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Reforming the Sri Lankan Employees Provident Fund – A Historical and Counterfactual Simulation Perspective

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1. Introduction

Developing countries in general and Asia in particular are ageing rapidly. Modern economic development is marginalising the role played by the family as a source of informal old age support while exerting greater reliance on formal systems of old age income support. Many countries have adopted parametric or marginal reforms, such as decreasing the retirement income replacement rate, increasing the pension contribution rate and increasing the retirement age. Yet, increasing fiscal pressure and the rapid ageing of the region's population usually require more than parametric reforms. Moreover, in many developing countries, the lack of ring fencing of pension funds from government access further limits the scope and choice of parametric reform. Recently, the view that retirement income provision should become the mandated responsibility of individuals rather than part of the tax transfer arrangements of governments is attracting much attention. The focus of this paper is on the mandatory funded retirement income support system in Sri Lanka, which is largely provided by the Employee Provident Fund (EPF).

Provident funds were created by the British in several former colonies and currently operate in about 20 countries such as Singapore, Malaysia, Mauritius and Kenya. This paper first of all seeks to reveal the deficiencies in the Sri Lankan EPF system from both a micro and a macro perspective. The micro perspective focuses on income replacement, longevity and coverage risks and the financial liquidity of the fund, using accounting based numerical simulations on the basis of information from actual EPF financial accounts. From a macro perspective, the paper aims to examine income replacement on a model consistent basis and the fiscal implications of delivering equitable retirement income support. The paper employs historical simulation methods using a computable general equilibrium (CGE) model that integrates essential demographic and labour market trends, actuarial features of the EPF as well as the conventional neoclassical economic growth mechanism. To our knowledge, the use of such a simulation framework for examining the EPF is the first rigorous approach to the study of Provident Fund type pension systems in the literature.

The second objective of the paper is to use the CGE model to evaluate various options for reforming the EPF through counterfactual simulation methods. Such options typically include parametric reforms and the "clean-break" privatisation strategy. The

paper examines the implications of introducing reform scenarios for the design of the counterfactual simulations and evaluates the effects of the reform strategies on macroeconomic performance and income replacement ratios. In pursuing the "clean-break" strategy, the issue of dealing with the transition cost is also examined.

2. Critical evaluation of the EPF from a micro perspective

Sri Lanka's formal mechanism for providing old age income security consists of unfunded pension schemes and a fully funded defined contribution scheme. The former provides coverage to all government employees and defence force personnel by way of a pay-as-you-go (PAYGO) type pension while the latter covers private sector employees through provident funds. Sri Lanka, like most other developing countries, does not have a pension system that is universal in coverage. In the period following independence in 1948, Sri Lanka was largely an agricultural based economy with a large unorganised sector. The EPF was established in 1959 to cover employees in the organised sector. Coverage was largely confined to the then small urban formal sector. During the past two decades, the EPF membership has rapidly expanded by around 60% over the period from 1960-1995, albeit from a low base, reflecting the growing prominence of the manufacturing and service sectors relative to the agricultural sector. Despite this substantial increase, by 1995 the EPF membership as a proportion of Sri Lanka's total workforce stood at around 10%. This low rate of coverage reflects both limited participation in the EPF across all sectors in the economy and the rapid growth in the size of the working age population. This low rate of participation in the EPF may be due to a substantial hidden tax on the formal sectors in the current EPF system, as we reveal below.

Provident funds are systems in which the employer and the employee pay a defined contribution into a pooled fund, which is invested and paid back to the employee usually in the form of a lump sum at retirement. In contrast to the mandatory fully funded retirement income scheme of the decentralised types such as those prevailing in the UK and Australia, provident funds are centralised. That is, all funds are collected, invested and paid out in the form of a lump sum by a central financial agency to beneficiaries. Table 1 reveals a summary of the main administrative features of Sri Lanka's EPF.

Table 1 Salient Characteristics of the Sri Lankan EPF

Administration	Centralised and Administered by the Government
Financing	Fully Funded
Contribution	20 percent
Investment regulation	Almost exclusively in government bonds
Fund Performance	Almost equal to return on government fixed income securities
Administrative Costs	Low
Determination of Benefit	Defined contribution type
Nature of Benefit	Lump sum payment on retirement
Pre-mature withdrawals	Easily accessed prior to retirement age
Taxation	10 percent of retirement benefit
Regulation	Centralised
Coverage	To formal sectors

The EPF is the single largest investor in the domestic financial market with virtually all investments in Government debt instruments. The total investments of the Fund as at end of 1995 was close to Rs 97bn (US 1bn), of which 99 percent was invested in Government money market and fixed-interest instruments. Total government debt outstanding as of end 1995 was Rs 631.5bn. Hence, close to 17 percent of this outstanding debt is owned by the EPF. The reasons for the EPF's investment being confined almost exclusively to government debt instruments are as follows:

(1) Income tax enforcement in Sri Lanka has been weak and consequently the tax revenue in-take has also been low. Corporate and personal income taxes averaged only 1.7 percent and 0.8 percent of GDP respectively at the end of the 1980s. Exemptions, tax holidays, exclusion of public servants from paying income taxes, and most importantly the failure to comply and lack of enforcement were the reasons for the low tax collections.

