Mandatory Savings and Retirement Adequacy: Portfolio Simulation of EPF in Sri Lanka

Wasana Karunarathne*
National University of Singapore

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Abstract

Investment performance of the defined contribution (DC) pension plan is crucially important since it directly affects members' retirement benefits. Researchers believe that unnecessary government intervention have caused serious consequences on investment performances of many DC pension plans in the world. This paper attempts to shed some light on this based on the experience of Sri Lanka, a low-middle income country. The simulation exercise carried out in this paper analyses investment performance of Sri Lanka's mandatory pension scheme, namely the Employees Provident Fund (EPF). Tight government restrictions on EPF's portfolio allocation have resulted in significantly low rate of return over the last few decades. Such erosion of capital rather than a growth has lead to accumulate insufficient member balances exposing members in to many financial difficulties after retirement. The exercise further shows how EPF could have increased its accumulated member balances if its investments were diversified among different portfolios. However, a suitable macroeconomic environment should be prevailed, if EPF performances to be enhanced.

Key Words: EPF savings, investments, rate of return, member balances, replacement rate

* Contact Address: Department of Economics, The University of Melbourne, Melbourne Vic 3010. Telephone: (03) 8344 5397. Email: lakminik@unimelb.edu.au

1. Introduction

Because of economic and financial consequences of pay-as-you-go (PAYG) pension provision, fully funded (FF), defined contributory (DC) pension schemes have become popular in many countries in the world. Particularly in developing countries, where voluntary savings are mostly hit by poor economic conditions, such as low and uncertain income levels, higher inflation and unemployment rates, and limited financial facilities, mandatory savings are expected to play a major role in provision of retirement protection.

In a DC pension plan benefits of a member are directly linked to the accumulated balances: net contributions (contributions less administrative charges and pre-retirement withdrawals) and investment returns, therefore do not guarantee a fixed replacement rate (RR) at retirement. Therefore, members of a DC plan, unlike in a defined benefit (DB) plan, bear many risks including investment risk (risk of low returns and volatility in returns), longevity risk and inflation risk. Investment performance of a DC pension plan therefore is crucially important since it directly affects the welfare of the retirees. If investments of these funds do not earn adequate rate of return to grow accumulated contributions at a significant rate, members can face deprivation after retirement.

However, researchers are sceptic whether many of DC plans in the world, particularly in developing countries, have earned enough to provide members a sufficient balance. Notably, poor investment returns due to inefficient management, high administrative costs, politicisation and government restrictions, have been traced by researchers in many countries (Asher, 2004, 2002; Karunarathne and Goswami, 2002; Davis, 1995). In countries like Malaysia, Singapore, India, and Sri Lanka, where DC

pension funds are centrally managed and controlled by the government, portfolios are traditionally restricted to invest in government securities. As a result of these controls, most of these pension funds have earned negative or insignificant returns that finally have accumulated insufficient member balances for retirees exposing them in to many difficulties during their retirement.

Investment restrictions imposed on private pension funds have been constantly criticized by researchers (Shah, 1997; Vittas, 1998; Alier and Vittas, 2000; Srinivas, et al, 2000; Asher, 2001) as they can create potential losses mainly because of inefficiency and less competitiveness of the investment process. Researchers have found that countries, where pension funds are restrictively invested mainly in government papers have earned lower returns compared with the countries where equities dominate portfolios; for example Chile and Peru in 1997 (Shah, 1997); Malaysia (Asher, 2001); US (Thaler and Williamson, 1994), India (Asher, 2002; Karunarathne and Goswami, 2002). This, however, does not mean that a good regulator of pension management on the grounds of financial solvency, fiduciary responsibility, and proper management should be mitigated. However, direct investment regulations beyond these prudential requirements and limitations on selection criteria of asset classes that prevent investments in some assets while pressurizing bulk of investments in others are not acceptable (Asher, 2001).

Pension fund managers can set an optimal allocation of investments by considering diversification among different portfolios of local and international bonds and equities (Reisen and Williamson, 1997; Davis, 2002). As pension funds are long-term contracts, volatility of equities can be smoothed out over the multi-decade horizon of pension investments. Pension funds as advocated by Ailer and Vittas (2000) may start

diversifying when their assets continue to grow: for example, investments in domestic equities can be allowed when the total assets of a pension fund exceed 5 per cent of the GDP and international diversification should be permitted when the fund assets exceed 20 per cent of the GDP.

However, Davis (2002) points out that even if a pension fund earns a high mean rate of return, if investments are excessively risky, pensioners may face a high risk of low balances if they retire under unfavorable market circumstances. For example, an individual who retires in a stagnant period of equity (and bond) markets will receive a lower replacement rate than a person who retires during a financial upsurge. Alier and Vittas (2000) suggest a few strategies which would reduce risk of retiring under bear market conditions. One is to gradually shift portfolios from equity market to bond market (or purchase deferred annuities) few years before retirement. This strategy can help minimize the occurrence of risk due to the collapse of markets at the final years before retirement. Phase withdrawals or annuity payments instead of lump-sum payments can be another solution.

The above discussion suggests the necessity of initiating a new investment regime for mandatory pension funds. This paper attempts to analyze the typical model of investment-related regulations imposed on the Employees' Provident Fund (EPF), the major vehicle of retirement provision in Sri Lanka. Against the backdrop of a poor investment performance resulting in low member balances for the members of EPF, the paper examines the various possible returns if EPF portfolios were invested in different asset classes. The major argument of EPF that justifies low investments in equities is the limited size of the domestic capital market and the high risk involved in investing in this

market due to volatility. The simulation exercise carried out in this section analyses the validity of this argument. It should be noted that EPF, given the size of its portfolio, has limited opportunities of investing in different asset classes in Sri Lanka due to the limitations of the domestic financial and capital markets. The domestic capital market in Sri Lanka is not only proportionately limited but also highly volatile. In 2002, the market capitalization of Colombo stock exchange was Rs. 163 billion (10.3 per cent of GDP), while the value of EPF's portfolio was Rs. 262 (16.6 per cent of GDP) billions. Evidently, the market capitalization of the Colombo Stock market is smaller than the investment portfolio of the EPF. Therefore, in order for the EPF performances to be enhanced, a suitable macroeconomic environment should be prevailed.

