of future pensions to be paid on the basis of accrued rights, with future contributions of current contributors and the accrual of new entrants not considered; (ii) the closed-group approach, which estimates present pension liabilities to current pensioners and contributors by assuming that the pension scheme exists until the youngest contributor dies, with no new entrants; and (iii) the open-system approach, which measures the present value of liabilities to current pensioners, current contributors, and people who have not yet entered the labour market (including children and the not-yet-born population).

This Section aims to review a number of approaches in the literature to see how the size of pension liabilities is estimated, both in developed and developing countries, and what policy options should be selected to mitigate these liabilities and to achieve a just generational balance. The papers using closed-group approaches are the main focus of attention. For critical comments on estimation methods and policy implications in this literature, the paper by Franco, Marino, and Zotteri (2004) is especially helpful.

The earliest comparative study of the impact of ageing on public pension liabilities, conducted in four OECD countries (Germany, Japan, Sweden, and the United States), was carried out by Hagemann and Nicoletti (1989). The authors measured unfunded public pension obligations by a closed-group approach, and their estimate showed obligations as percentage of 1985 GDP. The figures for the US, Japan, Germany, and Sweden, were respectively 158, 217, 355, and 183 percent[2]. Regarding the rapid ageing of populations in these countries, the paper indicated that trends would give rise to intergenerational equity problems since estimates indicated that returns to more recently born cohorts were likely to be much lower than those to older cohorts (ibid., p. 22). To

[1] For detailed discussions, see Holzmann, Palacios and Zviniene (2001, 2004).
[2] The estimates include only men and women with pension rights, and exclude benefits of dependent spouses, survivors and disability payments. The estimated result for Sweden refers to unindexed pension units.

avoid these problems, the paper proposed alternative policy options such as accumulating funds that would balance revenues and expenditures, raising the retirement age, and reducing benefits. These options would obviously need to be implemented with careful consideration. For instance, under the first option, a government could set periodically adjusted contribution rates in excess of PAYG requirements so as to accumulate capital; contribution rates would otherwise increase swiftly during the projection period (for example, from 3.85 percent in 1987 to 22.95 percent in 2050 in the case of Japan).

Kane and Palacios (1996) discussed various aspects of pension debt in PAYG public pension schemes. Their estimates again used a closed-group approach, applied to several countries in different continents. Their estimates indicate that the size of debt varies across countries, and seems to be higher where countries are both heavily committed to PAYG public pension schemes and are experiencing rapid demographic change. Comparison of projected pension costs with GDP, for example in the early 1990s, revealed that the most serious cases were Uruguay and Croatia, with levels at 214 and 350 per cent respectively. Levels were also high in Brazil, with 187 percent, and China, with 63 percent. According to the authors, pension debt was a fiscal burden that could not be ignored in low- and middle-income countries, particularly in regard to the long-term imbalance of the pension scheme, which would very likely require massive intergenerational transfers when the population became older. Standardization of pension debt estimates, in their view, serves as an accurate long-term fiscal indicator, helping to compare countries over time more appropriately.

Holzmann, Palacios, and Zviniene (2001, 2004) also apply a unified methodology and assumptions to this issue, comparing estimates for 26 countries in the former study, and 35 countries in the latter study[3]. Applying the closed-group approach, the authors estimate debts in various years during the late 1990s and 2000 with discount rates of 2, 4, and 5 per cent. Their estimates

[3] Nine countries were added in the latter, i.e. Iran, Bolivia, Mexico, Colombia, Dominican Republic, Cape Verde, Chile, El Salvador, and Peru.

vary between countries, and indicate that countries with swift demographic transitions and a long history of PAYG pension schemes will face the most serious problems. For instance, with a 5 per cent discount rate, the estimates in the former study ranged from 26 per cent of GDP in Morocco to 275 per cent of GDP in Brazil; in the latter study, indicative figures are Iran (72 per cent), Mexico (54 per cent), and Peru (34 per cent). These rough results indicate that liabilities need to be identified since they influence the macro-economy significantly via many channels. An index of liabilities is clearly an important indicator of the need to reform a pension scheme to achieve long-term financial sustainability, particularly where an ageing population is likely to lead to faster maturation of the schemes.

Finally, Bravo and Uthoff (1999) use a closed-group approach in estimating pension debt for 20 countries in Latin America. Their results are calibrated, the discount rate being equal to wage growth rate, indicating that the liabilities are severe, even in countries with young populations and low coverage rates, such as the Dominican Republic, Ecuador, and Honduras (1999:10). The estimated size of debt, as a percentage of 1990 GDP, ranged from 4.3 in Haiti to 305.4 in Argentina, and on average it was several times greater than the official debt. In order to assess the impact of demographic factors, the authors applied population structures to the several countries, instead of to Latin America as a whole. The results show that old-age mortality had a small effect on the size of debt, but population structure, particularly a highly aged population, did have significant impact. Sensitivity tests, assuming a 4 per cent economic growth rate and varying discount rates over a 40-year period, showed that fiscal costs of pension debt seemed "manageable" for low- and very low-debt groups, but were still high or very high in other countries. To deal with the problem, the paper recommends a partial shift to funded or notional defined-contribution (NDC) schemes, changes in benefits and eligibility conditions, and adoption of an inter-temporal budget approach to reduce financial shocks.

