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# The Fiscal Burden of the Legacy of the Civil Service Pension Systems in Northern Cyprus

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## Abstract

This paper estimates the fiscal burden of the Pay-As-You-Go (PAYGO) civil service pension systems that were closed in 2008 to new members in North Cyprus. At that time, a new pension system was introduced for the newly hired government employees and new private sector workers. Estimates are made of the difference between the present values of future contributions and the pension benefits. This approach measures the government's net liabilities related to the accruals of the pension rights received by the individuals covered through these plans for the period from 2009 to the death of the last member in the system. The estimated unfunded cost of these civil service pension plans is 7.3 billion euros or 276% of GDP. This amount of implicit debt is significantly higher than 5.8 billion euros that has been estimated as the amount of cash compensation for land and property that would need to be paid in order to reach an agreement for a solution to the Cyprus conflict.



**JEL classification:** H55, H68

**Keywords:** civil service pensions, pension liabilities, implicit pension debt, pension indexing, North Cyprus.

# The Fiscal Burden of the Legacy of the Civil Service Pension Systems in Northern Cyprus

## 1 Introduction

Civil servant pension obligations have become a serious fiscal problem for many European countries in recent years (Gokhale, 2009). Generous promises have been made by governments to avoid paying higher salaries immediately or to buy peace from public sector unions.

High replacement rates, low retirement ages, generous PAYGO provisions and especially demographic changes appear to be the main reasons for the significant burden on future government budgets, and ultimately for taxpayers (Oksanen, 2004). For instance, for the OECD countries less than 25% of the civil service pension schemes have any accumulated reserves. As a result, these countries are now spending an average of nearly 2% of GDP on pensions for civil servants and other public-sector employees. In the 1990s, central-government employment decreased relative to the population by a full percentage point in both developing and OECD countries. In developing countries, although the growth in the size of civil service slowed down or even stopped, the amount paid for public-sector employees' pension benefits has often increased continuously because of the long lag in time between the reduction in the number of active employees and the decline in the number of retired civil servants together with their survivors (Palacios and Whitehouse, 2006).

The average spending just on civil-service pensions is around 1.2 % of GDP for OECD and around 1.33% of GDP for non-OECD countries. A better indicator of the fiscal pressure of civil-service pension spending on the budget is the ratio of pension spending to government revenues. For OECD countries this ratio is 5%, whereas for the non-OECD countries it is 6% (Palacios and Whitehouse, 2006).

In 1995, prior to implementing pension reforms, it was estimated that the implicit debt of the public sector pension systems amounted to 102% of GDP in France, 109% of GDP in Portugal and 132% of GDP in Sweden (Disney, 2000).

In the US, the greatest fiscal problem is created by the defined benefit pension plans of state and local governments. Novy-Marx and Rauh (2011) estimate the present value of the unfunded deficit in 2009 of these government pension plans to be approximately 3 trillion dollars.

Although the attempts to reform the public sector pension systems have faced great resistance and resulted in massive strikes, especially in Greece and France, the determination of the EU countries to solve this problem demonstrates the severity of the issue (Featherstone, 2005). North Cyprus faces a similar funding crisis in its public sector sponsored pension funds. This study will show that its options for reform are severely limited.

## 2 The North Cyprus Situation

In North Cyprus, the historical evolutions of the pension systems and the political forces at play have resulted in a large civil service relative to the size of its population, and a very generous defined benefit public sector pension system. Prior to 1974 Turkish Cypriots were largely shut out of influential public sector positions. This changed after 1974 with the area's separation from South Cyprus, hence, opening up full range of positions in the Turkish Cypriot government administration[1]. The implicit guarantee of financial support to the budget from Turkey made public sector employment a highly sought after career by most Turkish Cypriots. The public sector turned into a "protected" sector in the economy's labor market with higher than market wages and the ultimate in job security. With competition for private sector employment coming from immigrants from Turkey, a depression of wage rates would have caused a pressure for Turkish Cypriots to move away to the UK and elsewhere. Hence, public sector employment with higher salaries and generous pension benefits became an effective instrument to retain indigenous Turkish Cypriot population on the Island.

Thus, a low statutory retirement age with generous pension replacement rates and loose eligibility rules increased the incentive for people to seek public sector employment and hence the number of people eligible for pensions.

Also, the amalgamation of factors like the attempts to unify the island with the further EU membership and current fiscal reforms taking place in Turkey has contributed to the 2008 civil service pension reform in North Cyprus. A more complete analysis of this reform is the subject of another paper.

[1] Prior to 1974 there was a long civil war in Cyprus stretching from at least 1963. After the division of Cyprus in 1974, the defenders of the Turkish Cypriot villages were compensated for their efforts with civil service jobs accompanied by generous accrued pension rights for their military service during the wartime years.

The purpose of this paper is to evaluate the fiscal legacy of the civil service pensions system that is operative for all those employed or pensioned by the government prior to 2008. The magnitude of the unfunded pension liabilities of the retired civil servants and of those hired before 2008 and those still working will have an important bearing on the public sector budgets of the future United Cyprus. Alternatively, if North Cyprus remains as a separate entity, the magnitude of these unfunded liabilities will be a major factor to determine the fiscal viability of North Cyprus without budgetary transfers from Turkey.

## 3 The Structure of Civil Service Pensions System (for employees hired prior to 2008) in North Cyprus

In North Cyprus the civil service pension system prior to 2008 consisted of two defined benefit pension funds. They were separate from the government sponsored social security system for private employees. The first plan includes those workers who started their employment in the public sector prior to July 1, 1987. It is financed entirely through the government budget. The second fund is for the government workers who entered into employment after July 1, 1987. The latter is partially financed by the contributions of its members. It was initially designed to be independent on the government budget, but the contributions have not kept pace with the accrued pension liabilities. In 2009, both of these plans were closed to new employees and a new pension plan was designed for the new government employees and new private sector workers.

