

Social Security Reforms in Northern Cyprus: Are they Fiscally Balanced and Socially Equitable?

by

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Abstract

This paper contains a quantitative assessment of the social security pension reforms in Northern Cyprus (TRNC) that were introduced in 2008 and later refined in 2012. A set of estimations are carried out to determine if the reforms were adequate enough to make the system self-financing. The key question is whether now the contributions over a participants working life would be sufficient to finance the pension promises through retirement. It is found that although significant improvements were made, the new system is neither fiscally neutral nor socially equitable. It delivers a higher budgetary subsidy to high income participants relative to the subsidy received by those with lower incomes. Recommendations are made for the policy changes to correct these defects.

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1. Introduction

In recent years many countries within the EU have undertaken fundamental reforms of their PAYGO pension systems. Their main target was to protect their systems against the aging population that is creating too many pensioners relative to the number of contributors. Demographic changes undoubtedly increase the size of the pension liabilities forced on the government budget as the dependency ratios increase. This is not the only reason, however, behind the mounting implicit public debt created by pension systems. Structural problems in the design of the pension systems also play an important role in creating the massive accrued pension liabilities in many countries (OECD, 2011).

The reforms have mainly focused on three pension policy areas. Firstly, the retirement age has been increased. This has been necessary because the life expectancy for almost all Europeans is increasing. In some cases the pension systems could not afford to pay the pensions for longer periods after retirement without increasing the contribution rates. As this was often not politically or economically desirable, a more acceptable option for dealing with the solvency problem has been to increase the age that people can retire and receive a full pension. Secondly, in some cases the contribution rates were increased to provide sufficient funds to finance the pension benefits of the existing retirees. The third set of reforms have been to readjust the replacement rate formulae to make the pension benefits affordable and at the same time promote private savings through tax assistance for defined contribution pension plans. A fourth element of some of the reforms of the PAYGO systems has been to limit the size of the public sector PAYGO pensions systems and instead promote funded pension plans of either a defined contribution or defined benefit type. Chile was the pioneer in instituting such a reform

(Edwards, 1998) but other countries such as Canada and the former socialist countries of Europe have also moved their systems towards defined contribution pension plans (OECD, 2011).

The imbalance between pension promises and the pension contribution of the pension participants has been carried to the extreme in the TRNC. Studies of the publically supported pension systems have shown that the present value of the deficit for the Civil Service Pension System (CSPS) is about 276% of GDP (Altıok and Jenkins, 2012a) and this accrued liability for the publically supported Social Insurance System (SIS), that until 2008 covered the rest of the residents, is equal to another 392% of GDP (Altıok and Jenkins, 2012b).

The liabilities of the existing pension systems in the TRNC are also not only the results of demographic change but also the product of the inadequately designed pension schemes. Until 2008, there were two main pension schemes in the country: The SIS (1976) that was designed to provide pension benefits for the privately employed people and the CSPS (1977) which covered the public sector workers who were employed as civil servants. Both pension systems were defined benefit pay-as-you-go (PAYGO) systems and generous. The main reason for these pension systems being PAYGO and generous was that they were set up after a long-lasting civil war in the country. At those times there was a need for funds to provide pension benefits to the elderly and compensation to those who served in the army during the war. However, the accumulation of capital was not there and there was not sufficient time for accumulation to take place. For policy makers at that time it was attractive to establish the PAYGO pension systems. In addition to this, generous pension rules were also considered as an incentive to retain the Turkish Cypriots on the island until both the economic and political situation approached normality.

Over time a number of changes were made in both systems with the intention to reduce the fiscal burden imposed on the taxpayers. None of these measures were successful. In 2008 the government of the TRNC, with the prospects of entering in the European Union and with the assistance of the World Bank and the Turkish government, reformed the pension system as a whole and launched a unified Social Security Pension System (SSS) for all the employees (public and private) as well as the self-employed people in the country. Later in 2012 a number of changes were made to the SIS pension system (Social Insurance Law, 2012) so that its contribution rates are the same as under the SSS. Changes were also made to the rules concerning retirement age and the benefit formulae so that over time it would become fully harmonized with the SSS pension system.

The three major pension changes that were implemented by the EU countries are also the primary measures undertaken in the TRNC. The reforms regarding the old-age and survivor benefits are presented below.

Retirement Age

Under the old CSPA and SIS systems, people who satisfy certain criteria could retire at an age of 50 or even below. The average retirement age, however, was 55 for both civil servants and workers in the private sector. With the new SSS system, the retirement age for the new entrants has been increased to a minimum age of 60. Although this number is still below the EU average of 63 for men and 62 for women, it is a significant step in attaining a more sustainable pension system.