In Vietnam, to the best of my knowledge, there have been few studies on pension liabilities of the current PAYG DB pension scheme, with most of them focused on the financial sustainability of the scheme with open-system projections. The International Labour Office (1998), employing actuarial models, measured the financial capability of the social insurance scheme, including pensions. Although it did not focus directly on estimating pension debt, the cash-flow results for the period 1996-2040 indicated that the current scheme would accumulate significant debt in comparison with 1996 GDP. Projections showed that the total contribution rate required to balance the scheme might increase to more than 35 percent by 2040, compared with 20 percent at present (1998:42). The report suggested several parametric reforms needed to achieve financial viability, such as cutting benefits, revising the pension formula by employing regular adjustments, and increasing the retirement age for females to 60. In terms of generational equity, it was suggested that the scheme carefully reconsider early retirement and disability benefits, since these entail costly provision and a high dependency burden for working participants.

Vietnam Social Insurance (2004), also by means of actuarial models, estimated that the social insurance fund would be depleted in 2032 if it was kept the same. Nguyen (2004) also pointed to the threat of generational inequity by indicating that a person with a 30-year contribution would receive his/her benefits in only 6-8 years, while the average number of years to receive benefits was estimated at 15 years (2004:8).

In a previous paper (Giang, 2004b), I estimated pension debt for Vietnam's pension scheme during the long period 2000-2050 by using an open-system approach. This indicates that pension debt will rise in comparison with 2000 GDP, the contribution rate increasing to 26.5 percent in 2050 if financial balance is to be achieved. Without such increases, the scheme will collapse in 2035. The paper suggests as policy options that the scheme move to a partially funded defined-contribution scheme with sound governance and an explicit regulatory framework.

3. Analytical Framework, Dataset, and Assumptions

3.1. Analytical Framework

In this paper, pension liabilities will be estimated using the closed-group approach, by applying the estimation methods of Franco, Marino, and Zotteri (2004). These assume initially that disability and survivor pensions, and the practice of using different rules for males and females, are not considered. These assumptions of course need to be modified as the analysis proceeds. To begin with, it is simply assumed that the current pension scheme in Vietnam will continue until 2077 when the youngest contributor in the year 2002 dies (assuming he or she was 15 years old in 2002). There are no new entrants to the scheme. The different characteristics of pre- and post-1995 schemes[4], which include variations in benefit levels and replacement rates, require four components to be estimated: (i) pension liabilities to pre-1995 pensioners; (ii) pension liabilities to post-1995 pensioners; (iii) net pension liabilities to pre-1995 contributors; and (iv) net pension liabilities to post-1995 contributors.

a. Pension Liabilities of Current Pensioners

Suppose that, in the year 2002, N_j is the number of pensioners of age j, each of whom receives B_j as their average pension, and that their survivorship probability is S_j. Pension liabilities for these people in the year 2002 may then be expressed by the equation:

$$P_j^{(2002)} = N_j S_j B_j \tag{1}$$

[4] See Giang (2004b & 2005) for detailed descriptions of the pension scheme in Vietnam and debates surrounding it.

If we assume that these people may live until *D* years of age, which is the maximum age of the population, then their pension liabilities during (*D-j*) years will be:

$$P_j = B_j \sum_{i=2002}^{2002+D-j} N_j S_{j,i} = N_j B_j \sum_{i=2002}^{2002+D-j} S_{j,i} \tag{2}$$

where $S_{j,i}$ is the probability that the person of age *j* will be alive in year *i*. Moreover, by assuming that *p* is the constant growth rate of a pension, that $\bar{j}$ is the minimum age of pensioners, and that *r* is the discount rate, we can calculate the present value of pension liabilities to these people in 2002 as follows:

$$PVP_j(2002) = \sum_{j=\bar{j}}^{D} N_j B_j \sum_{i=2002}^{2002+D-j} S_{j,i} \left(\frac{1+p}{1+r}\right)^{i-2002} \tag{3}$$

Equation (3) can be applied to estimate pension liabilities to both pre-1995 and post-1995 pensioners in Vietnam.