(2) Since the Government is responsible for the administration and investment decisions of the EPF, the scope for political bias in the Fund's investment supersedes the retirement objectives of its members. As long as the Government has complete access to the EPF and tax enforcement remains inefficiently low, the Fund's investments will be restricted to Government sponsored financial debt instruments.

The EPF represents the largest source of funds for government domestic borrowing, exceeding even the amounts contributed by savings institutions and commercial banks. As the increase in the working age population and thus the workforce and the growth of the formal sectors result in increased contributions to the Fund, the incentive to remove political interference with the EPF remains low. As a result, the defined contribution features of the EPF have been seriously undermined and a widening gap has emerged between the notional and actual performance of the EPF over time, as we show below.

Between 1960 and 1995 the rate of return on EPF investments has ranged between 11 percent and 14.75 percent while the rate of interest payable to member balances has been between 2 percent and 12.75 percent. The difference between the two rates of return arises from the need to cover administrative and other incidental costs as well as to finance government current and capital expenditures. Invariably, the real returns to individual balances have been negative to slightly positive as is evident from Table 2.1. Moreover, using the published figures on total EPF contributions and rates of return to the Fund, we can calculate the notional accrued pension benefit for the average EPF member at retirement. This calculation is done by numerically simulating the growth of the individual member balance for the average EPF member who commences employment at age 25 and retires at age 65. This notional amount is then compared with the amount that the EPF actually paid to the average member, and the results of the comparison are shown in Table 2.2.

Table 2.1 EPF – Returns to Member Balances (% per annum)

Year	**1981-1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**
Rate of Return to Member Balances	9.50 to 12.50	13.00	11.50	11.50	11.50	13.50	12.75	12.75	12.5
Annual Inflation	12.40	11.60	21.50	12.20	11.40	11.80	8.40	11.30	9.10
Real Rate of Return to Member Balances	-2.90 to 0.10	1.40	-10.00	-0.70	0.10	1.70	4.35	1.45	3.40

Table 2.2 Notional versus Actual Lump Sum Pension Entitlements

Year	Average Notional Lump Sum Benefits (Rs)	Average Actual Lump Sum Benefits (Rs)	Difference Between Notional and Actual Lump Sums (Rs)
1981	16328	4847	-11481
1982	20063	5328	-14735
1983	24833	6981	-17852
1984	30942	8482	-22460
1985	38478	11341	-27137
1986	47215	12854	-34361
1987	57334	16612	-40722
1988	69940	15951	-53989
1989	86096	24069	-62027
1990	106312	26988	-79324
1991	129565	34548	-95017
1992	157058	45426	-111632
1993	193367	46351	-147016
1994	233677	50628	-183049
1995	278794	55207	-223587

Source: Derived from EPF Annual Accounts[1].

As is clear from Table 2.2, notionally the average lump sum benefit for an individual EPF member rises far more dramatically than the average lump sum that a member actually receives. Moreover, the gap between the notional and actual benefits is getting wider over time. These figures clearly demonstrate the extent to which any notional link between contributions and benefits has been destroyed within the EPF. The difference between notional and actual lump sum benefits represents a hidden tax on the EPF members and the firms in the formal sectors that is used to finance government current and capital expenditures. This difference also has a dramatic effect on the level of income support for the EPF members during their retirement years in notional and actual terms. The level of income support during retirement is usually measured by the income replacement ratio, which, in our case, is calculated as the ratio between a constant annuity income derived from the lump sum pension benefits and the average EPF member final year wage, given a discount rate of 9.54%. This discount rate is the average rate of return to government bonds during the calculation period from 1981 to 1995. It should be pointed out that since no published

data is available on average final year wage for the average retired EPF member, we have to estimate the figures for different years using the average amounts of contribution that the average member makes each year and the contribution rates. The derived notional and actual income replacement ratios are reported in Table 2.3.

Table 2.3 Notional and Actual Income Replacement Ratios

Year	Notional income replacement ratio		Actual income replacement ratio	
	Life expectancy = 7	Life expectancy = 10	Life expectancy = 7	Life expectancy = 10
1981	0.42	0.33	0.13	0.10
1982	0.42	0.34	0.11	0.09
1983	0.48	0.38	0.13	0.11
1984	0.47	0.37	0.13	0.10
1985	0.48	0.38	0.14	0.11
1986	0.55	0.43	0.15	0.12
1987	0.62	0.49	0.18	0.14
1988	0.62	0.49	0.14	0.11
1989	0.69	0.54	0.19	0.15
1990	0.70	0.55	0.18	0.14
1991	0.80	0.63	0.21	0.17
1992	0.84	0.67	0.24	0.19
1993	0.88	0.70	0.21	0.17
1994	1.02	0.81	0.22	0.17
1995	1.25	0.98	0.25	0.19

Clearly in notional terms, the income replacement ratios for the average retired EPF member look very impressive. As will become clear below, the impressive notional performance of the EPF is primarily due to the snowballing effect of the government rolling over matured EPF investments and constantly issuing new debts to the EPF. However, in actual terms, the income replacement ratios fall far short of the desired level. Especially when the life expectancy is assumed to extend to 10 years from retirement, the annuity income from the lump sum EPF pension benefits is less than 1/5 of the average EPF member's final year wage, compared to the 98% of the final year wage in notional terms.