Contribution Rates

Civil servants under the CSPA system contributed 5% (women) and 9% (men) of their gross monthly income for their future pensions. People in the private sector, on the other hand, contributed 11% of

their monthly gross income for their future old-age pension and survivor benefits. With the new law (SSS), these rates have been unified and increased to a rate of 12.5% of the monthly gross salary for all the new entrants with no exceptions. Such a policy change aims to fix the fiscal imbalance as the ratios of APD / tax revenue ratios were very significant. It has been estimated that more than 50% of the annual tax revenues will be needed to be used to finance the annual deficit created by the CSPS (Altıok and Jenkins, 2012a) and the SIS systems (Altıok and Jenkins, 2012b) for the next 30 years.

Replacement Rate and the Calculation of Pension Benefits

With the 2008 reform, one of the basic problems of the old pension systems, the generous replacement rates, was also addressed. Prior to the reform, for an average civil servant the replacement rates used in the calculation of pension benefits were 55.79% of the last year's income. For workers subject to the SIS system, the replacement rate of the pension was 70% of the highest four years out of the last 7 year's incomes. It was designed to be tied to the final year's wages to protect the potential retirees from the negative impacts of inflation over time. However, this allowed anyone to receive high pension benefits under the SIS system by suddenly declaring higher real incomes in the last 4 years of their working life.

The new system determines the basis of pensionable income differently. In the new SSS system, the declared incomes of the contributor relative the average income of all contributors in the corresponding year throughout his or her working life are taken into account. The overall average (excluding the last year prior to retirement) is then multiplied by a replacement rate. This replacement rate is found after multiplying the first 15 years of service by 2.5% and adding a 2% for every additional year of service to that sum (Social Security Law, 2007).

2. A Model of Social Security Pension System Outcomes

Because a PAYGO system is not a funded pension plan, the contribution of any single individual or age cohort of individuals do not finance their own pension benefits. The basic principal of a PAYGO pension system is that the pension benefits of one generation are funded by the contributions of the next generation. Hence, the long run financial solvency of the SSS will depend on the generosity of the pension promises that are made, the rate of SSS contributions of the labor force, and in addition the rate of growth of the labor force over time. The long term solvency of the combination of the historical SIS system and the new SSS system has been analyzed and it was found that with the present rates of contribution a large element of government subsidy was required to meet the obligations of the combined SIS and SSS systems (Altok and Jenkins, 2012).

A narrower question is addressed here. Would the contributions that an individual is required to make under the rules of the new SSS system be sufficient to fund the benefits that are promised by this pension system? In other words, could the new SSS system be converted into a funded defined benefit pension plan? In the base case a real rate of return of 3% net of inflation is assumed on the amount of invested contributions. Many such reforms have been carried out in this direction where an unfunded PAYGO system was partially or wholly converted into a funded pension plan, with transition provisions for those in the historical PAYGO systems (IMF, 2011).

To simulate the effects of the new social security rules, we have constructed a theoretical model of the SSS system. As discussed above, the parameters that determine a person's pension benefit is the length of time an individual works and contributes to the SSS pension plan, the wages earned by the individual relative to the average wages each year of his fellow members of the labour force, and the average wage of the entire labour force one year before the person retires. The wage history of a

member of the pension plan and the relationship of the wages of the individual and those of the other members of the plan are illustrated in Figure 1. All the parameters of the model can be changed to simulate their impacts. As we will see, this formula is a very effective way of dealing fairly with the pension participants both in terms of eliminating the effects of inflation and also taking into consideration lifetime earnings and contributions.

Initially we assume that everyone who enters the labour force in a given year is earning the same base wage. In addition, the labour force is made up of a set of people who have entered in past years and are now earning a wage that has been increased by the average growth in real wages in the country times the cumulated growth in wages that comes from the increased experience of the individual. In other words, in our model all the individuals are identical except for age and seniority. Later this assumption is relaxed to analyze the situation where a pension system participant might earn a wage that is very different from the model's standard worker with the same age and seniority. Our model also incorporates the fact that people retire at higher wages as a result of seniority and these retirees are replaced with low seniority workers with lower starting salaries.