b. Net Pension Liabilities of the Current Contributors

These estimates are more complicated than those just outlined, since we have to consider both accrued contributions and benefits up to the year 2002, as well as future contributions and benefits from 2002 onwards. A number of further variables are required: N_j^c is the number of active contributors of age *j* in the year 2002; B_j^c is the average pension paid at retirement to the contributors of age *j* in the year 2002 measured as contributions already paid (in other words, accrued-to-date contributions); $Q_{j,i}$ is the probability of receiving a pension at year *i* for active contributors of age *j* in the year 2002; $S_{j,i}^c$ is the probability of being alive in the year *i* for a contributor of age *j* in the year 2002; PF_j^c is the average pension paid at retirement to contributors of age *j* in the year 2002

measured on the basis of future contributions; *C* is the contribution rate according to labour income in the year *i* for the contributor of age *j* in the year 2002 (i.e. $FI_{i,j}$); and $R_{i,j}$ is the probability of being in employment in year *i* for contributors of age *j* in the year 2002. The total present value of pension liabilities to current contributors is then calculated as follows:

$$(4) \quad PVC_j(2002) = PVC_j1(2002) + PVC_j2(2002) =$$

$$= \sum_{J=\bar{j}}^{D} N_j^c \left[B_j^c \sum_{i=2002}^{2002+D-j} Q_{j,i} S_{j,i}^c \left(\frac{1+p}{1+r} \right)^{i-2002} \right] + \sum_{J=\bar{j}}^{D} N_j^c \left[PF_j^c \sum_{i=2002}^{2002+D-j} Q_{j,i} S_{j,i}^c \left(\frac{1+p}{1+r} \right)^{i-2002} - C \sum_{i=2002}^{2002+D-j} - R_{j,i} FI_{j,i} \left(\frac{1+p}{1+r} \right)^{i-2002} \right]$$

where *$PVC_j(2002)$* is the present value of net pension liabilities to the current contributors. This calculation includes the present value of accrued-to-date liabilities (i.e. *$PVC_j1(2002)$*) and the present value of future liabilities in respect of future contributions (i.e. *$PVC_j2(2002)$*).

For each generation, the present value of (net) pension liabilities may be taken to represent its generational account. A positive value of this account indicates that the generation receives transfers from other ones, and vice versa. In the case of the pension scheme in Vietnam, we may expect that current pensioners will have positive accounts since they are pure beneficiaries; the question of whether current contributors will have positive or negative accounts is less certain, since the answer depends heavily upon projections of future contributions and benefits. To reach generational equity, the proposed policies need to focus carefully on these accounts.

In addition to status-quo projections, this paper also considers some additional scenarios which take into account mortality rates, an increase in the timing of women's retirement to age 60, an increase in contribution rates, and a reduction of replacement rates.

3.2. Dataset and Assumptions

The dataset includes the number of pensioners and contributors of both pre- and post-1995 schemes. These people are categorized by sex and 5-year age cohorts. Figures 1.1-1.4 in Appendix 1 indicate the age distribution of pensioners and active contributors in the year 2002, which is the base year for projections. It is obvious that the number of pre- and post-1995 pensioners will decline over time. In the absence of a life table for pensioners, estimations assume that mortality rates will follow those indicated in the life table for the Vietnamese population of 1999 (Lopez et al. 2000) (see Appendix 2). Average benefits in each age group are assumed to grow at the same rate as active contributors' wages. This is indicated by p in equation (3), which will be discussed in detail later.

A further problem is that benefits of dependants or survivors (e.g. children, spouses, or parents) will entail lump-sum or monthly payments. It is infeasible, however, to estimate these benefits since there are many reasons why beneficiaries may terminate the schemes. For the present purposes, these payments are assumed to represent about 10 percent of total pension benefits in each period, meaning that 10 per cent of pension liabilities are due to benefits for dependants or survivors[5].

The projection of future benefits and contributions for both pre- and post-1995 active contributors is clearly a very complicated task. For the sake of simplicity, the projections developed here will begin from three initial assumptions: (i) benefit and contribution data may be grouped into 5-year periods, with no policy changes during each period; (ii) the early or late retirement of contributors is not considered; and (iii) there are no differences in average wage rates among contributors belonging to public and private sectors. These assumptions are admittedly "heroic", since various policy

[5] The data show that, during 1995-2002, total benefits to dependants or survivors fluctuated around 9.88 per cent at least, and 10.22 percent at most, of the total pension benefits.

changes will inevitably be required to adapt to rapid changes in the transitional economy of Vietnam, and these changes will in turn influence working and retirement decisions of contributors.

To estimate the number of contributors and pensioners in the future, it is also assumed that there are three probabilities for a contributor in successive periods. He or she: (i) will die; (ii) will continue to work; or (iii) will become a pensioner[6]. For the first probability, the paper assumes that the mortality rate of contributors is respectively the same as the population by age and sex in the life table, even though it is commonly recognized that participants of the social insurance scheme receive better healthcare treatment and other social services, which impact on survivorship via lower mortality rates and higher life expectancy than the average population. For the second and third cases, since early and late retirements are ignored in the projections, male and female contributors are assumed to be pensioners only when they reach 60 and 55 years of age, respectively.