In 2009, the civil service pensions system as a whole included 11,000 contributors and 11,813 retirees. This group represents about 20% of the total working population or about 8% of the total population of North Cyprus. Presently working male civil servants who were employed before 1987 contribute only 3.5% of their gross wages for the survivor retirement benefits for their wives and children. These workers make no direct contribution to the funding for their own pension benefits. Workers employed between 1987 and 1997; however, contribute 4% (women) and 8% (men) of their gross salaries to their pension system. In 1997, these rates increased to 5% and 9%, respectively.

New recruits to the civil service of North Cyprus enter into employment at an average age of 25 years old. The eligibility requirements for full pension benefit mandate a minimum of 25 years of service and a minimum of 55 years of age. The mandatory retirement age is 60. These retirement ages for civil servants are lower than for EU countries, where the normal

retirement age is 65 for men and 60 for women. Even France which has traditionally had a low retirement age has recently increased it from 60 to 62.5% (Bennhold, 2010).

In North Cyprus, every civil servant with 30 years of work experience is eligible to receive a pension based on a defined benefit formula that will give the person a replacement rate of 55.79%[2] of their last working month's salary. In addition, they are entitled to a lump sum gratuity payment at the point of retirement equal to the person's last monthly salary times the years of service. This gratuity payment has a value equal to an additional pension with a replacement rate of 13.95%[3]. These two benefits make up a total replacement rate of about 70% of the final year's income. Since pension benefits are not subject to income tax in North Cyprus, this rate is a net replacement rate (NNR). If the average tax rate of a pensioner is 20%, then a 70% net replacement rate is equal to a gross replacement rate (GRR) of 87.5%[4]. This is significantly higher than the 34 OECD countries' average gross pension replacement rate (for workers with average earnings) of 58.7% (OECD, 2007).

Another benefit is the pension provision for payments to be made to surviving widows. Women receive 50% of the husband's pension benefits after his death, even if the husband has not yet retired. The opposite does not hold for male spouses, who enjoy no survival benefits from the wife's employment unless she makes a special contribution. Our data show that almost no women (less than 100 out of a total of 4,591) are paying for the survival benefits that will be enjoyed by their husbands. From the life tables for Cyprus (World Health Organization, 2011) we learn that when evaluated at age 25 (the average age when men are hired into the civil service) Cypriot women are expected to live on average 4 years longer than men. In addition, historical cultural practices have resulted in wives being on average 5 years younger than their husbands. We have carried out an actuarial estimation of the value of this benefit, considering both the probabilities of the husbands dying each year after 25 years of age and that the wife (five years younger) is still surviving. In addition we consider the expected life of the wife as of

[2] The basic replacement rate of 55.79% is calculated by multiplying the years of service (an average of 30 years in our analysis) with 12 (the number of months in a year) times 0.00155 (a pre-determined constant number). Those who would like to work more than 30 years and receive higher replacement rates are subject to higher monthly contribution rates.

[3] Both the lump sum gratuity payment and the initial level of the monthly pension benefits are based on the value of the person's salary during the last year of employment. Hence, the additional replacement rate of 13.95% for the gratuity can be calculated by comparing the value of the gratuity to the present value at the point of retirement of the cost of funding the basic pension plan with a replacement of 55.79%.

[4] NRR = GRR * (1-t), GRR = NRR/(1-t), GRR = 70%/(1-20%) = **87.5%**

that point in time. The value of this additional spousal survivor benefit that is assigned to every male is estimated to be equal to the normal annual pension received by male civil servants for an additional 7 years beyond their expected life.

## 4 Estimation of the Fiscal Burden of the Civil Service Pensions System

The aim of this paper is to evaluate the cost of the civil service pensions system as of 2009.

**Table 1: Parameter Values for the Base Case Analysis (all 2009 figures)**

| | |
|---|---|
| Number of contributors TOTAL: | 11,000 |
| Women: | 4,591 |
| Men: | 6,409 |
| Number of pensioners TOTAL: | 11,813 |
| Women: | 4,231 |
| Men: | 7,582 |
| Retirement age: | 55 |
| At 55, expected life expectancy: | 25.9 for men, 29.3 for women |
| Replacement rate: | 55.79% |
| Discount rate: | 3% |
| Average number of years worked: | (Retirement Age – 25) |
| Widow compensation: | 50% of the husband's last salary |
| Widow survivor benefit: | Equal to 7 additional years of husband's normal pension benefit. |
| Change in rate of contributions (base case): | 0% |
| Growth rate in real value of pension benefits (base case): | 0% |
| Growth rate of real wages (base case): | 3.75% for men, 4.00% for women[5] |
| Growth rate of GDP (base case): | 4.61% (average of last 32 years) |
| Growth rate of Tax revenues (base case): | 4.61% (same as GDP growth rate) |

[5] In our econometric estimation of the age-earnings profile of the labor force in North Cyprus we find that the growth in real wages per year for those employed from ages 20 to 60 attributable to age alone is 1.75% per year for men and 2.00% for women. In addition, in the base case we add a real increase of wages of 2% to these seniority factors. Hence, the members of the labor force in the civil service pension system can expect on average to earn 3.75% more each year if they are a man and 4.00% more each year if they are a woman. Because high seniority people retire with high wages and people enter the civil service at relatively young age with lower wages, the overall wage bill will rise by approximately 2 percent.

| | |
|---|---|
| EURO / TL (2009): | 1.94 |

The annual net cost and the present value of the future costs are made for the period from 2009 to the date that the last person in the system is expected to die. Using the parameter values presented in Table 1 for the base case, the fiscal burden of the existing civil service pensions system is estimated.