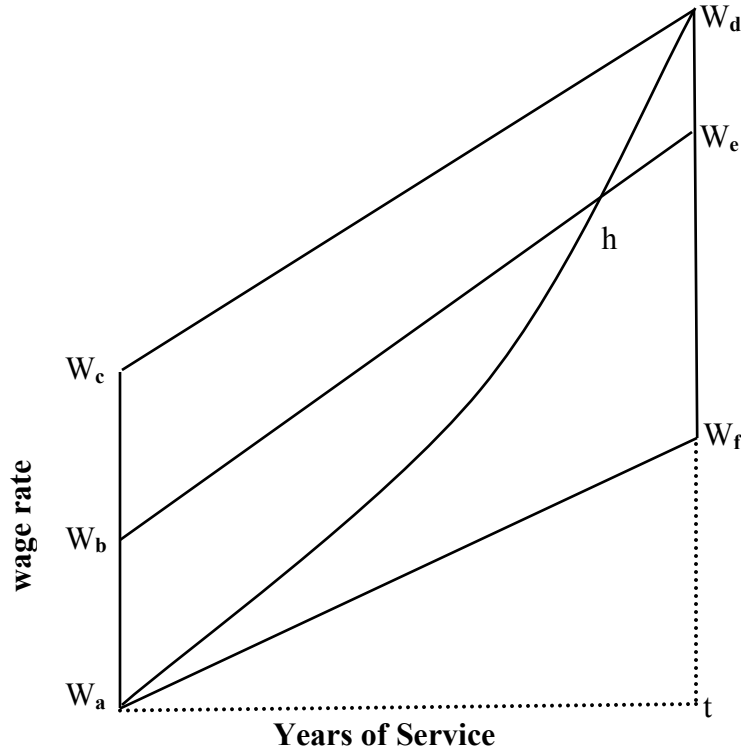


Figure 1: A Model of the Wage Rates of an Individual Participant and the Distribution of Wage Rates of SSS Participants.

According to our model, as illustrated by Figure 1 every new SSS participant upon entering the labour force receives a basic salary denoted as point W_a in the figure above. At that moment in time, there are other people in the system with different seniorities receiving higher wages which are the products of the basic wage times the age-earnings premium for every year of work experience. The person who has the maximum number of years of experience therefore receives a wage of (W_c) which is equal to

$$W_c = W_a(1 + aep)^{ys-1} \quad (1)$$

where; W_a is the basic starting wage for the population, ys is the number of years of service to be eligible for retirement, and aep is the rate of wage increase due to the age-earnings premium a worker receives for every year of work experience.

In Figure 1, the line $W_a h W_d$ illustrates the path of an individual's wage rate over time as he or she gains seniority and moves towards retirement. Every year, his salary will grow by the real annual growth in

wages that the whole labour force receives that increased the basic wage, plus an additional real annual growth, aep , for seniority. The growth over time of the basic wage rate is shown by the line W_aW_f . The component of an individual's wage arising from the age-earnings premium is illustrated by the distance between the line W_aW_d and line W_aW_f . At the point of retirement after t years of service, the basic wage rate in the economy will be at point W_f and the cumulated impact of the age-earnings premium can be shown as the distance W_fW_d in Figure 1. The value of aep is estimated for men and women separately from the age-earnings profile of the members of the labour force who are not civil servants. The wage in time period t of the typical participant is denoted as W_t , and at any point in time t is:

$$W_t = W_a (1 + g_{wc})^t (1 + aep)^t \quad (2)$$

where; W_a is the starting basic salary of a typical pensioner, ys is the number of years of service, g_{wc} is the real annual growth in wage rate and aep is the age-earnings premium a worker receives for every year of experience in the labour force.

According to the SSS law, (unlike the old SIS law where the pension benefits were directly tied to an individual's last highest four-year salaries), the monthly pension currently will be determined by the multiplication of a number based on the person's labour force exposure with the general average monthly wage rate for the total labour force. In other words, a typical individual will receive his pension benefit on the basis of the wage denoted in Figure 1 as W_e , that is; the general average monthly wage rate of total labour force one year prior to the typical pensioner's retirement. This rate is estimated as the basic wage rate growing at the real annual increase in wage rate times a factor (F) which is the average of the age-earning premiums of all the workers in any given period of their service. If we assume that the distribution of seniority across the labour force is uniform then the average monthly wage for the labour force at any given point in time in an individual participants working history is therefore;

$$W_e = \sum_{t=0}^{ys-1} W_a (1 + g_{wp})^t F \quad (3)$$

where; W_a is the initial wage rate when the participant entered the labour force, g_{wp} is the annual real growth in this starting wage rate, ys is the number of years of service to receive a pension and F is

$$F = \sum_{i=0}^{ys-1} (1 + aep)^i / ys \quad (4)$$

where; ys is the number of years of service required to draw a pension, and aep is the age-earnings premium a worker receives for every one year of experience in the country.