To clarify the impact of demographic changes in all projections, however, the life table will be modified by an initial assumption that life expectancy at birth of both men and women will increase 5 years during the projection period. The results are expected to show how mortality rates and the age structure of the population affect the estimated size of pension liabilities.

The growth rate of average wages (or average compensations) of both pre- and post-1995 contributors, which are used in calculating contributions to the pension scheme, are assumed to grow at the same rate (p). It is supposed that p is the same as the productivity growth rate, which is assumed to be 3 percent for the whole projection period. In the sensitivity tests, this growth rate will be ±1 per cent difference.

[6] As indicated in Plamondon et al. (2002), there are further probabilities that shape accounting practice, notably that contributors may become unemployed or re-enter the workforce. Their rights are obviously still valid in the scheme. Such cases, however, are difficult to estimate, particularly in the context of rapid labour mobility between economic sectors.

As indicated in Giang (2005), the benefit formula is varied for beneficiaries from different economic sectors, since they refer to different wage systems. This in turn makes the actual base wages, which are used to estimate pension wages, different. The dataset, however, does not include detailed information on the relation between average compensation and the average base wage of the contributors by age and sex; hence it will be assumed that average base wages are proportionate to average compensation at the time of retirement. In practice, the actual variance between these indicators has gradually reduced from about 15 percent in 1998 to 5.7 percent in 2002[7], and it is therefore assumed that the average base wage is about 90 percent of the average compensation at the time of retirement. In addition, the average replacement rates for male and female contributors at retirement ages in the base year will be employed (as would be appropriate with the assumption of no early or late retirement), and they are assumed to be unchanged during the projection period. Finally, adopting the same procedure used in projections for pre- and post-1995 pensioners, it is assumed that benefits for dependants and survivors of the pre- and post-1995 contributors are 10 percent of their total pension benefits.

The discount rate (*r*) is the critical factor for determining the size of pension liabilities since a lower discount rate leads to greater present value of (net) pension liabilities, and vice versa. In the base case, it is assumed that the discount rate is the same as the wage growth rate. In sensitivity tests the discount rate will be examined with ±1 per cent difference from the wage growth rate. Moreover, this is also a crucial factor when considering amortization of pension liabilities, particularly in the context of a dynamically efficient economy.

[7] These figures are respectively from Holzmann, Arthur, and Sinn (2000), and author's estimation from VSI (2004).

4. Estimated Results and Implications

a. Results of the Base Case, and Sensitivity Tests

The estimated results for the base case, which assumes that the discount rate is equal to the wage growth rate at 3 percent, are presented in Table 1. These estimates are also examined with ±1 percent difference of discount rate from the base case.

Table 1. Estimated (Net) Pension Liabilities as Percentage of 2002 GDP

Category	***Discount Rate***		
	2%	***3%***	***4%***
Pre-1995 Pensioners	1.49	1.46	1.42
Post-1995 Pensioners	1.82	1.75	1.70
Pre-1995 Contributors	1.98	1.85	1.75
Post-1995 Contributors	2.03	1.91	1.86
Total	***7.32***	***6.97***	***6.73***

Source: Author's estimates

This table shows that, in comparison with 2002 GDP, the total pension liability is small. This result can be explained by the fact that the PAYG pension scheme in Vietnam is young (it started in 1995), has a low coverage rate (about 12 percent of the labor force in 2002), and that average labour compensation and pension payments are low. The result is also consistent with the findings of other studies, such as for El Salvador and Haiti (Bravo and Uthoff 1999). Another possible cause of this result is inherent in the closed-group approach, which limits the number of future contributors and pensioners.

As expected, the generational accounts of both pre- and post-1995 pensioners are positive, and the estimated total pension liability of these pensioners is about 3.2 percent of 2002 GDP. Both generational accounts of the current contributors are also positive, and their estimated net pension liability is

about 4 percent of 2002 GDP, meaning that they will also be positive beneficiaries in the future.

In order to see how the size of pension liabilities is different from the base case, some scenarios may be tested. Results from Scenario 1, which assumes ±1 per cent difference in wage growth rate from the base case, do not show significant differences. For example, with wage growth rate at 4 per cent and 2 per cent, the estimated size of liabilities as a percentage of 2002 GDP is 6.89 per cent and 6.53 per cent, respectively. All generational accounts of the current pensioners and contributors are positive. Scenario 2, which uses the modified life table to discover the impacts of demographic variables, shows interesting findings: the estimated total pension liability is 7.74 per cent of 2000 GDP, which is about 1 per cent higher than that of the base case. It is found that lower mortality rates for age cohorts have small impacts on the estimated size of pension liabilities since the number of pensioners and contributors does not change significantly in comparison with the base case. Conversely, the age distribution of both pensioners and contributors have a substantial influence on their respective pension liabilities, particularly for the group which has more people who are senior or reaching retirement ages. The latter finding can be explained partly by the assumption of no early or late retirement for current contributors.