Our analysis consists of three components. First, an estimation of the present value of the cost of the future pensions payments received by public servants who have already retired (existing pensioners) is made. Second, the net cost is estimated, in present value terms, of the pensions that will be paid to those currently working. The net fiscal burden of the latter component is the difference between the present value of the future contributions made by civil servants minus the present value of the future pension benefits they are entitled to receive. The third component is the present value of the cost of the gratuity payments to those who are still working and will be paid out in future in the form of a lump sum payment when they retire.

To derive the cost of the future pension payments by those currently retired, the first task is to determine the number of years each person is expected to live, given their current age. This number is calculated individually for each of the 11,813 retired individuals. This number is derived from the life tables for Cyprus where the expected life of each individual (men and women separately) is estimated, given their current age[6]. Subtracting the actual age of the individual from the person's expected future life (given their current age in 2009), gives us the number of additional years that this retired individual is expected to receive a pension. This variable is denoted as (n) in equation 1 below.

For those already retired, the estimation of the cost of future pension payments starts with the actual pension they received in 2009. This variable (P) is then increased each year until the expected year of death by the annual real rate of growth of pension ($g_p$) payments. Finally, each

[6] The civil servants on Northern Cyprus have higher incomes than the average resident in Northern Cyprus. Based on evidence found in the literature, they are expected to live longer than the average person in Northern Cyprus. At the same time the World Health Organizations Life Tables (2011) are based on the residents of both North and South Cyprus. The residents of South Cyprus make up 80% of the population of the Island and have an average per capita income that is approximately 55% higher than that of Northern Cyprus. Hence, we feel the WHO life tables for Cyprus will be fairly accurate for the higher income cohorts of civil servants in Northern Cyprus we are considering here.

of the annual payments is discounted by the rate of discount (r) to 2009. The resulting present value is the cost, evaluated as of 2009, of the future pension payments received by each individual. To find the present value for the entire set of retirees the present values as of 2009 for each of the individuals are added together. This is expressed by the first term of equation 1.

The second term of Equation 1 is to calculate the cost of pensions paid to widows after the death of their husbands. As discussed above, the value of this benefit is equivalent to

$$C_{EP} = \sum_{i=1}^{11,813} \sum_{t=1}^{n} \frac{P_i (1+g_p)^n}{(1+r)^n} + \sum_{s=1}^{7,582} \sum_{t=n}^{n+7} \frac{P_s (1+g_p)^t}{(1+r)^t} \quad (1)$$

where; $P$ is the annual pension payment, $n$ is the life expectancy after 2009, $g_p$ the annual growth rate of pension benefits, $r$ is the discount rate, $i$ is the number of pensioners, $s$ is the number of married male pensioners and $EP$ stands for the existing pensioners.

The second group of people for which the pension burden should be calculated is made up of those individuals who are still working for the government, but belong to one of these two old pension plans. The present value of fiscal burden created by the pensions that will be paid to those still working less the present value of their contributions from 2009 to retirement is calculated using equation 2.

$$C_{EC} = -\sum_{i=1}^{11,000} \sum_{t=1}^{R-A} \frac{cW_i (1+g_w)^t}{(1+r)^t} + \sum_{i=1}^{11,000} \sum_{t=R-A}^{(R-A)+n} \frac{MW_i (1+g_w)^{R-A} (1+g_p)^{t-(R-A)}}{(1+r)^t} \quad (2)$$
$$+ \sum_{u=1}^{6,409} \sum_{t=(R-A)+n}^{(R-A)+n+7} \frac{(MW_u (1+g_w)^{R-A} (1+g_p)^{t-(R-A)})}{(1+r)^t}$$

where; $n$ is the life expectancy after age of retirement, $g_w$ is the annual real growth rate of wages, $g_p$ the annual growth rate of pension benefits, $r$ is the discount rate, $R$ is the retirement age, $A$ is the current age in 2009, $c$ is the contribution rate, $W_i$ is the annual wages of contributors and $i$ is the index for the number of contributors, , $W_u$ is the annual wages of married male workers and $u$ is the index for the number of married male workers, $M$ is the replacement rate and $EC$ stands for the existing contributors.

To estimate this component of the cost of the pension system, we begin with the annual contributions made by each of the 11,000 individuals from 2009 until their retirement. The first term of equation 2 shows the summation of the discounted value of each civil servant's annual wage times the corresponding contribution rate. The annual wage is increased by the expected

growth in the real wage rates ($g_w$). The negative sign used for this part of the formula is because we need to subtract the present value of the contribution inflows from the pension benefits to be paid to each person after retirement. Secondly, the annual pension for each of the currently working civil servants is calculated using the replacement rate (M) times the expected real wage earned by the individual during the last year before retirement. This wage is estimated by taking the individual's wage rate in 2009 and adjusting it through time from 2009 until the year of retirement (R) by the expected real rate of growth of real wages ($g_w$). Once the individual retires, the annual pension benefit is then increased each year by the assumed real growth rate of pensions ($g_p$) until each individual dies. When the present value of the estimated pension payments for each contributor is added up and then subtracted from the present value of the summation of each person's contribution, the net cost of the pension system for the currently working civil servants is calculated. Finally, the last term of the equation calculates the expected present value of the future payments to the widows who are expected to receive benefits after the death of the spouse using the same assumption as employed in equation 1. The present value of the cost obtained from this term is added to the net cost calculated from the first two parts to find the present value of the fiscal cost that will have to be borne the current level of pensions to existing workers.

The last component of the analysis estimates the present value of the future fiscal cost created by the gratuity payments of the working civil servants that come under this scheme. These are received at the time of their retirement. Equation 3 below shows how this cost is calculated.

$$C_{GP} = \sum_{i=1}^{11,000} \frac{W_i(1+g_w)^{R-A}(\frac{1}{12}R_i - 25)}{(1+r)^{R-A}} \qquad (3)$$

where; $g_w$ is the annual real growth rate of wages, $r$ is the discount rate, $R$ is the retirement age, $A$ is the current age in 2009, $W_i$ is the annual wages of contributors and $GP$ stands for the gratuity payments.