3. Modelling the Social Security Pension System

According to the SSS law, the monthly pension to be received by a pensioner is calculated by multiplying the general average monthly wage of the labour force one year prior to that individual's retirement (l_e) with the replacement rate (r) formulated by the law that depends on the number of years of service times a rate, denoted as p , in equation 5.

$$p = \frac{\sum_{i=0}^{ys-1} w_c (1 + g_{wc})^i (1 + aep)^i}{w_a (1 + g_{wp})^i \sum_{j=0}^{ys-1} (1 + aep)^j / ys} \quad (5)$$

p can also be defined as the simple average of the ratios of the individual pension participant's wage rate W_i in year i to the average wage of everyone who is working in the labour force in that given year W_{ei} . The average is taken of the ratios arising in each year of service of the individual, excluding the last year. It can be expressed as,

$$p = \sum_{i=0}^{ys-1} \frac{W_i}{Average W_{ei}} / (ys - 1) \quad (6)$$

The rules of the SSS system states that the replacement rate (r) is calculated as follows:

$$r = [\text{Years of service up to a max of 15} * 2.5\%] + ((\text{total number of years of service} - 15) * 2\%)] * p$$

Then, the actual amount of monthly pension (m) to be received by a retiree becomes

$$m = l_e * r \quad (7)$$

where m is the amount of monthly pension to be received, l_e is the general average monthly wage rate of the total labour force one year prior to an individual's retirement, r is the replacement rate defined by the law that depends on the number of years of service and p is individual's average wage rate (excluding the first and last years' wages) relative to the general wage rate of the labour force (excluding the first and last years' wages).

4. Estimates of the Net Cost of Social Security Pension System

We made estimations of the financial sustainability of the new pension system in North Cyprus by determining whether over the lifetime of a pension participant the present value of the pension contributions that he or she makes is equal to the present value of the pension benefits they receive. The expression that allows us to calculate the value of the deficit or surplus of a typical male pension plan participant over his lifetime is as follows:

$$PVC_{tmp} = - \sum_{t=1}^{R-A} \frac{c W_{tmp} (1 + g_w)^t (1 + g_{aep})^t}{(1 + r)^t} + \sum_{t=R-A}^{(R-A)+n} \frac{r_{tmp} W_e (1 + g_{wp})^{R-A-1} (1 + g_p)^{n-(R-A)}}{(1 + r)^t} + \sum_{t=(R-A)+n}^{(R-A)+n+7} \frac{W_u (1 + g_p)^{n-(R-A)}}{(1 + r)^t} \quad (8)$$

where, n is the life expectancy after age of retirement, g_w is the annual real growth rate of wages, g_p is the annual growth rate of pension benefits, r is the discount rate, R is the retirement age, A is the current age at time of employment, c is the individual's plus employer's contribution rate to the

pension part of the social security pension system, W_{imp} is the annual wage of a typical pensioner during employment, W_e is the annual average wage rate of the labor force, g_{wp} is the annual real growth in average wage rate of the labor force, W_u is the annual pension of the married typical male pensioner at time of his death, r_{imp} is the replacement rate and PVC_{imp} stands for the present value of a typical male pensioner's pension liability (cost).

The first term of equation 8 measures the present value of the pension contributions made by an individual, the second term measures the present value of the pension benefits received based on the number of years the individual is expected to live (WHO, 2011) given his age at retirement, and the third term measures the cost of the pension received by the spouse in the event of the prior death of the husband.

We first evaluate the SSS system assuming that everybody's income is evenly distributed and the only difference in wage rates is due to seniority. Therefore, all the workers start employment in any given year with an identical wage rate. In our base case assumption for a SSS participant in Northern Cyprus in 2009, W_a = minimum wage (1,190 TL or 613 euros in 2009 values). From our econometric analysis, we know that age-earnings premium (*aep*) for a year of service has been 2.55% for men and 1.55% for women. In addition to these, we also assume that the real growth in the basic annual wage will increase by 2% every year.

These parameter values are substituted into expressions 1 to 7 and yield the following values for F, and p for male workers.

$p = 1$ and $F = 1.34$ for 25 years of service, 1.42 for 30 years of service, 1.52 for 35 years of service and 1.62 for 40 years of service.

The Deficit in the Social Security Pension System for Male Members

The major difference between male and female participants in the labour force, as far as pensions are concerned, is that while men tend to not live as long as females, the spousal pensions are much more important in terms of their cost for the male pensioners. As their female spouses in Northern Cyprus tend to be about five years younger and live until they are four years older in age, we find that this spousal benefit costs the same as adding seven more years to the pension benefits of a man¹. Hence, while female workers live on average four years longer, the cost of their pension benefits are less by about three years of payments at the end of their life as compared to males. In the analysis below we first carry out the analysis for males, and then for females.