In all of these cases, intergenerational and intra-generational inequities are obvious since current workers (who are not participating in the pension scheme) and future workers will be losers in the "generational battles" as long as the government pays these liabilities via higher taxes. It is, however, also apparent that the government must pay these liabilities in any case, so it remains important to find appropriate payment settings which ensure the government's financial solvency. One way is to use the inter-temporal amortization approach, in which a government uses a constant tax rate (t) for the whole economy to finance pension liabilities (see Appendix 3). For instance, if we assume that the economic growth rate during the projection period is 5 per cent annually for the

base case, the government will have to tax about 0.05 per cent of GDP to finance pension liabilities.

It is worth noting that, if the Vietnamese economy is dynamically efficient, or $g < r$, then the tax rate (t) will be greater, and thus both intergenerational and intra-generational inequity problems will become more severe. Higher economic growth is one possible source of mitigating the financial and generational problems of the pension scheme.

b. Reducing the Size of Pension Liabilities

Even though the above-mentioned tax is negligible in comparison with annual GDP, the question of generational inequity is unavoidable, since the burden will surely be shouldered by the current and future working population. Therefore, in order to mitigate these burdens, the following scenarios will be carefully considered. Note that these scenarios apply under the base case's assumptions on discount and wage growth rates.

- Scenario (i): Reduce replacement rates of both pre- and post-1995 pensioners by 3 percent, and increase contribution rates of pre- and post-1995 also by 3 percent (to 18 percent), simultaneously from 2002.

- Scenario (ii): In addition to (i), increase retirement age for both pre- and post-1995 female contributors from 55 to 60.

- Scenario (iii): Keep the same benefit rates as for the current pensioners, and consider balancing contributions and benefits of current contributors (that is, reduce the estimated size of net pension liabilities of current contributors to zero).

- Scenario (iv): Shift current contributors to a funded-type scheme.

The estimated results of these scenarios are presented in Table 2 below.

Table 2. Summary of Estimated Results from Different Scenarios

Scenario	***Total Pension Liabilities (as percentage of 2002 GDP)***	***Tax Required* (as percentage of 2002 GDP)***
Scenario (i)	5.12	0.034
Scenario (ii)	4.43	0.030
Scenario (iii)	3.21	0.021
Scenario (iv)	4.90	
	- pensioners (3.21)	0.021
	- accrued rights to contributors (1.69)	scheduled by notional accounts

Note: (*) discount rate = wage growth rate = 3%, and economic growth rate = 5%.

Source: Author's estimates

For Scenario (i): the estimated results show that total pension liabilities of all pre- and post-1995 pensioners and contributors, as percentage of 2002 GDP, would be reduced to 5.12 per cent from the level of 6.79 per cent in the base case. This means that the government would have to tax at a rate of about 0.034 per cent of annual GDP during the period to finance these liabilities. In terms of intergenerational equity, the possible burdens on current and future working population are lower than the base case, even though they still have to bear some of the load (i.e. since the tax rate is positive). In terms of intra-generational equity, however, this policy must take into account the fact that there are both poor and rich pensioners in the current scheme. Therefore, if possible, consideration needs to be given to cutting benefits of rich pensioners rather than a once-for-all reduction, as in Scenario (i). In addition, there is also a possibility that intra-generational inequity will exist among contributors, especially as younger contributors who have a longer service period may get lower benefit rates than older ones, particularly people reaching retirement age in 2002 when this Scenario begins.

For Scenario (ii): the total pension liabilities are lower than the scenario (i), at 4.43 per cent of 2002 GDP. The inter-temporal amortization approach shows, in this case, that the government will have to tax 0.03 percent of annual GDP to finance these pension liabilities, meaning that current and future working population will shoulder lower burdens than in Scenario (i). It is again, however, worth noting that both inter- and intra-generational inequity will exist, although the seriousness of differences will vary. For instance, young female contributors will have absolutely lower benefit rates than older ones, particularly females upon reaching the new retirement age.

For Scenario (iii): the estimated size of pension liabilities to the scheme is the same as that for current pensioners, which is 3.21 per cent of 2002 GDP, and therefore the government needs to tax 0.021 per cent of annual GDP to finance the pension liabilities. It seems that this case is the most prospective one since the burden for taxpayers is the least. Nevertheless, to achieve this Scenario, an immediate increase (i.e. from the year 2002) in the contribution rate would be required of current contributors, from 15 per cent to about 24 per cent. The feasibility of this scenario depends much upon the contributors' income profiles since a swift increase in contribution rate may put a significant number of contributors (who already have very low labour compensation) into poverty.