[1] Details of the derivation are available upon request.

The breakdown of the actuarial features of the EPF can be further illustrated by examining the aggregate EPF account figures. From an actuarial point of view, for the EPF as a whole, the total lump sum payments to the retired members in each year depend on contributions to the fund by the current cohort of retirees over their entire working life, the historical performance of investments in government securities, and proceeds from sales of matured government securities. It is expected that contributions to the EPF in any particular year, which are made by all age cohorts of the EPF members, should have minimal impact on the lump sum payments for one age cohort of the members (i.e., the retirees) in that year. However, if the EPF is mismanaged and used as a de facto taxation mechanism for the government, then the actuarial features of the EPF will be broken. In such a scenario, the government may be forced to rely on new contributions to the EPF from all age cohorts and proceeds from sales of matured EPF investments in each year to meet the lump sum payments in that year. In order to reveal the empirical relationship between lump sum payments in each year and new contributions to the EPF, maturities and investments, we regress the first variable on the remaining variables. Table 2.4 presents the regression results.

Table 2.4 Regression Results of EPF Annual Cash Flows

Dependent variable is **ALUMP**

26 observations used for estimation from 1970 to 1995

Regressor	**Coefficient**	**Standard Error**	**T-Ratio(Prob)**
CONST	-92.2890	94.5666	-.97592(.340)
CONTR	.53890	.18665	2.8873(.009)
MATURITY	.0083680	.0065397	1.2796(.214)
INVEST	-.023817	.022487	-1.0591(.301)

R-Squared	.97606	R-Bar Squared	.97007
S.E of Regression	151.1009	F-Stat. F(5, 20)	163.0497
RSS	456629.5		
DW-statistic	1.8323		

Clearly, investments are inversely correlated with lump sum payments showing that as investments increase lump sum payments decrease. Even maturities due barely explain annual lump sum payments. It is only current contributions that are significant

in explaining the lump sum payments to retirees each year. If new contributions increase by 1 percent it translates to a .54 percent rise in lump sum payments, *ceteris paribus*. Therefore, instead of EPF lump sum retirement benefits being driven by investment returns, past contribution rates, working years and the benefits of compounding, they are dominantly influenced by current contribution inflows and possibly from external sources by now. The lack of ring fencing of EPF funds has meant that they are hostage to political bias in how they are disbursed and invested. While current tax payers mostly fund pension benefits in PAYGO systems, within the EPF system current contributions by EPF members fund current lump sums, in effect making current contributions like a de facto tax. Therefore, effectively, the EPF appears to be no different from the PAYGO system. On the one hand, the EPF does not deliver any actuarially accrued benefits for retired members and the actual benefits are not different from the defined benefits as in the PAYGO system. On the other hand, the way the current liabilities of the EPF are financed is also similar to that of the PAYGO system – both rely on taxation of the current generation of workers, either explicitly or implicitly.

We now turn to examine the financial liquidity of the EPF. One difficulty in analysing the EPF's financial liquidity is that since the EPF does not pay retired members their full accrued benefits, the implicit pension liabilities to all existing members are significantly deflated. However, as we have no information on the age structure and numbers of working years for the EPF members, it is impossible to derive the implicit pension liabilities. Nevertheless, by examining the composition of the EPF's assets, investment strategy and cash flows, we can highlight the potential dangers in the financial liquidity of the Fund. Looking at the asset composition, it is noted that in 1995, 95% of the EPF's total assets and 99% of the EPF's total investments were held in government securities. Given the fact that the government uses the bonds to finance current and capital expenditures, there is the danger of the government playing the Ponzi game of paying for the matured debts through rolling-over of existing debts, issuance of new debts, or current contributions by EPF members. Unlike a private fund that has control over its own investment strategy, the EPF is under government control. Thus, the government has the incentive and the ability to keep playing such a game by either imposing the extra tax burden on the current generation of workers and firms in the formal sectors or shifting these burdens to future generations of EPF

members. By examining the cash flows of the EPF over time, we can reveal that the Sri Lankan government was indeed involved in such a game. Table 2.5 shows the EPF's total investments, maturities and net new investments from 1970 – 1995. It is clear that both total investments and maturities have exploded over time, growing at an annual average rate of 31% and 49% respectively. The net new investments, which are total investments net of maturities due, were growing at an annual average rate of 23%. Therefore, it appears that the government was relying more and more heavily on rolling over existing debts and issuing new debts to the EPF to meet its various obligations. It is no surprise that the notional entitlements for retired EPF members as derived in a previous section are so high and it was impossible for the government to deliver these notional amounts. Due to the nature of the Ponzi game, such notional amounts are not derived on any rationale basis and this will have implications for measuring the transitional cost of reforming the EPF, as we discuss in a later section.