Another adjustment must be made because not all of the workers will survive until the age of retirement and the people who do live to the age of retirement will not all live exactly to their average life expectancy (evaluated at the age of retirement) but there will be a distribution of ages of death with a mean equal to the expected age of death at retirement. For the individuals who die before retirement while still contributing, the pension system will have savings from not having to pay out their pension benefits, but the surviving spouse is eligible for half of the pension benefits calculated on the basis that her husband had worked for a minimum of 20 years. At the same time there will be a loss of contributions between the time of death and the date of normal retirement. The overstatement of the base case value of the pension deficits (based on the probabilities of a worker dying each year from age 25 to 55) is approximately 2%. In addition to this, for the individuals who live until retirement, the overstatement of the value of the pension deficits is a further 4.5%. Because future pension benefits are discounted, and also the real value of the pension benefits might be adjusted upward or downward over

¹ For the case of men the period of pension payout will be seven years longer than their expected life after retirement due to their surviving widows.

time then the present value of the pension benefits whose end periods are distributed over time will be different than the present value under the assumption that all deaths occur at exactly the expected age of death. This means that we need to reduce the estimated cost of the pension benefits for contributors by 6.5%. These adjusted values are presented below.

Estimates are made of the value of the deficit or required subsidy of the pension plan per individual as compared to a fully funded pension system. Table 1 summarizes the present values of contributions less benefits of typical male pensioners over their life time for different retirement ages and different number of employment years. These present values of deficits are calculated as of the date they entered the SSS system. Tables 2 reports on the same estimates made for women. All the estimates are expressed in terms of the price level as of 2009.

Rows 1 and 2 of Table 1 compare the situation under the SIS and the SSS systems. Recall that under the SIS system the average retirement age was 55. So, a typical pensioner's net present value cost to the system is equal to 126,751 euros using a 3% discount rate (Table 1, row 1, column 8) if he earns the minimum wage when he begins working. The same individual's cost is equal to 78,545 euros (Table 1, row 2, column 8) under the new law with the same number of years of employment. Hence, we can see that these measures have reduced the present value of the deficit of the pension system for each new member by 38% as compared to the SIS system.

Table 1: Results (for Men) under the Base Case Scenario when the starting wage (W_c) of our participant is equal to the basic starting wage W_a and $p=1$

	Gender	Years of service to retirement	Average wage as proportion of basic (minimum) wage (F)	Retirement age	Replacement rate of average SS wage (r)	Replacement rate of last salary of retiree	Years of life expectancy at retirement age	PV of deficit before adjustment	PV of deficit after adjustment
		1	2	3	4	5	6	7	8
1	M	30	-	55 ²	-	70.0%	25.9	-135,563	-126,751
2	M	30	1.42	55	67.5%	48.6%	25.9	-84,005	-78,545
3	M	25	1.34	60	57.5%	43.6%	21.6	-64,601	-60,402
4	M	35	1.52	60	77.5%	53.0%	21.6	-85,599	-80,035
5	M	30	1.42	65	67.5%	48.6%	17.6	-64,915	-60,696
6	M	40	1.62	65	87.5%	57.0%	17.6	-82,822	-77,439
7	M	35	1.52	70	77.5%	53.0%	13.8	-60,535	-56,600

This decrease in the present value of the deficit is mainly due to the lower replacement rate of 48.6% rather than the SIS replacement rate of 70%, and the higher contribution rate of 12.5% as compared to the 11% in the old SIS system. However, it is clear that the proposed rate of contributions are not sufficient to allow a fully funded SSS pension system to be set up for the future participants of the public pension scheme.

Table 1, row 3 shows the case under the new SSS law where the retirement age is 60 and minimum number of years of employment for a full pension is 25 years. In this case, (Table 1, row 3, column 4), a typical pensioner receives a monthly pension equal to 57.5% of the general average monthly income of the labour force one year prior to his retirement. This amount is equal to 43.6% (Table 1, row 3, column 5) of that individual's last year monthly wage prior to his retirement. The present value of the benefits drawn minus the contributions made by this typical pensioner using a real interest rate of 3% is a net deficit of 60,402 euros per individual in 2009 values (Table 1, row 3, column 8).

² Under the SIS system, contribution rate 11%, replacement rate 70% of last salary of retiree.

It can be seen that as the individual's retirement age increase from 60 to 65, and hence the number of years of service increases, then the result is that the present value of the cost of the SSS pension also increases. This happens because the replacement rate is directly tied to the number of employment years. There is an incentive for workers to retire at 65 rather than at 60 as the present value of the subsidy the person receives is maximized at 35 years of service with a retirement at age 65 (Table 1, columns 1 and 8). If one has to work until age 70 to obtain 35 years of service, they would be better off to retire at age 65 with 30 years of service than at 70 with the larger number of years of service. The estimated present values of the implicit subsidy in 2009 euros that is given to each member of the SSS system as they enter the labour force ranges between about 56.6 thousand euros and 80.0 thousand euros when the individual's wage over his working years averages out to be the same as the labour force average (Table 1, column 8).