The rest of the paper is organized as follows. Section 2 briefly examines the EPF scheme and its historical asset allocation performances. Section 3 discusses the methodology followed by a description of data used in Section 4. Section 5 discusses the results of the simulation exercise leading towards policy recommendations. Section 7 provides the conclusion.

2. EPF: Investment Performance and Member Balances

The Employees' Provident Fund was established in 1958 with the objective of providing superannuation benefits to employees of the private sector and government corporations. EPF, the largest single pension fund in terms of asset size and membership is administered by the Monetary Board of the Central Bank of Sri Lanka on behalf of the Department of Labor. The board is also responsible for management and investment of the balances.

The total contribution rate to the fund is 20% of gross wages; 12% from the employer and 8% from the employee. The benefits are paid as a lump sum upon attaining the retirement age of 55 years. This sum represents cumulative net contributions (gross contributions less any pre-retirement withdrawals) and the rate of return credited to the individual accounts. According to current regulations in Sri Lanka, almost all corpuses of pension assets are invested in government securities, in which the rate of returns are not market driven but are administered by the government. In 2002, EPF invested 97.5 per cent of its total portfolio valuated at Rs. 186 billion, in government securities. Until 1997, EPF invested around 95 per cent of its assets in Rupee Loans. Since the government introduced bonds as a new debt instrument in 1997, EPF has gradually shifted its portfolio investments from Rupee Loans to government bonds. During 2002, EPF invested 61 per cent of its portfolios in Rupee Loans and 35.5 per cent in government bonds. During the year, equity investments were only 0.5 per cent of EPF's total investments.

EPF is the major source of corporate tax income for the government of Sri Lanka. The fund is subject to a 10 per cent tax on its gross income. In 2002, EPF was liable to pay a sum of Rs. 3.32 billion as income tax contributing 14.49 per cent of the corporate tax revenue of the government.

Figure 1 shows the historical nominal and real rates of return earned by the EPF. Although the nominal interest rate earned by EPF has increased over the years, the real rate has been meager, exhibiting considerable volatility with higher range and standard deviation. The average annual compound growth rate (AACGR)[1] for the real

[1] AACGR is calculated using the formula: r=((1+rA)^(1/t))-1 where, r_A = aggregate return over t years (Annual rates are aggregated by taking their product for t years).

rate of return on investments of EPF is -0.29 during the period of 1961-2002.[2] Obviously low real returns are the result of earning low nominal returns investing in government papers and high and persistent inflation in Sri Lanka. The situation has slightly improved since 1980s. The average nominal rate of return earned by EPF for the period of 1983-2002 is 12.19 per cent and the real rate of return for the period is 1.39 per cent. These figures can be compared with average nominal rate of return of 5.11 per cent and average real rate of return of -1.59 per cent over the period of 1961-1982. The increase in the real rate over the years however is not totally due to improvements in returns but mainly contingent upon the changes in the inflation rate.

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Negative real returns obviously do not permit the power of compound interest to be harnessed for retirement benefits. Such a poor investment performance stemming from an excessive concern for avoiding any apparent financial risk[3] has resulted in lower returns and low member balances. This in turn has adversely affected on the adequacy of EPF funds in fulfilling retirement needs, mainly given the high life expectancy at retirement (around 25 years) in Sri Lanka. In 2002, the average member balance of EPF was only Rs. 31,653, a figure much below the per capita income of Rs. 83, 382.[4]

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[2] The EPF calculates interest on the basis of end-of-year balances. Therefore, the effective rate credited to members' is slightly higher.

[3] loss averse as defined by Thaler and Williamson, 1994 p. 29

[4] However, the average balance per contributor was comparatively high, cresting at Rs. 148,503 (1.8 times per capita income).

3. Methodology

The simulation exercise performed in this section follows the method used by Ailer and Vittas (2000) with necessary modifications. The simulation exercise entails two aspects. Firstly, it calculates EPF member balances under existing rate of return it earns. Secondly it analyzes the impact of different asset allocation strategies on member balances and suggests appropriate strategies of investments for EPF in order to reap the rewards of the members in higher returns at an acceptable level of risk. Accumulated balances of different Cohorts are computed as two ratios; Capital Accumulation Ratio (CAR) and Replacement Rate (RR). These are calculated in nominal and real terms where necessary. CAR is defined as the ratio of total accumulated capital to final wage. The replacement rate is the ratio of annual pension as a percentage of final wage. The size of the Replacement Rate is contingent on several factors, for example, the rate and the number of years of financial contributions made to the system, wage growth, the rate of returns on investments of accumulated balances, age of retirement, life expectancy at retirement and the discount rate of annuities.

In a fully funded Defined Contribution plan, where employees contribute to their own retirement benefits, the accumulated balance at retirement would equal the sum of employee and employer contributions, and investment returns credited to their accounts.[5]

$$\sum_{t=1}^{r} (Wage_t \times C_t) \times (1 + r_t)^{(t_r - t_1)} \qquad (1)$$

where:

$t_{1,r}$ = The period of contributions

$Wage_t$ = Average annual pensionable wage in t^{th} year

[5] If there is no pre-retirement withdrawal

C_t = Contribution rate in t^{th} year

r_t = Rate of return at given year t

Unlike a pension plan, which makes a stream of regular payments throughout the retired life, Provident Funds generally make an accumulated balance or lump sum at retirement. Hence, members of a provident fund bear the responsibility of investing their accumulated balances at retirement to produce adequate returns to hedge for the future inflation. However, in Sri Lanka there are only limited opportunities available for retirees to grow up those balances or keep them without further declines.