Table 2.5 Main Cash Flows of the EPF, 1970 – 1995

Year	(1) Investments During the Year	(2) Maturities During the Year	(3) Net New Investments During the Year* (1-2)
1970	100,713,660	3,035,685	97,677,975
1971	164,904,374	4,338,409	160,565,965
1972	165,910,882	9,322,682	156,588,200
1973	204,196,991	7,662,541	196,534,450
1974	200,240,100	2,125,000	198,115,100
1975	262,186,000	13,490,250	248,695,750
1976	295,712,200	3,950,000	291,762,200
1977	401,002,800	3,021,060	397,981,740
1978	677,724,915	35,760,187	641,964,728
1979	971,471,264	190,413,682	781,057,583
1980	1,022,500,194	137,207,674	885,292,520
1981	1,123,971,335	48,165,679	1,075,805,656
1982	1,477,718,111	108,845,054	1,368,873,058
1983	2,389,003,050	676,619,780	1,712,383,270
1984	5,895,620,191	3,717,662,491	2,177,957,700
1985	5,401,865,229	2,484,537,829	2,917,327,400
1986	6,137,981,584	2,471,422,084	3,666,559,500
1987	6,409,686,440	2,494,305,940	3,915,380,500

1988	7,012,551,410	2,154,442,710	4,858,108,700
1989	8,897,190,604	3,115,218,570	5,781,972,034
1990	11,044,726,977	4,852,060,118	6,192,666,859
1991	16,014,421,247	8,234,821,350	7,779,599,897
1992	26,742,416,857	18,154,002,576	8,588,414,281
1993	30,426,631,060	18,729,004,708	11,697,626,352
1994	37,606,164,370	23,085,051,075	14,521,113,295
1995	82,696,453,950	66,813,093,114	15,883,360,836

* Includes Re-investment of Maturity Proceeds

Source: EPF Annual Accounts.

To summarise our discussion so far, it is abundantly clear that due to government control of the EPF, its funds are creamed off by the government and constitute a hidden tax on labour in the formal sectors. It may be argued with little difficulty that the EPF is used to compensate for the weak tax enforcement capabilities, thereby significantly underrating its retirement income objective. Whether it is mismanagement and/or the pursuit of conflicting objectives by the EPF, the Fund's cash flow affords very little to its members. Moreover, the political interference with the EPF has also seriously undermined the financial sustainability of the Fund. As demographic transition in Sri Lanka delivers a large number of retirees in twenty to thirty years from now, so will there be a substantial escalation in the liabilities of the EPF of catastrophic proportions. This will place a large financial burden on future taxpayers and stifle investment rates, unless future retirees are to be forced to endure a life of poverty during their retirement years. The World Bank also echoes this as a globally pervasive threat of relative proportions in its 1994 publication aptly titled "Averting the Old Age Crisis".

The above discussion has highlighted the urgency for reforming the EPF. Given the simultaneous interactions of the EPF transactions, government fiscal position and macroeconomic performance, it is completely inadequate to discuss pension reform in Sri Lanka by focusing on the EPF alone. In the literature on pension reform, various models such as the over-lapping generations (OLG) and actuarial models have been used (examples include Atkinson, 1987; Aaron, 1997; Arrau and Schmidt-Hebbel, 1993; Cifuentes and Valdes-Prieto, 1996; and Kotlikoff et. al., 1997). The key limitations of these models lie with the difficulties they have in incorporating

demographic – EPF – macroeconomic links. This is a crucial aspect of pension studies since demographic transition has bearings on overall economic activity due to its effects on savings behaviour, labour market behaviour, interest rates and investment levels. Thus a suitable model must capture the impacts of reform options on both the demand (disposable income) and supply (labour market participation levels, labour supply, unit cost of production and wage and price structures) sides of the economy simultaneously. Therefore, we construct a computable general equilibrium (CGE) model that integrates essential demographic and labour market trends, actuarial features of the EPF as well as the conventional neoclassical economic growth mechanism. The CGE modelling approach has also been used to study pension reform in other countries (see, for example, Wang, et. al., 2000). The next section introduces the essential features of the Sri Lankan CGE model and its database.

3. Essential Features of the Sri Lankan CGE[2]

The Sri Lankan CGE model identifies six industrial sectors (Tea and Rubber, Other Agriculture, Mining and Industry, Electricity, Construction and Services) and four aggregate economic transactors (households, corporations, government and the rest of the world). The treatment of production, trade flows, distribution and redistribution of income, and domestic final consumption follows the conventional CGE models (see, for example, Shoven and Whalley, 1992; Bateman and Piggott, 1997; Kehoe, 1992). In the production side of the model, cost minimisation is imposed with multi-level CES production functions. There are four major components of final demand: consumption, investment, government expenditure and exports. Of these, real government expenditure is exogenous. Consumption is a linear homogeneous function of real disposable income which reasonably captures the aggregate consumption behaviour in a country that lacks a sophisticated financial and consumer credit market. Exports (and imports) are generally determined via an Armington link (Armington, 1969) and are therefore relative-price sensitive. Investment is determined in such a way that the actual capital stock is ultimately adjusted to the desired capital stock, which is compatible with a simple theory of optimal investment behaviour given the assumption of quadratic adjustment costs. The crucial aspect of the present

[2] Due to limit of space, we only give a brief qualitative introduction of the essential features of the Sri Lankan CGE model. A detailed technical specification of the model is available upon request.

model is the incorporation of the EPF into the conventional CGE model, which warrants some elaboration here.