Each individual's wage ($W_i$) is estimated at time of their retirement using 2009 wages and adjusting them with the expected real annual growth rate in wages ($g_w$). The number of years to make such an adjustment is found by subtracting the current age of each worker (A) from the retirement age (R). Then, each individual's estimated wage is multiplied by 1/12 times number

of service years. This gives the gratuity payment to be received by each individual. Adding together the discounted value of the gratuity payments of the working civil servants makes up the third component of the fiscal burden of the civil service pensions system.

## 5 The Results of the Analysis

Table 2 below shows the present value of the cost (in 2009 prices) of the unfunded liabilities of the civil service pensions system in North Cyprus. In our base case estimate, we have used a real discount rate of 3%[7].

To begin with, the present value of the cost of the pensioners is calculated to be about 3.31 billion euros while the net fiscal cost of the working individuals in present value terms is estimated to be equal to about 3.22 billion euros. Moving on to the present value of the gratuity payments, it can be seen that the present value of the cost for the working individuals is estimated as 0.8 billion euros. Combined they give a present value of total cost of 7.3 billion euros which is 321,184 euros per person within the system.

**Table 2: Summary Results of the Baseline Scenario**

(euros, 2009 price level)

| | | Before Adjustment | After Adjustment |
|---|---|---|---|
| | (1) | (2) | (3) |
| (1) | PV cost of the gratuity payment (PVGP) | 794,433,958 | 794,433,958 |
| (2) | PV cost of the existing contributors (PVEC) | 3,438,941,635 | 3,215,410,429 |
| (3) | PV cost of the existing pensioners (PVEP) | 3,469,263,930 | 3,313,147,053 |
| (4) | PV TOTAL COST (PVT) | 7,702,639,523 | 7,322,991,440 |
| (5) | PV cost per person in the system (PVPP) | 337,835 | 321,184 |
| (6) | PV TOTAL COST / GDP | 290% | 276% |

There are two adjustments that we needed to make to the estimations using equations 1 to 3 as reported in Table 2 column 2. The first adjustment arises because not all of the civil servants will survive until the age of retirement. For these individuals, the pension system will have

[7] 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% is used in our base case estimates with a sensitivity analysis conducted using real rates of discount of 2% and 4%. The average nominal interest rate paid on Euro zone long-term bonds in August 2010 (European Central Bank, 2011) was 4 percent, yielding a real rate of approximately 2% net of inflation in 2010.

savings in the own pension benefits they would have claimed, but at the same time there will be a loss of contributions between the time of death and the date of normal retirement. In the case of these historical civil service pension systems the present value of contributions is equal only to 8% of pension benefits so we simply apply the adjustment to the deficit numbers present in Table 2, column 2, row 2. In terms of the gratuity, the death benefits are given on the assumption that the person has worked 20 years even if the person dies after working less than 20 years and the payment is made immediately. Normally the gratuity is received only when the person reaches an age of 55. Hence, we make no adjustment to our base estimate of the cost of the gratuity payments, Table 2 column 2, row 1. Our estimate of the overstatement of the value of the pension deficits (based on the probabilities of a civil servant dying each year from age 25 to 55) for the base case ($g_w$ = 3.75% and 4.0%, and $g_p$ = 0%, retirement age 55) is 2% of the values in Table 2, column 2, row 2.

The second adjustment is required to reflect the fact that for the people who do live to the age of retirement they 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. Because future pension benefits are discounted, and also the real value of the pension benefits might be adjusted upward or downward over 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. With the base case assumptions the present value of the cost of the pension benefits for those who are retiring in the future (Table 2, column 2, row 2) are overstated by a further 4.5%.

This means that we need to reduce the estimated cost of the pension benefits for contributors in Table 2 column 2, row 2 by 6.5%, and the cost estimates for the currently retired individuals that are reported in Table 2 column 2, row 3 by 4.5%. These adjusted values are presented in Table 2 column 3.

This debt is being rolled over to future generations. Clearly the government of North Cyprus is faced with an enormous fiscal challenge in the near and medium terms as the present value of the liability arising from the closed civil service pension plan is about 278% of its

annual GDP. This figure is significantly higher than the corresponding figures for any of the EU countries.

According to OECD findings (Mylonas and Maisonneuve, 1999), Greece's PAYGO system's unfunded liabilities are among the highest in OECD countries. In 1998, the estimated present value of the deficit of the future pension liabilities for Greece, calculated for in the same way as was done for North Cyprus, was in the order of 200% of GDP. However, this deficit included not only the deficit for the civil service pension system, but also for all publically managed pensions for the private sector as well. The comparison with Greece shows the severity of the situation in North Cyprus. Compared with the Euro zone countries with an average present value of pension's deficit equal to 50.6% of GDP, it is evident that the unfunded liabilities of the pension system of North Cyprus are likely to cause more serious problems for government budget makers in the long run than elsewhere in Europe.

Over a number of years, intensive negotiations have been taking place amongst the political leaders on how an integration of North Cyprus might be carried out with the Republic of Cyprus that would ultimately allow it to enter into the European Union with full legal rights. The issues of land and property have dominated these discussions. Many efforts have been made to estimate the nature and the value of the compensation to the Greek Cypriots that would be needed in order to obtain a resolution to the political conflict. A recent effort to arrive at an estimate of the amount of monetary compensation required, after territorial adjustments, has determined the amount to be 5.8 billion euros[8]. Although our estimate of 7.3 billion euros as the cost of the unfunded liability of only the civil service pensions of North Cyprus is 25.86 % higher than the cash cost of settling the property issue, it is surprising that little or no attention has been given to the pension liability issue in the ongoing negotiations. It seems unlikely that North Cyprus or a United Cyprus could bear the fiscal burden of these historical civil service pension systems without continued infusion of budgetary support from outside the island. In the past, it has been the government of Turkey that had assumed this burden.