If all members' balances are assumed to be reinvested in annuity schemes, annual benefits after retirement can be computed as,

$$A = \frac{P\left\{r(1+r)^{t_m - t_{r+1}}\right\}}{(1+r)^{t_m - t_{r+1}} - 1} \qquad (2)$$

where:

A = Annual annuity payment

P = Principle amount

t_m = Mortality Year

t_{r+1} = The First year in Retirement

The results of different strategies are compared with a baseline case. In the baseline case two ratios are calculated using the actual rate of return earned by EPF. It is important to mention that actual returns are net of 10 per cent tax imposed on EPF's earnings and other administrative expenses. Other rates of return used in the simulation are only net of tax rate, but have not been adjusted for expenses. Four other strategies will be compared with the baseline case. The first strategy assumes investing fully in

Rupee Loans throughout the period of 1959-02. Meanwhile the second, third and fourth cases involve balanced portfolios between three assets, Rupee Loans, Treasury Bills and Equities. As previously discussed, capital markets in Sri Lanka were very primitive and underdeveloped prior to introducing the structural changes in 1977. Therefore, it is not practical to assume that EPF would have realistically diversified portfolios prior to 1977. Therefore, the exercise is carried out assuming that the EPF started diversifying its assets since 1980. This is the reason for the assumption that the EPF was fully invested in Rupee Loans (It is the true case however) prior to 1980. Accordingly, the strategy of balanced portfolios actually starts in 1980. In the case of the second strategy, portfolios are assumed to be diversified according to a mix of 60% - 30% - 10% in Rupee Loans, Treasury Bills, and equities respectively, while in the third and fourth cases the relevant percentages are 20% - 40% - 40% and 10% -30% - 60%.

Hypothetically workers enter the workforce when they are 21 years old and retire at the age of 55, and are employed throughout this period. This provides for 10 retiring Cohort from 1959 to 2002. Life expectancy at retirement is assumed to be 25 years.[6] Thus the accumulation phase of the worker is 35 years while the deccumulation phase is 25 years. First Cohort starts contributions in 1959 and retires in 1993. Accordingly, the tenth Cohort joins the scheme in 1968 and retires in 2002. For simplicity, early-retirement, and disability and survivor benefits are ignored. The assumptions thus provide a more favorable picture of the potential for accumulating balances with the EPF. However, The CAR and the RR with pre-retirement withdrawals have been calculated in the baseline case, which provides the members' balances for the rate of returns that EPF

[6] The life expectancy at age 55 is taken based on the United Nation's figure of 18.4 at 60 years (The United Nations 2002, p423)

declared on member accounts, and summarized in Table 2. Cohorts 5-10 are considered in the calculation of above ratios in the case of pre-retirement withdrawal. Pre-retirement withdrawals were allowed to members since 1987. It is assumed that members withdraw 40% of their accumulated balances when they complete 25 years of service. Thus, Cohort 5 withdraws 40% of the accumulated balances in their accounts in 1988. The 10^{th} Cohort withdraws money in 1993.

In the calculation of the annual pension, it is assumed that accumulated balances of all members at retirement are converted in annuity schemes. It is also assumed that there are no costs involved in conversion to annuity. Replacement rates are calculated both in nominal and real terms. In Sri Lanka, the annuity industry is operated mostly by life insurance companies. The rates payable on annuities are low even in nominal terms. Generally, nominal returns on these products range from 5 to 10 per cent. Therefore, given an average inflation of around 9 per cent for the period of 1959- 02, annuity schemes in real terms are calculated using an assumed real discount rate of 1 per cent. While in the calculation of nominal annuities average bond yields at the time of retirement are considered.

Average annual salary in 2002, is assumed to be Rs. 48,560. Earnings of participating workers from each Cohort are assumed to have increased over the working life at an average rate of growth of wages. In addition, 1 percentage point is added to each year's growth rate of the wages in order to allow for the upward sloping career profiles of workers. Transaction costs of transacting in Colombo Stock Exchange as well as with other involving bodies such as insurance companies, mutual funds or asset management companies are ignored. However, it is important to note that the actual

returns, declared by EPF on member balances, which are used in the baseline case, are net of taxes (10%) and all the other expenses made by the EPF. Therefore, for the sake of comparison with the baseline case, 10% has been deducted from the returns yield from all the asset classes considered.

4. Data

Data on rate of returns include All Share Price Index (ASPI) since 1980, and returns on Rupee Loans and Treasury Bills since 1959. All series of rate of returns considered in this section are primary market yields. The bond market in Sri Lanka is quite underdeveloped with only a few players. The government, the major player in the bond market, issues Rupee Loans since the early 1950s and has introduced a new debt instrument called Treasury Bonds in 1997. Since then, the EPF, which invested considerably in Rupee Loans, is gradually shifting their investment profile from Rupee Loans to Treasury Bonds. Interest rates on Rupee Loans are administratively fixed whereas the rate of returns on Treasury Bills is market-based. There are three types of Treasury Bills; 3 months, 6 months and 12 months, according to the period of maturity. While 3 months Treasury Bills have been issued since 1953, 12 months bills have been issued since 1989. The series of rate of returns on Treasury Bills therefore include returns on 3 months Treasury Bills until 1988 and 12 months bills since 1989.

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According to Table 1, the overall average of nominal rate of returns for Rupee Loans is 8.72 per cent, while the corresponding figures for T-Bills and equities are 8.95

and 17.61 per cent. Treasury bill rates for the whole period are lower than the rupee loan returns due to low returns before 1980s. Until the mid 1980s, there were no active primary or secondary markets operating for Treasury Bills. The rate of returns on these bills was below the market rate of interest. However, with the development of primary and secondary market operations since the 1980s, the Treasury Bill yields increased gradually and became market determined. For the period of 1980- 2002, Treasury Bills have yielded an average nominal rate of return of about 13.46 per cent with a standard deviation of 3.10 per cent while the rate for Rupee Loans was 11.68 per cent with a standard deviation of 1.97. Equity returns exhibited the highest average during the period of 1980- 2002 (16.51 per cent).[7] While the highest rate of returns of 105.87 was reported in 1991, the lowest, - 40.37 per cent was reported in 1995. Since 1995 the equity market returns were largely negative or low positive until the year 2000. But the markets have shown significant buoyancy since then.