We now change the assumption that a typical pensioner starts with the basic salary equal to the average wage rate in the country and make our estimations on the assumption that he earns 50% more than the average basic wage at time of first employment. In such a case, differences in results mainly come from the change in the value of the p parameter. As W_c increases, the p also increases. With a W_c 50% higher than W_p , we now have a p rate of 1.5 instead of 1. In all cases we find that the deficit of the pension plan increases by 50% over the case where the individual starts working at the standard starting wage. The rate of subsidy required is directly proportional to the ratio of the average wage rate of the individual to that of the rest of the labour force.

In the case that the man's wage is 50% higher on average over his working life than a typical member of the labour force, then the cost of the required subsidy ranges between about 86.6 thousand euro and

122.1 thousand euro. The values of the deficits for each of the cases are now 50% higher than the cases reported in Table 1.

When an individual's starting wage is twice the minimum wage and they maintain this relatively higher wage throughout their working life then the range values for the present value of the implicit subsidy (or grant) in 2009 prices is between 115.4 thousand and 163.8 thousand euros. For the base case with retirement at age 60 after 25 years of work, the deficit is 120.8 thousand euros or exactly twice the amount if the individual had a starting wage equal to the minimum wage and then earned the average wage of all the participants through their working life. The same pattern holds when the starting wage of the individual is three times the minimum basic wage. The implicit public sector subsidy is now between 173.2 thousand and 244.3 thousand euros or 300% of the deficits reported in Table 1. However, the reforms are significant as in each case the implicit subsidy under the SSS system is only between 45% and 65% of what it would have been under the old SIS system.

The Deficit in the Social Security Pension System for Female Members

The expression that allows us to calculate the value of the deficit or surplus of contributions less benefits to be received by a typical female SSS pension plan participant over her lifetime is as follows:

$$PVC_{tfp} = - \sum_{t=1}^{R-A} \frac{cW_{tfp}(1+g_w)^t(1+g_{aep})^t}{(1+r)^t} + \sum_{t=R-A}^{(R-A)+n} \frac{r_{tfp}W_e(1+g_{wp})^{R-A-1}(1+g_p)^{n-(R-A)}}{(1+r)^t} \quad (9)$$

where, n is the life expectancy after age of retirement, g_w is the annual real growth rate of wages, g_p is the annual growth rate of pension benefits, r is the discount rate, R is the retirement age, A is the current age at time of employment, c is the contribution rate, W_{tfp} is the annual wage of a typical female pensioner during employment, W_e is the annual average wage rate of the labor force, g_{wp} is the annual real growth in average wage rate of the labor force, r_{tfp} is the replacement rate and PVC_{tfp} stands for the present value of a typical female pensioner's pension liability (cost).

In this case because it is assumed that the female worker will outlive her spouse, equation 5.9 contains only two terms. The first term measures the value of the pension contributions such a female participant will make to SSS system and the second term measures the present value of the pension benefits she is expected to receive, given her age at retirement.

For female members of the labour force who retire with 30 years of service at 55 years of age we find that the present value of the subsidy needed to fund this pension is 62,481 euros. This is in the case where the female member just receives a starting wage equal the standard wage of W_a (Table 2). This cost is just 66% as much as what the fiscal cost would be under the previous SIS system (Table 2, rows 1 and 2, column 8). The required subsidy is also only about 80% as large as it is for a male member of the SSS (see Table 1 above). This difference reflects the cost of providing the survivors benefits received by spouses that accrues mainly to widows, and is an additional cost to the pension plans of male members.

In this case the range of the implicit subsidy extends from a value of 33.8 thousand euros for a female who retires at an age of 70 with 35 years of contributions to a high of 62.5 thousand euros for the case of woman retiring at 55 years of age with 30 years of experience. In comparison, for men the value of the subsidy ranges from 56.6 thousand to 80.0 thousand euros.

In the case of women, they have no incentive to work beyond 55 years of age with 30 years of experience, or the mandatory 60 years of age under the SSS rules because if they work for more years and retire later the value of the subsidy they receive from the government budget falls.