On the production side, the EPF is incorporated into the production structure through the link between the price of labour in different sectors and the employers' and employees' contribution rates to the EPF and the employees' participation rates in the EPF in each sector. These contributions are treated like an additional wedge, apart from the income tax, between the price of labour for the employers and the take-home wage for the employees. The total EPF contributions form part of the economy's Value Added. On the income distribution side, the interaction between institutions and governments must be extended to incorporate the EPF link. Total EPF contributions are paid out of the Value Added account into the households account, and subsequently are allocated from the households account to the government account as transfer payments. Moreover, the households also receive pension income from the EPF which comes out of the government account, as the EPF is under the government's control. It should be pointed out that each cohort of retired EPF members receive a lump sum from the government each year, however, we cannot include the total value of the lump sum in the calculation of pension income for that year. The correct procedure is to derive the stream of annuity incomes from the lump sum over the entire life span in retirement and sum over the annuity incomes for all the retired cohorts in a particular year. For example, if the life expectancy from retirement is 10 years, then there are 10 cohorts of retirees in a particular year. Each cohort would have received the lump sum in different years, reflecting the fact that they retire in different years. Let $LUMP_{coh}$ indicate the lump sums paid to all the cohorts, r the rate of discount, and assume a constant stream of annuity incomes over the retired years, the annuity income in a particular year for each cohort can be calculated as:

$$A_{coh} = \frac{LUMP_{coh} * r}{1-(1+r)^{-10}}$$

Then, for the households sector as a whole, the total income from the EPF in a year is simply the sum of the annuity incomes of all the cohorts of retirees in that year. A further point to note is that these lump sum payments are affected by the hidden tax, as is discussed earlier. This hidden tax gives rise to an actual and a notional measure of lump sums, and actual and notional income replacement ratios.

The present Sri Lankan CGE model is parameterised on the basis of a Social Accounting Matrix (SAM) for Sri Lanka in 1981 augmented with published EPF accounts and population statistics. Pyatt and Roe (1977) constructed the first SAM for Sri Lanka. It still remains the most detailed and exhaustive SAM for Sri Lanka. Considerable changes have occurred in the economy since then. Bandara (1989) and Herat (1994) have updated the earlier SAM to a new one for 1981, the latest year for which we have a full SAM. However, we have access to detailed EPF accounts for up to 1995. Given the absence of a more recent SAM, our modelling strategy is to employ historical and counterfactual simulations over the period from 1981 to 1995 to illustrate various scenarios regarding the EPF. Since the past performance of the Sri Lankan economy over the simulation periods is already observable, conducting the historical simulation requires that the model replicate the key macroeconomic values for each period over the entire simulation horizon. In order to do so, we have taken the published actual values for the key exogenous variables of the model, such as government expenditure, population, number of EPF members, number of EPF retirees, and the notional and actual lump sum payments by the EPF, as exogenous inputs into the dynamic process of the model. We also assume that any growth in aggregate GDP comes from population growth and Harrod type exogenous technical progress. We adjust the sectoral labour productivity growth rates in such a way that the model reproduces the published aggregate GDP growth rates in all periods. We have also carried out extensive tests on the model to make sure that the model exhibits some desirable long-run properties such as real values being homogeneous of degree zero in exogenous prices and sectoral output growth rates converging to balanced long-run levels. Once the model has passed all the tests, it is then used for the counterfactual simulation exercises to examine questions like what difference would it make if the Sri Lankan government were to introduce various changes to the EPF system over the historical period. The qualitative and quantitative results of the simulation exercises can provide useful guidance on any future reform agenda. We now turn to the discussion of various simulation scenarios in detail.

4. Model Simulations

Our design of simulations follows closely the conceptual discussion of pension reform options in Disney (2000). We consider three broad simulation scenarios: business as

usual, parametric reform, and a clean-break privatisation strategy. The following sections discuss each scenario and the simulation results.

4.1. Business as usual (BAU) scenario

In this scenario, we do not introduce any reform to the EPF. We conduct two simulations. The first is to simply run the model forward over the simulation horizon to explicitly reveal the extent of the government creaming-off of the EPF and the hidden tax in all periods. Since the model is an extended actuarial model to cover economy wide and demographic interactions, it allows macro economic and social equity issues to be considered on a model consistent basis. For example, in our earlier calculations of the income replacement ratios, since there is no published data on average incomes over time, we had to rely on some rough and ready methods to derive such figures. Within the CGE model, the sectoral and average incomes are generated endogenously, enabling the income replacement ratios to be calculated on a model consistent basis. The results of this simulation also serve as a reference case to make economic efficiency and social equity comparisons with the other simulations. The second simulation is to run the model forward with the hidden tax removed to examine the impact on the government's fiscal position. The purpose of this simulation is to investigate whether or not the government's dual objectives of making good its notional obligations to the retired EPF members and at the same time maintaining a sound budgetary position are compatible. Table 4.1 summarises the basic setups for these two simulations and the results of both simulations are reported in Table 4.2.