Daily average earnings of manufacturing and commercial sector workers in 2002 are used in the calculations of wages. Past years wages are calculated backward using the average annual earning in 2002 and the Nominal Wage Rate Index (NWRI, 1978= 100) of manufacturing and commercial sector workers. The series of real earnings were calculated using nominal wages deflated by Colombo Consumer Price Index (CCPI). An additional 1 percentage point is included to incorporate the annual wage increase according to the seniority.

[7] Returns on equities are only the capital gains. Dividends are not included in the calculations of returns. Similarly the cost of transacting in CSE (brokers' fee and commissions for mutual fund or asset management company) is also not included in the calculation of gross equity returns. At present, the capital gains made in CSE are tax free.

5. Results

Results of the baseline scenario (Table 2) show the Capital Accumulation Ratio (CAR) and the Replacement Rate (RR) of the baseline case with and without pre-retirement withdrawals. Calculations of Capital Accumulation Ratio using the returns declared on EPF member accounts show that a member who retires in 2002 will have an accumulated balance of 6.8 times the last drawn salary. If a member in this Cohort had had pre-withdrawals at the time of retirement, according to the assumption made in the calculations, his accumulated balance will only be 4.9-times the last drawn salary. In terms of The Replacement Rate, which is calculated using a fairly high nominal discount rate of 8.7 per cent for the annuity (see the section 4), a member in Cohort 10 will have 67.8 per cent of the last drawn salary at retirement. The Replacement Rate that is calculated in nominal terms using nominal discount rates will further decline because of future inflation. Therefore, nominal RR (RR1) does not give a clear picture of adequacy of the benefits in the long run. An inflation-hedged annuity scheme would be a good solution to avoid the erosion of the value of annual pension payment. RR 2 is calculated assuming that the accumulated balances at retirement are employed in a real annuity scheme with a fixed discount rate of 1.5 per cent for all Cohorts. According to these calculations, Replacement Rates (the average for all Cohorts is 32.9 per cent) are significantly lower than the RR1 (61.3 per cent). If members had withdrawn money from their accounts before retirement, the average RR for all Cohorts will be only 21.8 per cent.

These poor performances have prompted many researchers to advice the governing bodies to relax the investment norms (Rannan-Eliya, 1998; Wijewardene,

1999; De Mel, 2000,) arguing that the net gains from the investments of EPF against market benchmarks should be an important consideration to cope with the longevity risks and the population ageing.

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Rest of the results can be presented in two versions. The first version shows nominal balances of different Cohorts of EPF members using nominal annuity rates (Table 3 and Table 4). The second version presents nominal balances using real annuity rates (Table 5 and Table 6). In both versions, the capital accumulation ratio and the replacement rates are calculated for six strategies and for the baseline case. In the first three strategies there is no portfolio diversification. According to the first two strategies, EPF totally invests in Rupee Loans (100-0-0) or Treasury Bills (0-100-0). The third strategy consists of total investments in Rupee Loans until 1979, after which investments are totally in equities. The next three strategies present the balances with three combinations of balance portfolios: balanced strategy 1; 60 per cent, 30 per cent, 10 per cent, balanced strategy 2; 20 per cent, 40 per cent, 40 per cent and balanced strategy 3; 10 per cent, 30 per cent and 60 per cent in Rupee Loans, Treasury Bills and equities respectively. The last column of the each version shows results of the baseline case; i.e. returns calculated using actual net returns that have credited on member balances assuming no pre-retirement withdrawals.

5.1: Simulation with Nominal Returns

The baseline case shows the actual capital accumulation ratio and the replacement rates of members in different Cohorts (Table 3 and Table 4). Accordingly, all Cohort

average of the capital accumulation ratio amount to 5.56, which is very low and sufficient only for five and half years if the balances are not reinvested. Because of the increase in nominal returns compared to the increase in salary, the ratio has increased in recent years relative to the earliest Cohorts.

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The two ratios of the baseline case are obviously similar to the first strategy that invests all portfolios in Rupee Loans. As explained in a previous section, it should be noted that the balances in the baseline case have been estimated using net returns (net of 10% tax and other expenses), but the returns in other strategies are only allowed for 10% tax.

Under the first strategy, a member accumulates a balance of 6.6 (all Cohorts' average) times as his last drawn salary. Similarly the strategy always yields a lower Replacement Rate (64.19 Cohort average) for every single Cohort than the other strategies. All equity strategy produces a higher Capital Accumulation Ratio and higher Replacement Rate for each Cohort than the other five strategies. The maximum CAR for all equity strategy (19.38) is earned by Cohort 1 and the lowest is earned by Cohort 8 (4.9), who retired in 2000. The variation in the balances among Cohorts can be clearly seen in the calculations of standard deviation, range and the coefficient of variation. This relatively large variation in CAR (similarly in RR) explains the high volatility in equity returns. Both the CAR and replacement rate of final four Cohorts are low compared to the first Cohorts due to recent failures of the stock markets and the collapse in share prices. Nevertheless, a total investment in equities is neither feasible nor suitable to EPF

given the shallow markets in the country. Therefore, investments in equities are not a feasible or efficient solution for EPF or any other pension plan in the country.

Similarly, balanced portfolio strategy 3 is also not acceptable since the change in Replacement Rate from balanced 2 to 3 is not high compared with the increase in volatility. Balance portfolio strategy 2 earns relatively high, returns compared to the baseline case and the first strategy, with an acceptable variation in capital accumulation and replacement rates among different Cohorts. Under this strategy, the average accumulated balance for all Cohorts amount to 9.07 times the last drawn salary and the replacement rate amounts to 88.15 per cent of the last drawn salary.