Table 2: Results (for women) under the Base Case Scenario when $W_c = W_a$ and $p=1$

	Gender	Years of service to retirement	Average wage as proportion of basic (minimum) wage	Retirement age	Replacement rate of average SS wage (r)	Replacement rate of last salary of retiree	Years of life expectancy at retirement age	PV of deficit before adjustment	PV of deficit after adjustment
		1	2	3	4	5	6	7	8
1	W	30	-	55	70.0%	70.0%	29.3	-100,917	-94,357
2	W	30	1.26	55	66.9%	54.0%	29.3	-66,825	-62,481
3	W	25	1.21	60	57.0%	47.7%	24.7	-51,129	-47,806
4	W	35	1.31	60	76.8%	59.8%	24.7	-64,215	-60,041
5	W	30	1.26	65	66.9%	54.0%	20.3	-44,975	-42,052
6	W	40	1.37	65	86.7%	65.3%	20.3	-53,875	-50,373
7	W	35	1.31	70	76.8%	59.8%	15.9	-36,180	-33,828

As in the case of the male members of the SSS pension system, the women who earn higher wages receive proportionally larger amounts of subsidy from the fiscal system, or alternatively from the younger contributing members in the system if their contribution rates are increased in the future. With wage rates that are on average 50% greater the minimum wage, the subsidy is about 50% greater than the base case. When the woman's salary is double of the base case, then the subsidy is approximately doubled. It continues to increase proportionally with the woman's wage history in the same manner as in the case of male participants.

While it appears that it is the well-off men that are receiving the largest amount of subsidy from either the government or the young contributors to the SSS system, this is somewhat misleading. It is the well-off widows of the well-off male pensioners who are pushing up the cost of the male pension plans under the SSS system. If we consider the case of a woman earning three times the standard wage to start with. The amount of subsidy she potentially receives ranges from 101.5 thousand euros to 180.1 thousand euros. The comparable numbers for a male worker earning the same salary through their working life are 173.2 thousand to 244.3 thousand. The difference between the woman and men

subsidies of between 64.2 thousand and 71.7 thousand euros is the cost of providing the spousal benefits to the widows of the high earning male workers.

One often hears of generous divorce settlements to the ex-spouses of wealthy men based on the argument that there was some obligation for the man to allow the ex-spouse to maintain the lifestyle they were accustomed to. It is a very odd situation, however, when the state is undertaking the responsibility of maintaining the life style of surviving spouses in the style they have been accustomed before their husbands have passed away. Another way of looking at the generous spousal death benefits for widows is that this pension plan is designed to give an old-age pension to homemakers for their non-market time.

For those females who work outside of the household, they will have their own set of SSS pension benefits, and if their husband dies before they do, which is likely, the widows get to enjoy both their own pension plus the survival benefits of their deceased husband's pension. In this case they enjoy the subsidy of, say 80 thousand euros, in present value terms on their own pension plan, plus another subsidy of 64.2 to 71.7 thousand euros from the subsidy given to their ex-husband's pension plan to pay for their survival benefits. In addition, these benefits are particularly important to those widows that have enjoyed a higher family income while their husband was alive.

5. Contribution Rates and Social Security Pension System Sustainability as a Funded Pension System

We now turn to the analysis of the final element is the pension formula and that is the rate of contribution or the proportion of the annual salaries that employees and employers pay to fund the

pension benefits received by the retired members of the SSS system. Under the new SSS system the combined contribution of the employee and the employer that goes toward the funding of the retirement pensions is 12.5% of the individual's declared income for purposes of social security. We now ask, what is the contribution rate that would enable the TRNC Social Security Administration to fully prefund the retirement benefits of individuals if the retirement age were 60 or alternatively 65 years of age and the years of service in which they contributed to their retirement fund ranged from 25 to 40 years. The results of these simulations are presented in Table 3.

Table 3: Contribution Rates Yielding a Zero Present Value of Lifetime Liability of Pension Plan (at a discount rate of 3%)

Years of Service	Retirement Age	MEN	WOMEN
25	60	42.3%	38.5%
35	60	38.5%	34.6%
30	65	36.6%	31.0%
40	65	33.6%	28.3%

The rate of contribution through the working life of male and female individuals that would be necessary to fund the benefits promised by the SSS system are shown in Table 3 columns 3 and 4. For those wishing to retire at age 60 after working for 25 years the required contribution rates for men and women would be 42.3 and 38.5%, respectively, of earnings during their working life that is covered by the SSS pension system. This would require a 238 % and 200% increase in the contribution rates of men and women, respectively, over what is now required by the SSS system. If the man or woman were to work of 35 years and retired at age 60 then the contribution rates that would be required to finance the pension benefit promised by the SSS system would be 38.5 and 34.6% or increases of 200 and 176%, respectively.

If the retirement age were raised to 65 years, as is common around the world, and worked 30 years before retirement, then the contribution rate required to cover the pension benefit promises would need

to be 36.6% for men and 31% for women. Finally, if these individuals retired at 65 years of age after working 40 year, the normal situation in countries such as Canada or the US, then the required contribution rates would need to be increased to 33.6 and 28.3% or increases of 168 and 124%, respectively.