For Scenario (iv): the estimated size of total pension liabilities is the same as the previous one, as measured by accrued-to-date approach (or $PVC_j1(2002)$ in equation (3)). This Scenario does not take into account possible future contributions and benefits of the current contributions. It is shown that the estimated size is 4.9 per cent of 2002 GDP, including 3.21 per cent for pre- and post-1995 pensioners, and 1.69 per cent for accrued-to-date liabilities of pre- and post-1995 contributors. For the former, the government can pay them by an inter-temporal schedule, i.e. a tax of 0.02 per cent annual GDP. For the latter, the accrued-to-date liabilities will only become explicit when contributors have their own accounts. To avoid immediate payments on these accounts, the government would adopt a schedule in which notional accounts are

established at the beginning, and payments of these liabilities are then scheduled up to the point at which contributors reach their retirement ages. This policy action of course requires careful estimates of macro-economic factors (Giang, 2004a).

It is clear that, in any scenario, the government always faces pension liabilities and issues that normally arise in generational relations. It is difficult to conclude which policy option is the best since we have not taken into account a variety of factors influencing the economy in general, and the pension scheme in particular. However, given the four Scenarios presented, and considering both economic and equity viewpoints, the last scenario is preferable to the first three, for the following reasons. First, current and future taxpayers are likely to bear lower burdens if the government uses their taxes to finance their pension liabilities. Second, shifting current contributors to a funded scheme with a careful schedule for payments of accrued-to-date pension liabilities will put a stop to the government's need to make future promises -- promises which may, in turn, harm intergenerational relations and exacerbate inequities by placing higher tax burdens on the working population.

5. Concluding Remarks

This paper has aimed to measure the size of pension liabilities of the current PAYG DB pension scheme in Vietnam, and to focus on generational relations in economic terms. The resulting estimates indicate that liabilities are small in comparison with GDP in 2002, the base year used for projections. This can be explained partially by two most important factors, i.e. the estimation approach itself, and the scheme's youth and the relatively low levels of coverage, compensation, and pensions that it proposes to pay. Sensitivity tests with different discount and wage growth rates show that the estimated liabilities are not significantly different from that of the base case. Analysis of demographic impacts implies that mortality rates will not have much influence on the estimated size of pension liabilities. The age structure of the population,

however, remains critical. Pension liabilities will, moreover, have different economic impacts on the several generations, and hence on generational relations. If the government chooses to pay these liabilities by imposing higher taxes, then current and future workers will have to shoulder them, making intergenerational inequity ineluctable. Changing this policy to reduce pension liabilities may also lead to intra-generational inequity, since younger contributors may receive less net benefits than the older ones. These generational inequities will be less severe if the economy is dynamically efficient, and therefore promoting economic growth is a possible way to deal with these problems.

Needless to say, there are a number of limitations to this paper, owing mostly to reliance on static forecasting under heroic assumptions. As with other studies on this topic, which are subject to similar constraints, the estimates produced here are subject to differing degrees of uncertainty that are inherent in social and economic movements, and thus policy implications may be over- or understated.

As an indicative study, however, this paper indicates that the current pension scheme in Vietnam needs to be reformed immediately to achieve both financial viability and generational balance[8]. Hesitation or postponement may lead to painful social and economic consequences consequent on never-ending "generational battles".

[8] See Giang (2004b & 2005) for proposed reform of the pension scheme in Vietnam.