Although the replacement rates according to the above calculations are increasing and high in nominal terms, it is important to notice that they are highly vulnerable to threats of future inflation that could potentially be high and persistent in Sri Lanka. Therefore, it is worthwhile to check the returns in terms of real annuities. The results of calculations using the real annuity rate of 1.5 per cent are summarized in Table 5.

5.2. Simulation with Nominal Returns and Real Annuity Rates

According to Table 5, the average replacement rate across all Cohorts is very low if annuities are calculated using real rates. Cohort that retires in 2002 earns the highest rate of around 35 per cent in the baseline case and strategy 1. Similar to the nominal annuity case, balance strategy 2 earns a comparatively high replacement rate with an acceptable volatility between Cohorts. Accordingly, if EPF balances were invested according to a portfolio mix of 20 per cent in Rupee Loans 40 per cent in Treasury Bills

and 40 per cent in equities, members' balances could have increased by 15.6 percentage points compared to investing totally in Rupee Loans.

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6. Policy Options (Parametric Reforms)

Table 6 and Table 7 summarize the results of CAP and the RR for different reform options. In calculating the above statistics, the first five Cohorts are considered to simplify the process. If the last five Cohorts were included in the calculations of the first reform option, the increase in retirement age, further assumptions should be made for possible future inflation and growth of future wages as they retire after 2002.

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6.1. Reforming the Investment Function (Portfolio Diversification)

The Advantages of reforming the investment function and the options of asset diversification are comprehensively discussed in the previous section. Calculations of the simulation exercise suggest that the EPF would have increased its member balances significantly, if portfolios were diversified among different asset classes. However, as the equity market in Sri Lanka is limited and the returns are volatile, the selection of investment portfolio should be done carefully. As suggested by the results in the previous section, EPF can choose local equity investments to be 20 per cent to 40 per cent of its total investment. EPF could also have searched for the opportunities of investing in foreign equities.

6.2. International Diversification:

The search for the best approach that maximizes the rate of return for contributory pension funds is a difficult task. Academics suggest that the international diversification would be a better solution for pension funds to increase the returns to a given risk (Bodie, 1990). For EPF, international diversification would be a good solution in terms of reducing the systematic risk of investments in the domestic market. The domestic market is limited small number of companies, and is highly vulnerable to the political environment and macroeconomic shocks. International experience suggest that, pension funds are moving towards international diversification (for example; Australia, 18%; Chile, 17%; Argentina, 9%; in 2003).

Restrictions on foreign investments may be motivated by the desire to retain domestic savings in domestic capital markets. Similarly, higher transaction cost and shortage of information regarding foreign markets compared to the domestic markets are the other considerations that limit foreign investments. However, in the case of Sri Lanka and some other countries such as India, Malaysia and Singapore, certain regulations have prevented the possibility of international diversification. The idea is that the EPF should first change its investment function in favor of different domestic assets and then should search for possible mechanisms of international diversification. Although, a deeper discussion or calculation of advantages of international diversification does not take a prominence in this paper, an analysis in this regard will be worthwhile, if EPF starts diversifying significantly in domestic assets.

6.3. Increasing Retirement Age

The practice of adjusting the retirement age according to fluctuations in economic and social situations such as labor shortages, the increase in unemployment or life expectancy, and health factors are manifest in many countries (France, United States, United Kingdom for example, Quadagno and Quinn, 1997). Currently, the retirement age in developed countries is fixed around the age of 60- 65. However, the standard retirement age in developing countries is often lower than in industrialized nations, evidently due to above discussed factors. Hence, in these countries, political influence has played a substantial role in determining the low retirement age (World Bank, 1994).

Demographic and individual aging have already become a major issue in Sri Lanka. While share of alder population is increasing rapidly, labour force is expected to shrink in the future. Despite, the fact that Sri Lanka stands at the bottom rung of the middle-income countries, social indicators, including life expectancy are comparable to those of many high income countries. Sri Lanka has the highest life expectancy rate in the region and the life expectancy in the country, both at birth and at older ages, has been increasing steadily over the past few decades. The increase in life expectancy (individual ageing), and low retirement age has increased in the proportion of the life spent in retirement. Although the unemployment rate is moderately high in Sri Lanka, it has been decreasing over the last two decades at a considerable rate. The rate which was 17.9 in 1981 diminished gradually to 14.7 in 1991 and to 7.9 in 2001. These factors forewarn that the older workers should be encouraged to remain in the labor force for longer in the future than they do now.

Simulation results of Tables 6 and 7 clearly show that the benefits in terms of CAP and RR can be increased significantly if the retirement age increases form 55 years to 60 years. Accordingly, because of the increase in the retirement age, the average CAP has increased form 4.91 times to 6.66 times and the average Replacement Rate of all Cohorts has increased by around 30 percentage points from the baseline case.

Given the above reasons, increasing the retirement age would be suggested as an effective policy option for Sri Lanka in terms of providing adequate and sustainable retirement benefits for retirees.

6.4. Increasing Contribution Rate

The current contribution rate for EPF members is fairly high compared to current wages in the country. An Increase in the contribution rate can have different consequences depending on who pays the additional amount. If the employee pays it, and if the additional amount is a substantial proportion of his monthly earning, the employee's disposable income, net of all deductions (including EPF contributions) would be diminished further, forcing him to face more difficulties. In addition, as a result of the decrease in the disposable income due to surging contributions may cause to retrench the other forms of savings.

The results of the simulation suggest that an increase in EPF contributions can boost members' accumulated balances but it does not lead to a particularly significant rise in CAP or RR, as is the case in increasing the retirement age. As a result of hiking contributions by 2 percentage points, the CAP increases from 4.9 to 5.4, while the Replacement Rate increases form 47.2 per cent to 51.9 per cent. The comparison of the

increase in those two ratios due to the increase in the age of retirement should be done carefully, as they fluctuate parallel to the growth rate of wages.