[8] Çilsal, Kyriacou and Mullen (2010) calculated this amount with the assumption that territorial adjustment would be made according to UN Annan Plan. According to their estimate Turkish Cypriot Constituent State will be obliged to compensate in cash 480,788,000 square meters of Greek Cypriot land at 12 euros per square meter. This amounted to 5.8 billion euros in 2009 prices.

It should be noted that these estimates of the financial burden of these pension plans are based on the conservative assumptions that GDP will grow at a real rate of 4.61% a year (its historical average), where real wage rates are assumed to grow at a real rate of 3.75% for men and 4.00% for women a year. Once a person retires, the values of the pension benefits are adjusted nominally by only the rate of inflation.

## 6 Policy Implications

The estimates of the size of the civil service pension deficit in present value terms are presented in accordance with a series of assumptions made about the growth rate of the real wages, the pension benefits and the retirement ages. Various sensitivity analyses have been conducted to estimate the changes in these results under alternative values of the assumptions that could also occur.

At present, the retirement age is 55 and Cyprus experiences considerable pressure from various sources, including Turkey, to raise the age of retirement. By assuming the retirement age for new retirees is raised to 60 and 65, we obtain the results shown in Table 3.

**Table 3: Sensitivity Analysis for Retirement Age**

| | PVGP | PVEC | PVEP | PVT | PVPP | PVT/GDP |
|---|---|---|---|---|---|---|
| **55** | **794,433,958** | **3,215,410,429** | **3,313,147,053** | **7,322,991,440** | **321,184** | **276%** |
| 60 | 986,576,873 | 2,999,213,297 | 3,313,147,053 | 7,298,937,223 | 320,129 | 275% |
| 65 | 1,175,461,794 | 2,639,109,623 | 3,313,147,053 | 7,127,718,470 | 312,619 | 268% |

It is interesting to note that an increase in the retirement age from 55 to 65 actually increases the present value of the fiscal burden of the gratuity payments by 47.96%. However, the overall decrease of the present value of the cost of future annual pension payments to be paid to the existing working contributors dominates and the total impact, in 2009 values, is a net 2.82% decrease in the total cost from 7.3 billion to 7.1 billion euros and hence a fall in the ratio of present value of this pension liability to GDP from 276% to 268%. For the increase in the retirement age to 60 years, the impact is very small. However, because of the offsetting effects of the two components of the pension schemes, the increase in retirement age to 60 or 65 is not as effective as it otherwise would be in solving the budgetary crises created by these pension commitments.

The next scenario considers the effect of change in the replacement rate on new retirees. The impact of changing replacement rates on the budget and the share of GDP used to pay defined benefit PAYGO pensions has been extensively studied by Oksanen (2005). This evaluation was undertaken in the context of analyzing a series of pension reform options. Alternatively, in a budgetary crisis similar to the one that Hungary, Poland and the Czech Republic faced in the 1990's, the replacement rates for new retirees might be unilaterally cut (Muller, 2002). Currently, (in 2009) the replacement rate for the basic pension is 55.79% of last monthly salary. If this ratio was to be decreased, its impact on the fiscal burden would be as follows (see Table 4).

**Table 4: Sensitivity Analysis for Replacement Rate**

| | PVGP | PVEC | PVEP | PVT | PVPP | PVT/GDP |
|---|---|---|---|---|---|---|
| **55.79%** | **794,433,958** | **3,215,410,429** | **3,313,147,053** | **7,322,991,440** | **321,184** | **276%** |
| 53.00% | 794,433,958 | 3,040,394,414 | 3,313,147,053 | 7,147,975,426 | 313,508 | 269% |
| 50.00% | 794,433,958 | 2,852,205,151 | 3,313,147,053 | 6,959,786,163 | 305,254 | 262% |
| 47.00% | 794,433,958 | 2,664,015,888 | 3,313,147,053 | 6,771,596,900 | 297,000 | 255% |
| 44.00% | 794,433,958 | 2,475,826,626 | 3,313,147,053 | 6,583,407,637 | 288,746 | 248% |
| 41.00% | 794,433,958 | 2,287,637,363 | 3,313,147,053 | 6,395,218,374 | 280,492 | 241% |

Such a substantial decrease in the replacement rate would affect only the present value of the cost of pensions to be paid to the existing employees upon retirement. A replacement rate of 41% instead of 55.79% would decrease the total burden of the system from 7.3 billion euros to 6.4 billion euros. With such a radical decrease in the replacement rate, the present value of civil servant pension liability to GDP ratio would fall from 276% to 241% of GDP.

**Table 5: Sensitivity Analysis for Different Discount Rates**

| | PVGP | PVEC | PVEP | PVT | PVPP | PVT/GDP |
|---|---|---|---|---|---|---|
| 4.00% | 685,411,932 | 2,376,672,076 | 2,947,599,694 | 6,009,683,701 | 263,583 | 226% |
| 3.50% | 737,290,983 | 2,759,918,783 | 3,122,131,293 | 6,619,341,059 | 290,322 | 249% |
| **3.00%** | **794,433,958** | **3,215,410,429** | **3,313,147,053** | **7,322,991,440** | **321,184** | **276%** |
| 2.50% | 857,469,456 | 3,758,659,880 | 3,522,645,361 | 8,138,774,697 | 356,964 | 306% |
| 2.00% | 927,110,375 | 4,408,878,304 | 3,752,909,264 | 9,088,897,943 | 398,636 | 342% |

The discount rate plays an important role in estimating the present value of the deficit. In the base case scenario, a real discount rate of 3% is used. In addition, a sensitivity analysis for the impact of changes of this variable is carried out for a range of real rates from 2% to 4%. The

estimated projections show a range for the present value of the civil servants pension liability from 226% of GDP in the case of a 4% discount rate, to 342% in the case of a 2% discount rate. In the latter case the estimate of the total value of unfunded pension liabilities now equals to 9.1 billion euros[9].