Appendix 1

Summary of Data for Pensioners and Contributors, 2002

Figure 1.1. Pre-1995 Pensioners by Age and Sex, 2002

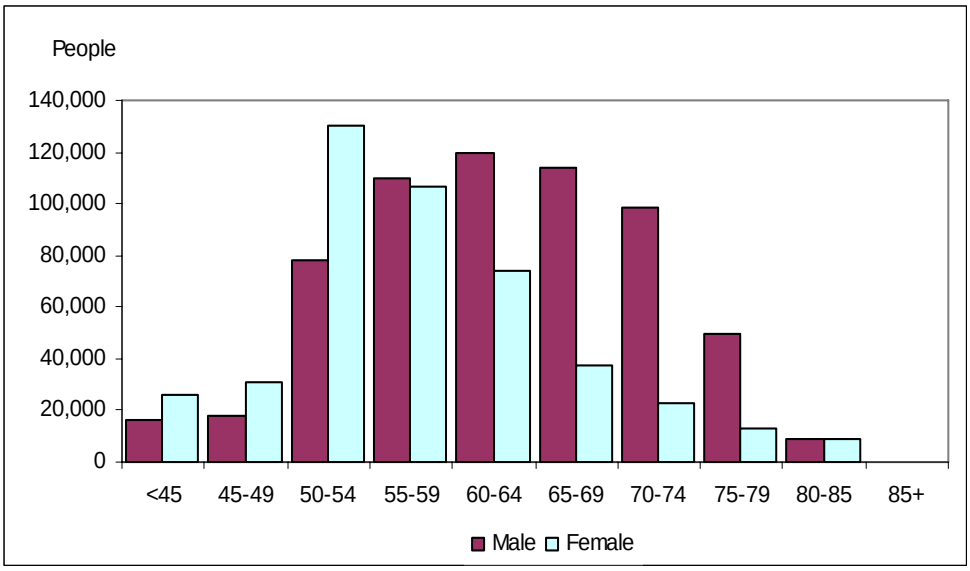


Figure 1.2. Post-1995 Pensioners by Age and Sex, 2002

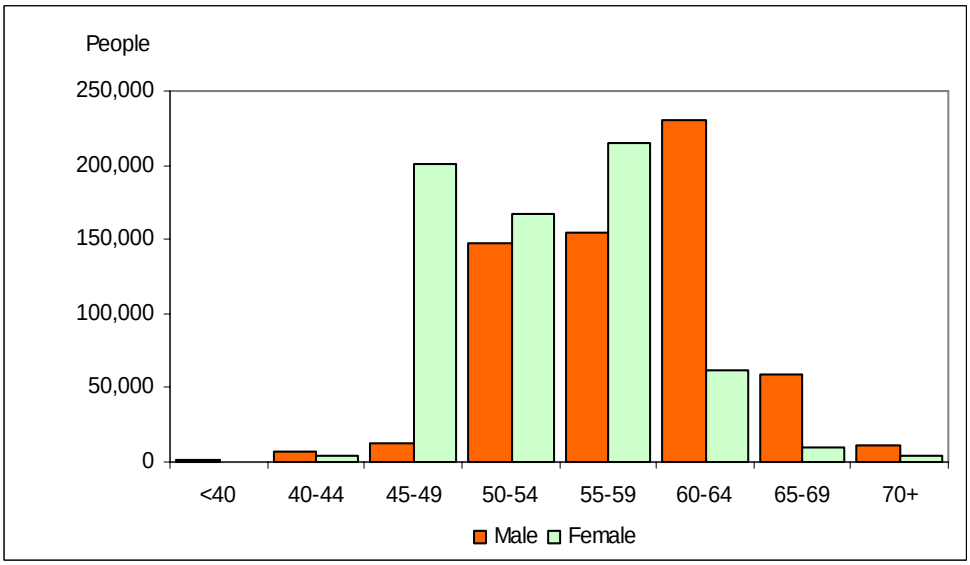


Figure 1.3. Pre-1995 Active Contributors by Age and Sex, 2002

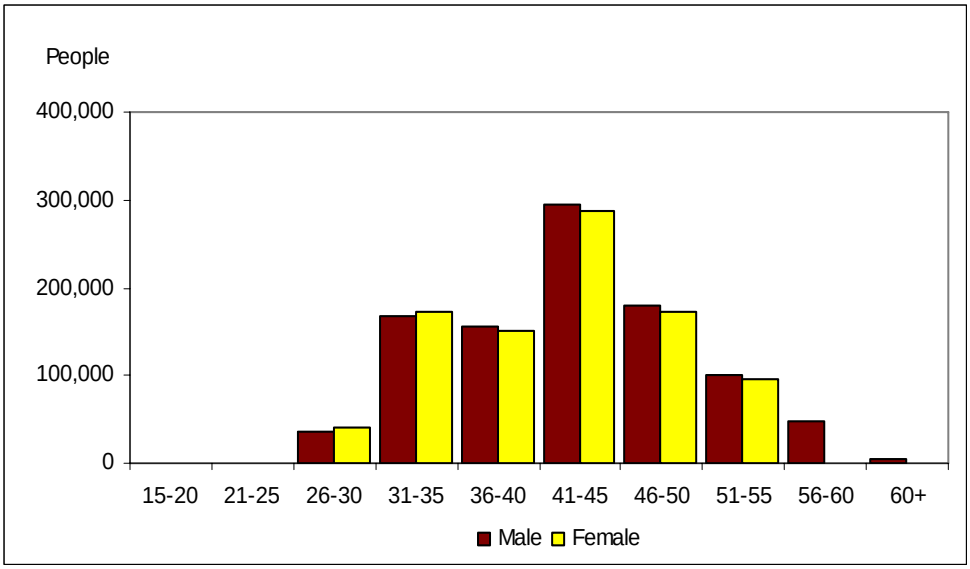
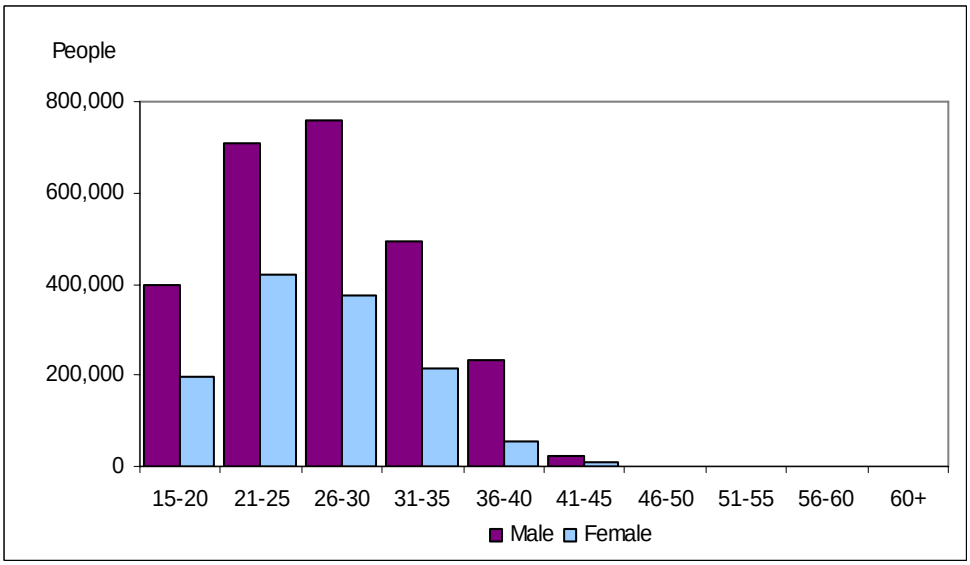