6.5. Introducing an Inflation Indexed Annuity Scheme

Researchers have different viewpoints on selecting between pension and lump sum payments. Most are in favor of pension payments (or annuity). Valdes-Prieto (1998) classifies annuity schemes into three different groups according to the influence of different risks. In a fixed annuity scheme, guarantors take the risk of investment as well as demographic risks. If the annuity rates are in real terms or inflation indexed, the guarantor will bear the inflation risk as well. In variable annuities, sponsors pass the investment risk to pensioners, but according to the design of the scheme, the demographic risk should be on the shoulders of the guarantors. The third, CREF annuity scheme promises a payment of number of annuity units hence passing both the investment and demographic risks to the pensioners.

The efficient design of a decumulation phase for EPF members should also take prominence, as EPF currently provides retirement benefits as a lump sum at retirement. Although we calculate the RR using assumed annuity rates, the industry is still in a very preliminary stage in Sri Lanka. Returns on annuities, which are mostly operated by life insurance, companies are low even in nominal terms. The calculations of CAR suggest that the accumulated balance at retirement as a share of the last drawn salary is significantly low in the real situation. For example, the highest accumulated balance that has been earned by Cohort 10 is only 7-times the last drawn salary of that Cohort. Therefore members, with little money in hand at retirement, confront many financial risks

including those faced in investing these balances in efficient sources to earn an adequate sum for their retirement needs.

The question whether the member balances are sufficient for members to maintain the standard of living that they sustained before retirement, can be tackled in different ways. The first possible answer is related to the required Replacement Rate after retirement. It is obvious that one should not have the same expenditure patterns at retirement as one had during one's active life. Therefore, it is apparent that the individual should not have a Replacement Rate of 100 per cent, but that should be adequate to cover the expenditures that can arise during old age.[8] EPF members, with relatively low accumulated balance in hand at retirement face a critical risk in investing their balances in order to achieve a sufficient Replacement Rate to maintain their retirement expenditures.

The second problem arises with the persistently high inflation in the country. Inflation further erodes the value of the accumulated balance at retirement. If members fail to invest these balances in inflation hedged sources, their Replacement Rate in real term will further decay over the years. Other aspects of the question are whether there are sufficient sources for members to invest their balances in, to maintain the value without eroding with inflation and whether members are educated or informed about these sources and efficient ways of investing.

A robust legal and financial infrastructure is a prerequisite for the development of a comprehensive, less expensive annuity market and for the development of public confidence regarding the structure (Mitchell, 1998; Doyle and Piggott, 2001). A

[8] Researchers find that a real replacement rate between two- third and three- fourth would be sufficient. But, these rates should be from different pillars rather than from a single pillar.

competent financial system including, banking system and stock market, would provide the public with greater investment opportunities in diversified asset classes.

Given these factors, EPF has obvious reasons for helping its members to design the decumulation phase in an efficient way to protect them against above discussed risks such as inflation risk investment risk and mortality risk. Conversion of lump sum payment to a pension however should be done carefully. There are different ways of providing well-designed benefit schemes. For example, members of the Chilean DC pension scheme have the option of choosing between phase withdrawals at retirement, joining an annuity scheme that provide lifetime benefits, or choosing a combination of both. Lump sum withdrawals however, are generally restricted unless the member's account has a replacement rate of 70 per cent and at least 120 per cent of the guaranteed minimum pension (Doyle and Piggott, 2001).

7. Concluding Remarks

The baseline scenario confirms the point made by critics that members' EPF balances are unlikely to provide financial protection for members against deprivation after retirement. For all the 10 Cohorts considered, the accumulated balances at retirement are between five to seven times their last drawn salaries. This suggests that the capital, a scarce resource particularly in developing countries, has been misallocated. However, if the EPF have followed a diversified portfolio strategy, as in the case of balanced strategy 2, it would have increased the ratio by nearly 40 per cent. Similarly, given moderate nominal annuity rates, EPF could have increased the replacement rates of

members by around 80 per cent if they invested in a balanced portfolio, as discussed in balanced strategy 2.

Calculations strongly suggest that turning to diversified, portfolio strategies with careful and efficient designs would be beneficial for EPF members, and that it is essential to launch such a diversification according to the modern theory of portfolio management. Furthermore, an efficient pension plan can assist developments in financial markets. Ailer and Vittas (2000) claims that properly designed pension funds can bring about substantial benefits for the development of financial markets. In return, developments in capital markets are obviously profitable for the prevailing pension plans.

In Sri Lanka, investments of EPF are politically determined and used for budgetary needs, and as a result, have achieved a consistence low rate of returns. Thus, decentralizing pension fund management, as many other countries have already introduced, is crucially an important factor. Malaysia (since 1996) and Singapore permitted individual account holders to choose outside investment instruments with the expectation that the overall returns to the members will improve (Asher, 2000, 2000). Olson (1999) argues that after developing the asset allocation, it should focus on the best fund managers for each asset class, who can produce the best future performance. Thus, professional fund management is important for EPF to earn enough for its members for their future needs. The fund management can be carried out internally, externally or as a combination of both.

Although the EPF began to diversify its portfolio since last couple of years, poor corporate governance, political motivation, and the lack of good quality assets due to poor and uncertain capital and financial market conditions in the country, have

complicated and reduced alternative portfolio investment capacities. Therefore, it is essential to increase the supply of investible quality debt and equity assets.

Restrictions imposed on EPF investments should be minimized by gradually phasing out the over-dependence of public finances on provident fund balances. Further, an independent setting and professional expertise in the operations of provident fund is an essential requirement for the development of the private pension fund system in the country.

The macroeconomic setting of the country including the under-developed financial and capital markets and political influence are major impediments that hinder the EPF from improving its investment performances through an efficiently designed portfolio approach. Financial market reforms; by which will enable them to shift being dominated by commercial banking to strong capital markets should be carried out as part of the economic reform process. Thus, reforms in private pension schemes should not be carried out in isolation. Rather they should be just one part of the overall macroeconomic reforms. Political will and leadership, sustainable development of the financial sector, reasonable absence of interference, minimum political risk, administrative efficiency and skilled personnel are prior requirements for a successful development of private pensions (Davis, 1995).