**Table 6: Sensitivity Analysis for Growth Rate in Real Wages**

| Men | Women | PVGP | PVEC | PVEP | PVT | PVPP | PVT/GDP |
|---|---|---|---|---|---|---|---|
| 4.75% | 5.00% | 924,516,187 | 3,791,062,077 | 3,313,147,053 | 8,028,725,317 | 352,137 | 302% |
| **3.75%** | **4.00%** | **794,433,958** | **3,215,410,429** | **3,313,147,053** | **7,322,991,440** | **321,184** | **276%** |
| 2.75% | 3.00% | 685,277,440 | 2,737,119,395 | 3,313,147,053 | 6,735,543,888 | 295,419 | 254% |
| 1.75% | 2.00% | 593,457,614 | 2,338,791,951 | 3,313,147,053 | 6,245,396,618 | 273,921 | 235% |

Table 6 above shows the impact of the growth rate of real wages for the employed civil servants on the overall cost of the existing pension system. It can be seen that if wages are increased only by the rate of inflation and for seniority increments, then the total pension cost to GDP ratio is reduced to 235% (Table 6, row 4) from the base case of 276%. If the increase in wages is greater at 4.75% for women and 5.0% for men, then the per person cost is 352,137 euros with a total cost to GDP ratio of 302%. These high values are close to the historical experience of real wage growth for the civil service of North Cyprus. These findings reveal that one of the most important factors affecting the unfunded liabilities burden on the budget is the real growth rate in wages of the currently employed civil servants.

Another sensitivity test has been conducted to find out the fiscal impact of the real rate of indexation of individual pension benefits after retirement. The results are summarized in Table 7 below.

[9] Changing the discount rate has implications for the values of two adjustments discussed above. For discount rates of 2, 2.5, 3.0, 3.5 and 4 percent, the downward adjustment of 2% remains constant for the deaths occurring prior to retirement. However, the additional downward adjustments to the costs due to the distribution of age of death after retirement are 3.5, 4.0, 4.5, 5.0, and 5.5 percent respectively.

**Table 7: Sensitivity Analysis for the Rate of Indexing the Value of Pension Benefits**

| | PVGP | PVEC | PVEP | PVT | PVPP | PVT/GDP |
|---|---|---|---|---|---|---|
| 4.61% | 794,433,958 | 7,031,334,788 | 6,510,652,488 | 14,336,421,234 | 628,790 | 540% |
| 4.00% | 794,433,958 | 6,245,342,029 | 5,859,131,853 | 12,898,907,840 | 565,742 | 486% |
| 3.00% | 794,433,958 | 5,228,389,101 | 5,015,280,065 | 11,038,103,124 | 484,127 | 416% |
| 2.00% | 794,433,958 | 4,399,409,904 | 4,319,310,135 | 9,513,153,997 | 417,244 | 358% |
| 1.00% | 794,433,958 | 3,740,900,656 | 3,761,719,563 | 8,297,054,178 | 363,906 | 312% |
| **0.00%** | **794,433,958** | **3,215,410,429** | **3,313,147,053** | **7,322,991,440** | **321,184** | **276%** |
| -1.00% | 794,433,958 | 2,779,078,685 | 2,935,416,384 | 6,508,929,027 | 285,479 | 245% |

Our assumption in the base case is that the retirees' pensions will not be increased in real terms. It can be seen from the table above that the present value of the deficit reaches a maximum value of 14.3 billion euros, or 540% of GDP, when the real growth rate of pension indexing is taken as 4.61%, the historical real growth rate of GDP. In fact this is close to the real rate of indexation of civil servant pension benefits until 2008. The present value of the deficit has a minimum value of 6.5 billion euros, or 245% of GDP, when the real growth rate of pension indexing is taken as a minus 1%, that is; a cut in real pension benefits over time[10].

It is clear from the results above that an increase in the real growth rates of wages for working civil servants and pensions for retirees amplifies the deficit, while decreasing the growth in real wages and pension benefits produces an opposite effect. However, in every case the burden of the costs as compared to the annual GDP is enormous considering that we are discussing only one part of the publicly sponsored pension system in North Cyprus since the issue of the deficit of the social security system applicable to private sector employees is beyond the scope of the present paper.

A more immediate measure of the fiscal burden of the public sector pension deficit than its present values is the ratio of the annual deficit of the system to annual public sector tax

[10] Changing the rate of indexing again alters two adjustments discussed above. For rates of pension indexing of 4.61, 4.0, 3.0, 2.0, 1.0, 0.0 and -1 percent, the adjustment of 2% remains constant for the effect of deaths prior to retirement. However, the adjustments to the costs of the system due to the rate of indexing of pension after retirement are upward adjustment of 4.0, 2.0, 0.0, and a downward adjustment of 2.0, 3.5 ,4.5 and 5.5 percent, respectively.

revenues. Also a measure of the macroeconomic burden of these pension deficits is their ratio on an annual basis to the corresponding year's GDP.

As the civil service pensions plans are pay as you go systems the assumptions on how the size of the civil service will change over time is a critical variable in determining their fiscal burden. At the present time the employees of the public service number 11,000, which is a large number for a country with a population of only about 250,000 people. It is the current policy of the government to slow the grown of public sector employment, hence in these estimations we assume that each person is replaced when they retire. In addition is assumed the overall size of the public service employment will grow by one percent a year overall to correspond to the expected growth in population. Although these budgetary systems are no longer accepting new members, the significant deficit of these plans will continue to be a burden on future taxpayers' shoulders and on the whole economy[11]. At the same time the pension plan contributions of the civil servants hired after 2008 to their new pension plan will help finance this PAYGO system overtime.