This analysis suggests that the contribution rates would need to be above what people are likely to be willing to pay for future pension benefit promises that based on past experience are subject to change. Studies of tax compliance in the TRNC suggest that evasion in paying the higher contribution rates would likely become widespread (Besim and Jenkins, 2005). Hence, a comprehensive reform of the SSS system is required that will reform all three key aspects of the SSS rules, namely; increase the age of retirement, reduce the generous benefit formulae still further and require a greater contribution to be made by the participants in the plan. The alternative is to continue with substantial budget support of the SSS system from the government of Turkey. This outcome is becoming increasingly less likely with the stringent expenditure policies being implemented in Turkey.

In funded pensions the rate of return that the contributions earn when invested during the working and pensionable life of the participant is an important variable. Thus far in this paper a real rate of return or discount of 3% has been used. This is a real rate so it is assuming that whatever inflationary expectations there are will be added to this real rate to give a nominal or market rate. A real rate of return of 3% is more than that paid historically on relatively risk free government bonds but less than the historical rate of stock market returns. Most actuarial calculations to determine the funding requirements of pension funds are carried out using real rates of return assumptions in the range of 2 to

4%³. To test out the sensitivity of the estimations above of the funding requirements of the SSS system in the TRNC the estimations reported are all carried out once again using a real discount rate, or assumed rate of return on invested contributions of 4%. The results are presented in Table 4.

Table 4: Contribution Rates Yielding a Zero Present Value of Lifetime Liability of Pension Plan (at a discount rate of 4%)

Years of Service	Retirement Age	MEN	WOMEN
25	60	33.5%	30.7%
35	60	29.3%	26.4%
30	65	28.8%	24.7%
40	65	25.3%	21.5%

When a discount rate of 4% rate of discount is used then the contribution rate for men, averaged over the four cases being considered, would be 29.23% as compared to an estimated required contribution rate of 37.8% if the rate of return on invested contributions were a real 3%. In other words the contribution rate that is now 12.5% would have to be increased by about 150%. This is about three quarters as large as the required rate of contributions found in our previous estimates.

For women the estimated rate of contribution, averaged over the four cases, is 27.25%, requiring an increase of 128% on top of the current rate of SSS contributions. This increase is about 17% less than the average required increase in the contribution rates when the assumed future rate of return on invested contributions was 3%. Even when making an optimistic assumption about the rate of return of invested funds, the contribution rates required to fund the generous pension promises of the SSS system would require massive increases of contribution rates from where they are now.

³ The appropriate discount rate for evaluating the funding requirements of pension plans is a topic of considerable debate. Real rates of discount in the range of 2% (Queisser and Whitehouse, 2006) to 4% (Brown, Clark and Rauh, 2011) appear to be appropriate for this situation. Hence, we employed a real rate of discount of 3% in our base case. The average nominal interest rate paid on Euro zone long-term bonds in August 2010 (European Central Bank, 2011) was 4%.

6. Conclusions

There are a number of attractive features in the reformed social security system of Northern Cyprus. Foremost is the innovative formula for determining the rate of pension benefits upon retirement. The formula ensures that the real value of the pension received at retirement is invariant with the rate of inflation. Furthermore, the entire lifetime of earnings of the individual is taken into consideration when determining the final pension received. Each year the individual's income is compared to the average income of all members of the labor force in that same year to determine the pension the person will receive relative to others.

Furthermore, this pension reform was able to significantly lower the replacement rates for the new SSS system from those of the previous SIS system. This was carried out without the massive protests of workers that have been witnessed elsewhere in Europe. One plausible reason for the acceptance of the reduced pension replacement rate is the greater certainty and stability that the new pension system is likely to deliver.

Non-withstanding these positive features, the overall financial position of the SSS pension system is such that the contributions paid into the system are not commensurate with the benefits received. For each individual the present value of the excess of pension benefits to be received as compared to the contributions to be made at the time they enter into the labor force ranges from 60,402 euros to 181,205 euros for men and from 47,806 euros to 143,417 euros for women under the base case scenarios with different starting salaries. The deficit rises proportionally with the income level of the person. Once it becomes obvious to the taxpayers that this pension system contains such huge subsidies to high income earners, it is likely that further amendments will have to be undertaken to these initial structural reforms.

In order to bring the system closer to being balanced and in line with international norms, further increases in the retirement age accompanied by a significant reduction in the earned benefit formula from 2.5% and 2% for each year of service are needed. To do this, the development of an alternative private pension system will be needed to give people the opportunity to build a supplementary private pension. A significant number of countries including UK, Netherlands, Poland and Sweden have already followed this path (Pinera, 2001). This will require an opening up of the financial markets in the TRNC for foreign private pension plans that are now prohibited from receiving the tax benefits that are currently given to life insurance plans. These life insurance plans are highly inefficient substitutes to private funded pension plans and do not provide a competitive alternative to the public social security system.

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