International diversification would be one possible way for EPF to enhance the rate of returns on investments, especially because of small domestic capital markets. However, international diversification should be initiated only after a careful analysis of different markets and the correlations among them, since additional risks such as exchange rate risk, settlement risk, liquidity risk and transfer risk are possible with

international diversification (Blake, 1992). Hence, given the limitations in the financial markets in Sri Lanka, international asset diversification will be desirable, provided all necessary precautions and preparations are in place.

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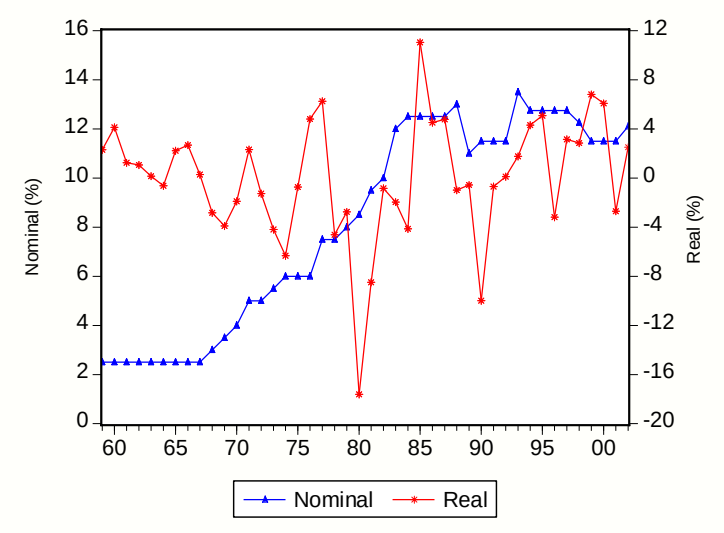

Source: EPF Department Sri Lanka

Figure 1: Nominal and Real Rates of Return on EPF Investments, 1959-2002

Table 1: Nominal Returns: Average and SD (%): 1959 - 2002

Period	Rupee Loans		T Bills [a]		Stocks		Combination (%) [b]					
							60 - 30 - 10		20 - 40 - 40		10 - 30 - 60	
	AVG	SD	AVG	SD	AVG	SD	AVG	SD	AVG	SD	AVG	SD
1959 - 68	3.29	0.74	2.51	0.45	0.75	10.45	3.29	0.74	3.29	0.74	3.29	0.74
1969 - 78	7.34	1.49	5.12	1.59	-3.63	9.50	7.34	1.49	7.34	1.49	7.34	1.49
1979 - 88	11.43	1.99	11.37	2.33	17.20	22.39	12.07	1.80	13.96	8.36	15.22	12.93
1989 - 98	11.93	1.51	15.46	2.86	17.43	41.33	13.54	4.84	15.54	16.91	16.29	25.04
1999 - 02	11.03	0.86	12.29	3.10	9.27	26.82	11.23	2.58	10.83	10.04	10.35	15.52
1980- 02	11.68	1.57	13.45	3.10	16.51	31.70	12.70	3.47	14.32	12.69 #	15.11	18.99
Overall	8.72	3.72	8.95	5.42	8.06	25.27	9.25	4.71	10.10	10.25	10.52	14.53

Notes:
(a). T bill rates prior to 1989 are rates yield for 91 day T-bills. Since then, rates on T-bills refer to rates on 364 day T-bills.
(b). It is assumed that the investments are totally in Rupee Loans prior to 1980. Since 1980, investments were diversified according to the given combinations. Hence, returns prior to 1980 are similar to the returns on rupee loans.

Table 2: Base Line Case: Capital Accumulation Ratio and Replacement Rate

	Without Pre-retirement Withdrawals			With Pre-retirement Withdrawals		
	CAR	RR a	RR b	CAR	RR	RR
Cohort 5	5.48	53.31	26.44	4.07	39.60	19.64
Cohort 6	5.42	52.96	26.17	4.01	39.18	19.36
Cohort 7	5.88	57.73	28.40	4.33	42.49	20.90
Cohort 8	6.33	62.26	30.54	4.62	45.46	22.30
Cohort 9	6.56	64.89	31.64	4.75	46.99	22.91
Cohort 10	6.82	67.85	32.90	4.90	48.80	23.66
Average	6.20	61.14	29.93	4.52	44.58	21.83
Standard Deviation	0.55	5.89	2.67	0.35	3.81	1.71
Coefficient of Variation c	8.93	9.64	8.93	7.84	8.54	7.84

Notes:
(a). Replacement rates have been calculated using nominal discount rates
(b). Replacement rates have been calculated using a real discount rate
(c). Coefficient of variation is SD/ Mean and generally expressed as a percentage

Table 3: Capital Accumulation Ratio (CAR), Summary of Nominal Returns for Alternative Cohorts

	R Loans 100-0-0	T- Bills 0-100-0	Stocks 0-0-100	Balance 1 60-30-10	Balance 2 20-40-40	Balance 3 10-30-60	Base line Case
Cohort 1	5.58	6.15	19.38	6.87	10.63	13.37	4.50
Cohort 2	5.98	6.87	18.06	7.32	10.91	13.30	4.84
Cohort 3	6.14	6.87	10.18	6.81	8.84	9.68	4.69
Cohort 4	6.14	7.56	8.69	7.16	8.74	9.14	5.06
Cohort 5	6.49	7.91	9.42	7.54	9.24	9.73	5.48
Cohort 6	6.30	7.74	6.99	7.14	8.10	8.08	5.42
Cohort 7	6.79	8.37	6.49	7.57	8.20	7.95	5.88
Cohort 8	7.20	9.36	4.92	7.90	7.84	7.08	6.33
Cohort 9	7.48	9.74	6.17	8.36	8.77	8.21	6.56
Cohort 10	7.76	9.83	7.30	8.69	9.45	9.12	6.82
Average	6.58	8.04	9.76	7.54	9.07	9.56	5.56
Range	2.18	3.68	14.46	1.88	2.79	6.29	2.32
Standard Deviation	0.70	1.27	4.98	0.62	1.02	2.15	0.81
Coefficient of Variation	10.69	15.86	51.07	8.22	11.28	22.49	14.63