We are fortunate to have data on all the new hires since 2008, including their job classification, sex, salary, and age. The average age of the new recruits is 25 years with 56 % being males and 44% being females. New recruits entering the civil service after 2010 are given salaries that are significantly lower (about 35%) than the salary scales in 2009 (Salary Law 2009). The wages used to project future wage rates are these reduced salaries.

Table 8 below shows the fiscal impact over time expressed as ratios of tax revenues and GDP North Cyprus.

**Table 8: Annual Pension Deficit (APD) / Tax Revenue & Annual Pension Deficit / GDP**

| | **APD / TAX REVENUE** | | **APD / GDP** | |
|---|---|---|---|---|
| | **Without New Entrants** | **With New Entrants** | **Without New Entrants** | **With New Entrants** |
| 2010 | 27.62% | 27.48% | 6.92% | 6.88% |
| 2015 | 25.70% | 25.08% | 6.44% | 6.29% |
| 2020 | 25.29% | 24.05% | 6.34% | 6.03% |
| 2025 | 24.67% | 22.74% | 6.18% | 5.70% |
| 2030 | 22.09% | 19.59% | 5.53% | 4.91% |

[11] The analysis of this new pension plan in terms of the adequacy of its funding rules is the subject of another paper. However, as it affects new employees only, during a time when there are promises to reduce the size of the civil service, it will unlikely make a significant contribution in the near future to the funding of the annual cost of the historical pension liabilities.

| | | | | |
|---|---|---|---|---|
| 2035 | 17.82% | 14.86% | 4.46% | 3.72% |
| 2040 | 12.47% | 9.31% | 3.12% | 2.33% |
| 2045 | 8.86% | 5.68% | 2.22% | 1.42% |

In the base case scenario, using the annual real historical annual growth rates for both government tax revenues and the GDP of 4.61%, it is estimated that the ratios of the total annual deficit of the civil service pension system to annual tax revenues and the GDP are about 27% and 6.9% respectively. They gradually decrease through time to about 15 % of tax revenue or 3.72% of GDP by 2035. However, the decrease is very slow, and these ratios approach 5.68% and 1.42% respectively only by 2045. It is important to remember that the average corresponding ratios for total spending on civil service pensions were 5% and 1.2% for the OECD countries in 2006 (Palacios and Whitehouse, 2006). Hence, it will take North Cyprus approximately 34 years from now before the annual burden of the extraordinarily generous pension rights given over the past 37 years to public servants in North Cyprus will be brought into approximately the same relationship to GDP as is the current situation in Europe. Even at these similar long term ratios, several countries, such as Greece and France, consider that their pension system is in a state of crisis.

## 7 Simulating Alternative Policy Measures

Under the present rules of the grandfathering civil servant pension benefits for all existing members, only three variables can affect the future budgetary burden of these pension systems and hence alter the relative sizes of their final annual and present value liabilities compared to GDP and tax revenues.

First, how will the pension benefits be indexed in the future? Will they be indexed only for inflation hence preserving the real value set at the time of retirement? Alternatively, will they be set at the rate of growth of real wages? Second, what rate of growth of GDP should be assumed in conducting these projections? The relative burden of these pension obligations are affected by the rate of real growth of GDP as tax revenues will tend to grow parallel to real GDP growth rate. The rate of growth of real GDP in turn will be a function of the growth of real wages (productivity change), the growth in the labor force (population change) and the growth in country's capital stock. Third, what will be the rate of growth of real wages that will determine

the defined benefit retirement payments received at retirement and beyond? Hence, we carry out a sensitivity analysis of the impact on the relative fiscal burden with alternative assumptions about the behavior of these three variables over time.

We begin by assuming that the economy in the future will grow at a real rate of 4.61% which is the average historical rate over the past 32 years. Looking toward the future the two parameters that may vary are the growth rate of real wages for those still working (and determining the size of the gratuity payment and base year retirement benefit) and the real growth in the annual pension benefit after retirement.

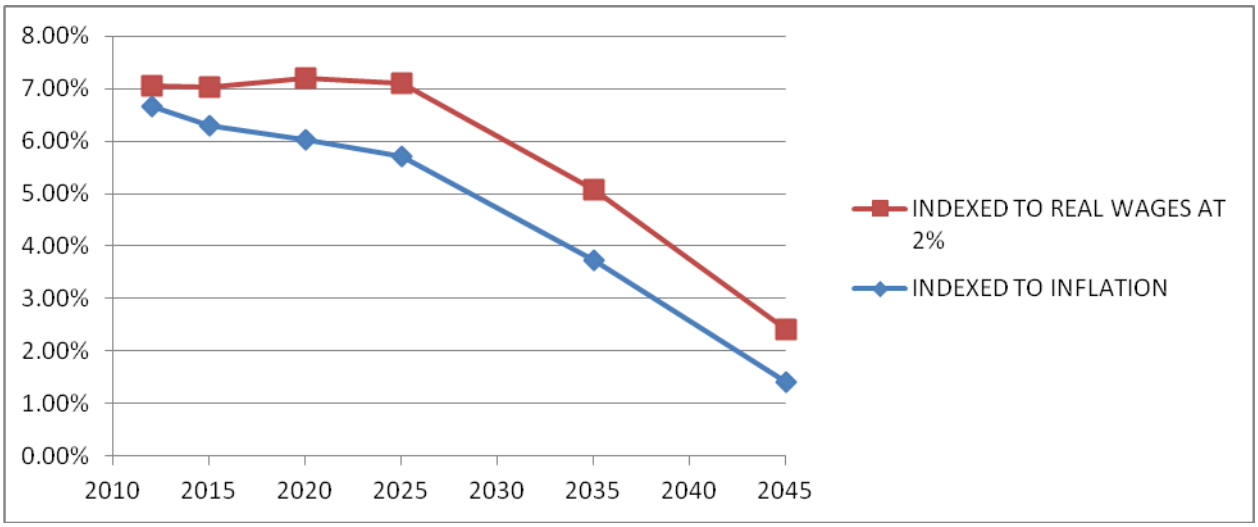
In the base case scenario, as stated earlier, the growth rate of pension benefits are indexed only for inflation and the real wage growth rate is assumed to be 2% plus the seniority increases of 1.75% for men and 2.00% for women. This analysis is carried out until 2045, the first year that the new recruits to the new system are expected to retire.