Table 4.1 Summary of Business as Usual Scenario Assumptions

Employer contribution	12 percent
Employee contribution	8 percent
Age at retirement	62 years
Life Expectancy at retirement	10 years
Type of retirement income	lump sum converted to annuity
Annuity term	10 years
Simulation time periods	15 years
Coverage	Mostly formal and urban sectors

Table 4.2 Simulation results for the business as usual case

Year	Notional Income replacement ratio	Actual Income replacement ratio	Creaming off / GDP (%)	Hidden tax rate on firms (%)	Hidden tax rate on workers (%)	Impact on GS/GDP (%)
1981	0.11	0.04	0.51	5.32	3.54	-16.20
1982	0.14	0.04	0.67	6.11	4.08	-16.43
1983	0.15	0.05	0.82	6.91	4.61	-17.99
1984	0.18	0.05	1.02	6.92	4.61	-18.98
1985	0.19	0.06	1.16	6.83	4.55	-19.12
1986	0.21	0.06	1.28	7.38	4.92	-20.59
1987	0.24	0.07	1.45	7.93	5.28	-21.48
1988	0.28	0.08	1.69	7.70	5.13	-23.13
1989	0.31	0.09	1.85	7.68	5.12	-24.63
1990	0.36	0.10	2.78	7.43	4.95	-27.07
1991	0.43	0.11	2.48	7.84	5.22	-28.79
1992	0.53	0.15	2.97	8.18	5.45	-33.08
1993	0.63	0.17	3.59	8.50	5.67	-37.21
1994	0.75	0.19	4.32	9.67	6.45	-43.41
1995	0.86	0.21	5.225	11.23	7.49	-49.61

Columns 2-6 in Table 4.2 relate to the first simulation and the last column relates to the second simulation. Columns 2 and 3 show the notional and actual income replacement ratios as afforded by the EPF to the average retired EPF member. Since we have assumed a life expectancy of 10 years from retirement, these ratios should be compared with our earlier mechanical calculations as reported in columns 3 and 5 in Table 2.3. Clearly our earlier mechanical calculations have exaggerated both the notional and actual ratios, particularly in the earlier years. However, the discrepancy between the notional and actual benefits is still evident. The resultant creaming-off by the government is computed in the model as the total amount of retirement benefits withheld by the government. Column 4 reports the amount of creaming-off as a proportion of GDP. As is evident, the extent of government creaming-off was increasing rapidly over time, rising from 0.51% in 1981 to 5.23% in 1995. As we discussed earlier, this creaming-off represents a hidden tax on the employers and the employees in the formal sectors. The next two columns report the hidden tax rates on the firms and workers. These hidden tax rates are calculated on the basis of what EPF contribution rates by the firms and workers are required to arrive at the total amounts of creaming-off, given the size of the current EPF membership and participation rates across sectors. Despite the substantial EPF contribution rates of 12% and 8% for the firms and employees respectively, by 1995 almost the entire contribution rates are accounted for by the hidden tax rates. Thus the creaming-off imposes an increasingly

heavy hidden tax burden on the firms and workers in the formal sectors. This may be a fundamental factor underlying the low participation rates in the EPF across all sectors in the economy. Obviously this situation is unsustainable both from the social equity and economic efficiency point of view.

The last column reports the impact on the government's budgetary position if the hidden tax is reimbursed to the retired EPF members in every year. In this case, if the retired EPF members were to receive the full notional pension benefits, the government's budgetary situation would rapidly deteriorate and the government would be compelled to resort to external sources of funding or getting even more deeply involved in the Ponzi game. Apparently, the government cannot make good its notional obligations to the retired EPF members and at the same time maintain a sound fiscal position without reforming the EPF. Thus the only way forward is to introduce a reform agenda, to which we now turn.

4.2. Parametric reform scenario

The choice of a country's pension system or any pension reform can have serious effects on the distribution of national income between the current generation of workers and retirees and the intertemporal allocation of consumption over different generations. Moreover, there are also serious implications for macroeconomic performance and the government's fiscal sustainability. Therefore, any pension reform option must be evaluated from both a social equity and economic efficiency perspective. In our evaluation of the pension reform options, we have adopted the following criteria: i) an adequate income replacement ratio; ii) adequate coverage; iii) maintenance or enhancement of economic growth; iv) sustainability of government budgetary position.