Figure 1.4. Post-1995 Contributors by Age and Sex, 2002



Source: Author compiled and estimated from VSI (2004)

Appendix 2

Life Table of the Vietnamese Population by Age Group and Sex, 1999

	Male				Female			
Age	${}_5m_x$	${}_5q_x$	l_x	e^0_x	${}_5m_x$	${}_5q_x$	l_x	e^0_x
0	0.0290	0.0283	100,000	64.65	0.0218	0.0214	100,000	68.64
1	0.0029	0.0115	97,174	65.52	0.0026	0.0103	97,862	69.13
5	0.0010	0.0052	96,052	62.27	0.0006	0.0032	96,856	65.84
10	0.0008	0.0041	95,555	57.58	0.0005	0.0026	96,550	61.04
15	0.0014	0.0068	95,159	52.81	0.0010	0.0048	96,298	56.19
20	0.0018	0.0089	94,515	48.15	0.0013	0.0066	95,839	51.54
25	0.0017	0.0087	93,679	43.56	0.0012	0.0062	95,209	46.77
30	0.0024	0.0120	92,863	38.92	0.0015	0.0077	94,617	42.05
35	0.0030	0.0149	91,749	34.36	0.0018	0.0090	93,892	37.35
40	0.0042	0.0210	90,384	29.84	0.0027	0.0133	93,046	32.67
45	0.0068	0.0333	88,487	25.43	0.0043	0.0215	91,807	28.08
50	0.0112	0.0546	85,539	21.22	0.0073	0.0357	89,836	23.64
55	0.0185	0.0884	80,871	17.30	0.0120	0.0581	86,626	19.42
60	0.0316	0.1464	73,724	13.74	0.0215	0.1020	81,591	15.47
65	0.0511	0.2265	62,928	10.66	0.0372	0.1700	73,265	11.94
70	0.0827	0.3426	48,676	8.05	0.0671	0.2873	60,811	8.87
75	0.1322	0.4968	32,000	5.95	0.1138	0.4429	43,338	6.44
80	0.2039	0.6754	16,101	4.35	0.1881	0.6398	24,145	4.57
85+	0.3119	1	5,227	3.21	0.0370	1	8,698	3.26

Note: ${}_5m_x$ is the central death rate for the age interval (x, x+5);

${}_5q_x$ is the probability of an individual at age x dying before the end of the age interval (x, x+5).

l_x is the number of survivors at age x in a life table with starting population of 100,000; and

e^0_x is life expectancy at age x.

Source: Lopez et al. (2000)

Appendix 3

Inter-temporal Amortization of Pension Liabilities

This methodology is derived from Bravo and Uthoff (1999). Naturally, it assumes that annual payments of pension liabilities are a constant fraction of annual GDP (i.e. *t)*, and that the tax rate is set annually by the government.

Supposing that GDP (denoted by *Y*) grows at a constant rate of *g*, and *r* is the discount rate, the inter-temporal amortization in the number of payment periods (*n*) expresses the present value of pension liabilities (*PL*) as a function of *Y*, *t*, *g*, and *r*, as follows.

$$PL = \left[tY_1 + tY_2(1+r)^{-1} + tY_3(1+r)^{-2} + \ldots + tY_n(1+r)^{-(n-1)}\right] = tY_1\left[1 + \left(\frac{1+g}{1+r}\right) + \left(\frac{1+g}{1+r}\right)^2 + \ldots + \left(\frac{1+g}{1+r}\right)^{n-1}\right]$$

We set $a = \left(\frac{1+g}{1+r}\right)$ then $PL = tY_1[1 + a + a^2 + \ldots + a^{n-1}] = t.Y_1 \frac{(a^n - 1)}{(a-1)}$

→ $t = \frac{PL}{Y_1}\left[\frac{a-1}{(a^n - 1)}\right]$ for all $a \neq 1$.

When $a = 1$, or $i = g$, we will have $t = PL/Y_1$.

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