Notes:
Coefficient of variation is SD/ Mean and generally expressed as a percentage

Table 4: Replacement Rate (RR) At Retirement, Summary of Nominal Returns for Alternative Cohorts

	R Loans 100-0-0	T- Bills 0-100-0	Stocks 0-0-100	Balance 1 60-30-10	Balance 2 20-40-40	Balance 3 10-30-60	Base line Case
Cohort 1	52.58	57.94	182.71	64.76	100.23	126.00	42.41
Cohort 2	56.94	65.44	172.10	69.79	103.91	126.68	46.13
Cohort 3	59.54	66.09	97.95	65.56	85.10	93.21	45.11
Cohort 4	59.54	73.33	84.26	69.46	84.75	88.61	49.04
Cohort 5	63.17	76.97	91.69	73.39	89.94	94.69	53.31
Cohort 6	61.52	75.57	68.25	69.71	79.08	78.91	52.96
Cohort 7	66.61	82.11	63.66	74.27	80.49	77.97	57.73
Cohort 8	70.83	92.12	48.42	77.76	77.18	69.63	62.26
Cohort 9	74.00	96.44	61.04	82.69	86.77	81.27	64.89
Cohort 10	77.21	97.80	72.70	86.50	94.06	90.75	67.85
Average	64.19	78.38	94.28	73.39	88.15	92.77	54.17
Range	24.63	39.86	134.28	20.95	8.96	56.38	25.44
Standard Deviation	7.85	13.65	46.29	7.12	8.92	19.32	8.78
Coefficient of Variation	12.23	17.42	49.10	9.70	10.12	20.82	16.21

Notes:
Coefficient of variation is SD/ Mean and generally expressed as a percentage

Table 5: Replacement Rate (RR) At Retirement, Summary of Nominal Returns of Alternative Cohorts for real Annuity Rates

	R Loans 100-0-0	T- Bills 0-100-0	Stocks 0-0-100	Balance 1 60-30-10	Balance 2 20-40-40	Balance 3 10-30-60	Base line Case
Cohort 1	26.92	29.66	93.54	33.16	51.31	64.51	21.71
Cohort 2	28.84	33.15	87.17	35.35	52.63	64.17	23.37
Cohort 3	27.79	33.14	49.12	32.88	42.67	46.74	22.62
Cohort 4	29.64	36.50	41.94	34.57	42.19	44.11	24.41
Cohort 5	31.33	38.17	45.47	36.40	44.60	46.96	26.44
Cohort 6	30.40	37.35	33.73	34.45	39.08	39.00	26.17
Cohort 7	32.77	40.39	31.32	36.53	39.59	38.35	28.40
Cohort 8	34.75	45.19	23.76	38.15	37.86	34.16	30.54
Cohort 9	36.09	47.03	29.77	40.32	42.31	39.63	31.64
Cohort 10	37.44	47.42	35.25	41.94	45.61	44.00	32.90
Average	31.60	38.80	47.11	36.37	43.79	46.16	26.82
Range	10.52	17.76	69.78	9.07	2.93	30.35	11.19
Standard Deviation	3.57	6.15	24.06	2.99	4.94	10.38	3.92
Coefficient of Variation	11.31	15.86	51.07	8.22	11.28	22.49	14.63

Notes:
Coefficient of variation is SD/ Mean and generally expressed as a percentage

Table 6: Capital Accumulation Ratio (CAR) for Different Parametric Reform Options: Summary of Nominal Returns for Alternative Cohorts

	Base Line Case (No Pre-retirement Withdrawals)	A. Increase Retirement Age to 60	B. Increase Contribution Rate	C. Investment Function Reforms (Balance 2)	A and c together	B and C together	A and B together	A, B and C together
Cohort 1	4.50	5.84	4.95	10.63	9.17	11.69	6.43	10.09
Cohort 2	4.84	6.33	5.33	10.91	9.28	12.00	6.96	10.21
Cohort 3	4.69	6.80	5.16	8.84	8.86	9.73	7.47	9.75
Cohort 4	5.06	7.03	5.56	8.74	9.89	9.61	7.73	10.88
Cohort 5	5.48	7.30	6.03	9.24	10.65	10.17	8.03	11.72
Average	4.91	6.66	5.40	9.67	9.57	10.64	7.33	10.53
Standard Deviation	0.38	0.58	0.41	1.02	0.71	1.13	0.64	0.78
Coefficient of Variation	7.67	8.70	7.67	10.57	7.41	10.57	8.70	7.41

Table 7: Replacement Rate for Different Parametric Reform Options: Summary of Nominal Returns for Alternative Cohorts

	Base Line Case (No Pre-retirement Withdrawals)	A. Increasing Retirement Age to 60	B. Increasing Contribution Rate	C. Investment Function Reforms (Balance 2)	A and c together	B and C together	A and B together	A, B and C together
Cohort 1	42.41	57.06	46.66	100.23	89.59	110.25	62.77	98.55
Cohort 2	46.13	62.09	50.75	103.91	91.06	114.30	68.30	100.16
Cohort 3	45.11	66.85	49.62	85.10	87.17	93.61	73.54	95.89
Cohort 4	49.04	69.56	53.94	84.75	97.85	93.23	76.52	107.64
Cohort 5	53.31	72.68	58.65	89.94	106.01	98.94	79.95	116.61
Average	47.20	65.65	51.92	92.79	94.34	102.07	72.22	103.77
Standard Deviation	4.16	6.18	4.57	8.82	7.64	9.70	6.79	8.40
Coefficient of Variation	8.81	9.41	8.81	9.50	8.10	9.50	9.41	8.10