In simulating the parametric reform options, our initial strategy is to specify a set of predetermined target income replacement ratio for every year from 1981 to 1995. We then let the model determine the required adjustment in a number of key EPF parameters such as the contribution rate by firms and employees and the rate of return to EPF investment in government bonds to achieve the targets. Determining the "right" replacement target ratio varies from country to country and individual circumstances. According to the World Bank (1994), the expectation is for the "right"

replacement target ratio to be 45% of gross final year wage in low-income economies. This can only be a reasonable estimate given that house ownership is low in Sri Lanka and retirees will still need to be able to afford shelter. However, given the very low base of the actual income replacement ratios in the earlier years, an imposition of a 45% target right at the start of the simulation period would generate too huge a shock to the model. Therefore, we have adopted a gradualist approach to meeting the 45% target by 1992 and thereafter. However, when we allow either the firms' or the employees' EPF contribution rate to be flexible, the model solution fails to converge in both cases. This result is not really surprising, as a change in the contribution rates will have both positive and negative impacts on the income replacement ratio. For example, when the contribution rate is increased, on the one hand, the income replacement ratio may also increase because of the increased lump sum benefits coming from the higher contributions. On the other hand, the income replacement ratio may decrease because the demand for labour may fall due to the increased labour costs, which will reduce the number of workers contributing to the Fund and hence lump sum benefits. Therefore, the net impact of any change in the contribution rates on the income replacement ratio may be limited and it may be impossible to achieve the target income replacement ratios whatever the new contribution rates are.

When the rate of return to EPF investment is allowed to be flexible to meet the targets, the model solution converges. However, the required rates of return are unrealistically high. Therefore, it is clear that tinkering with the key parameters of the EPF by itself is completely futile for achieving the desired income replacement ratio and coverage. To shed further light on the impacts of changing the key parameters on social equity, macroeconomic performance and government finance, we also simulated the effects of manually increasing the contribution rates and the rates of return[3]. As is expected, the impact on the income replacement ratios is limited across all cases. In terms of the impact on economic growth, again the effects are limited. Nevertheless, higher contribution rates tend to slightly reduce economic growth over the short term.

4.3. Clean-Break Strategy

[3] Detailed results of these simulations are not reported here, but are available upon request.

It is abundantly clear that the only viable option is to introduce a comprehensive and radical reform strategy, such as the clean-break privatisation programme. It entails a complete revamp of the old system and introduction of a dominant mandatory fully funded pillar 2 alongside an unfunded social safety net pillar 1. In our preliminary design of the new system, we assume that it has the following features. The new pillar 1 provides a flat retirement pension benefit of 10% of average take-home wage to all retirees excluding public servants, and is financed through a new national insurance contribution rate of 5% that is only levied on the formal sectors. Within the new pillar 2, the (average) hidden tax is calculated and removed from employers and employees contribution rates. The new employer and employee contribution rates are now 5 and 3 percent respectively. This is a substantial reduction compared to the previous 12 and 8 percent levels. The combined burden of pillar 1 and 2 in the new system is still substantially lower than the total burden in the old system. However, in a number of simulations, we also allow these new contribution rates to be endogenously determined in order to meet a set of predetermined target income replacement ratios, as we discuss below.

A further feature of the new pension system is that the PAYGO element within the old EPF system is removed by re-establishing the link between benefits and investments. The PAYGO feature of the EPF is dismantled and the private savings effort is introduced through pillar 2. The essence of this reform strategy is to gradually phase out within pillar 2 the reliance on new contributions to finance lump sum benefits and gradually phase in the defined contribution spirit of the EPF.

It is worth noting that the cost of moving from the existing system to the new system, that is, the transition cost of pension reform is different in this case from the usual PAYGO case. Because of the nature of the Ponzi game played by the Sri Lankan government in the finances of the EPF, the calculation of the full implicit pension liability, and thus the associated transition cost, is grossly exaggerated. It is impossible and indeed unnecessary for the government to calculate and finance the full amount of the transition cost. What is more important is to ensure that the new system delivers adequate and affordable retirement income support without jeopardising economic growth.

Our strategy is to introduce a set of combined progressive income replacement targets for pillars 1 and 2 that can be met by changing key elements in both pillars. These key elements include the national insurance contribution rate, the employers' and employees' EPF contribution rates, the rates of return to EPF investments, and the amount of total EPF investment each year. These targets are selected on the basis of the notional accrued pension rights to EPF members retiring under the early years of the new system. However, the targets for later years (post 1992) are capped at 45 percent. This compensates for the aberration in the old EPF accounts that have allowed notional investments to rapidly escalate implying huge notional income replacement levels. Making good such a high notional obligation is meaningless and would rapidly deteriorate the government's fiscal sustainability, as our earlier simulation results illustrate.

In several simulations, we let the model determine the required stand-alone change in the national insurance contribution rate or the EPF contribution rates or the rates of return to investment to meet the targets. In the cases of making national insurance and EPF contribution rates endogenous, non of the model solutions converges. In the case of making the rate of return to EPF investments endogenous, although the model solution converges, the required rates of return to meet the targeted income replacement ratios are completely unrealistic. Therefore, in designing a clean-break reform strategy, it seems that the use of any single dose of reform is unlikely to achieve the desired outcome. Our set-up for the next simulation is outlined below:

Pension benefits	Finance
Non-EPF members: 10% of average final year take-home wage that is afforded by pillar 1 only; EPF members: targeted income replacement ratios that are afforded by both pillar 1 and 2.	Pillar 1: National insurance contribution rate: 5%; Pillar 2: Employers' EPF contribution rate: 5%; Employees' EPF contribution rate: 3%; Average annual rate of return to EPF investment: 12%.

Given the above set-up, we let the annual gross investment by the EPF to be endogenous to deliver the specified pension benefits. Our intention is to examine whether the model solution would converge, and if so, whether the required investments are reasonable and the impacts on economic growth and government finance are acceptable. The simulation results are reported in Table 4.3.

Table 4.3 Simulation Results of the Clean Break Strategy

Year	Real GDP growth (%)		Income replacement ratio		% change in government saving	Investment Required
	(Business as Usual)	(Clean-Break)	(Business as Usual)	(Clean-Break)		
1981	3.2	4.9	0.04	0.13	1.9	-
1982	4.0	4.0	0.04	0.14	2.8	1065434758
1983	4.0	4.1	0.05	0.15	2.5	3370883304
1984	5.2	5.2	0.05	0.18	3.2	5547778600
1985	5.3	5.4	0.06	0.19	3.5	4418725757
1986	4.1	4.3	0.06	0.21	2.7	4173827477
1987	2.0	2.1	0.07	0.24	3.0	8717173558
1988	2.1	2.0	0.08	0.28	5.4	6900350587
1989	2.5	2.6	0.09	0.31	6.6	5516258174
1990	6.3	6.5	0.10	0.36	9.5	14336055616
1991	4.5	4.8	0.11	0.43	10.0	14765296390
1992	4.6	4.4	0.15	0.45	20.0	9787724570
1993	6.4	6.1	0.17	0.45	33.8	11470839910
1994	5.9	5.6	0.19	0.45	49.1	10830575339
1995	5.8	5.9	0.21	0.45	66.6	14719968803

As is evident from table 4.3 above, the clean-break reform has a clear advantage in providing a superior income replacement compared to the business as usual case. This is also achieved with a general improvement in economic growth in most of the simulation years. From a fiscal sustainability point of view, compared with the business as usual case, there is a rapid improvement in government savings by 1.9 percent in 1981 and 66.6 percent in 1995. In spite of the EPF now no longer acting as a de facto tax system to the government as well as introducing a flat benefit pillar 1, the effect on government savings is positive and further confirms the fiscal sustainability of the clean break strategy. The removal of the distortionary tax effects on the price of labour undoubtedly, on balance, benefits both the economy and retirees who now receive far superior retirement income support. The last column in table 4.3 provides information on the investment levels required to maintain pillar 2. Compared with the actual situation over the simulation years (see column 1 in the earlier Table 2.5), the pressure on the EPF to invest in government bonds is also

reduced substantially. The required annual growth rate in total investment is 21% compared with 31% before.

5. Conclusion

The discussion so far has suggested that Sri Lanka's largest provider of mandatory retirement savings that is the EPF has incurred excessive financial liabilities. Due to the lack of ring fencing of the EPF from government control, the EPF has become a de facto tax system. This has resulted in the EPF engaging in questionable investment decisions whereby it has served as a cheap source of public credit by investing in government securities. Consequently, a large build up of notional assets has evolved as the government engages in a Ponzi type game predicated upon its investments and access to future contributions. The effect of all this has led to retirees receiving sub standard retirement benefits relative to what they are entitled to. This deterioration in the real value of member benefits has generally been supplemented by informal support systems. However, the deterioration in informal support systems through development and the rapid ageing of Sri Lanka's population means that future retirees risk old age poverty. Moreover, the increasing burden of the hidden tax on the firms and employees in the formal sectors also has a detrimental effect on the participation in the EPF by workers across the economy. To rectify such deficiencies and to avoid the strong likelihood of a future public debt crisis, the EPF needs to be reformed. Ideally, the overall provision of pensions in Sri Lanka needs to be comprehensively evaluated and reformed. Whilst the focus of this paper has been on reforming the EPF and the introduction of a modest universal pension supplement, the simulation results have provided useful insights into the design and implementation of a new system.

A number of simulations have clearly demonstrated that any parametric reform of the existing EPF or the reliance on tinkering with either pillar 1 or pillar 2 alone simply cannot achieve the desired outcome. Nevertheless, our preliminary experiment with the introduction of a combined system consisting of both pillars has shown some promising results. In this system, we gradually phase in higher income replacement levels by encouraging a dominant funded element whilst also establishing a flat benefit to all retirees. Compared with the existing system, the superiority of the new system is apparent. First of all, the provision of income support for retired EPF members and also the non-EPF members is far better than what is available in the

existing system, despite the fact that the overall contribution rates are substantially lower than the rates in the existing system. Secondly, the fiscal and economy-wide benefits are also superior. Finally, the pressure on the EPF to rely on the snowballing of investments to finance government expenditures has been substantially reduced. The CGE model used in this paper offers the potential to evaluate more elaborate pension reform strategies, which is being considered in the on-going research.

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