Estimates are now made of the annual burden when pension benefits are indexed to real growth rate of wages. Figure 1 below shows the movements of the annual pension deficit as compared to GDP in both the base case scenario with no indexation and in the alternative scenario with indexation.

Although the two scenarios illustrate a similar trend in the annual deficit/GDP ratio over time, it can be clearly seen that the burden is more significant for the case where the real value of pension benefits are increased at the rate of 2% through time.

**Figure 1: Annual Pension Deficit / Annual GDP Ratios**

(Pension benefits indexed to the rate of inflation when the GDP growth rate is 4.61%)




The present value of the additional budgetary outlays between the two cases is about 1.6 billion euros in 2009 values[12]. The present value of these additional payment amounts is equal to 60% of the annual GDP of North Cyprus.

The importance of the economic problem that these pension promises are creating is seen in Table 9. Whether indexed or not, it is certain that the pension benefit payments are a heavy burden on the economy. Pension payments to this group of citizens are eating up on a net of contribution basis between 5.7% and 6.9% of GDP for the next 15 years. Until 2045, the ratio is much higher than the OECD average. The gradual fall in the figures is primarily due to the decrease in the number of pensioners as they die and are replaced by new entrants who are earning significantly smaller salaries. The GDP that is used to finance pensions and hence consumption of the retired civil servants will not be able to finance investments by local residents to enhance growth of the economy. In such a case, economic growth will only be achieved by increasing foreign investment and hence, foreign ownership of the economy. In the political context of North Cyprus, this is a highly contentious issue.

**Table 9: Annual Pension Deficit / Annual GDP Ratios**

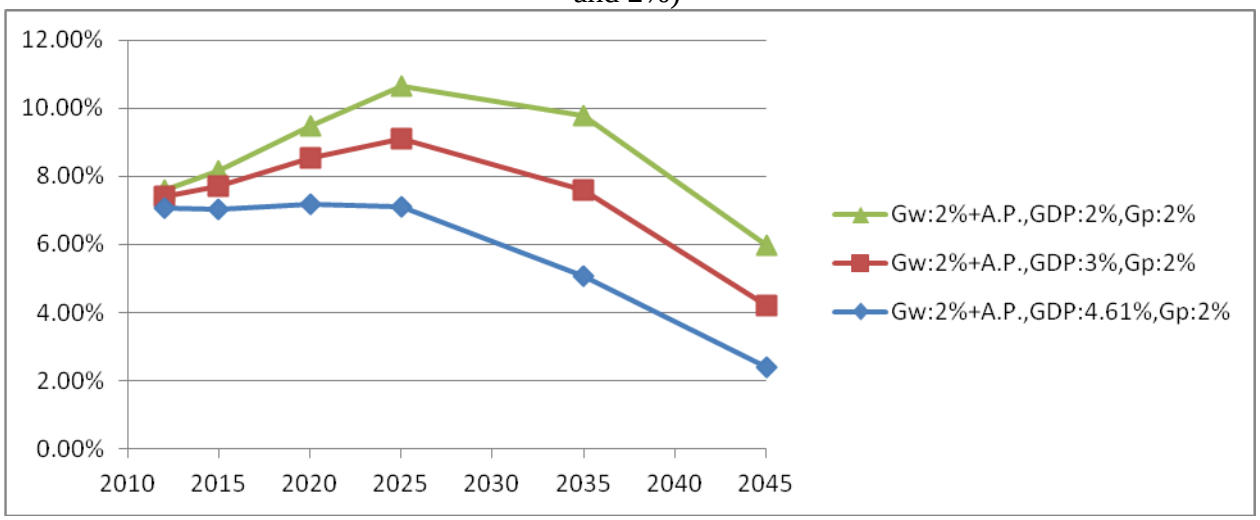
| | **2012** | **2015** | **2020** | **2025** | **2035** | **2045** |
|---|---|---|---|---|---|---|
| **$g_w$:2%+age premium,$g_p$:0%** | 6.66% | 6.29% | 6.03% | 5.70% | 3.72% | 1.42% |

[12] In the case that wages grew by 3% and pension benefits were also indexed to real wages at 3%, then the additional cost in present value terms would be about 2.2 billion euros.

| | | | | | | |
|---|---|---|---|---|---|---|
| **$g_w$:2%+age premium,$g_p$:2%** | 7.06% | 7.02% | 7.19% | 7.11% | 5.06% | 2.41% |

Suppose if instead of 4.61% the real growth rate of GDP for North Cyprus were to slow to 3%, while wages continued to grow at a real rate of 2% (Figure 2). Then, when pension benefits were only indexed to inflation, the members of these pension plans would receive more than 6.27% of GDP until 2025 (Table 10, row 3). If they were indexed to the growth rate of real wages, they could be consuming more than 7.7% of GDP until year 2025. This is shown in Figure 2 and the accompanying table (Table 10, row 6).

**Figure 2: Annual Pension Deficit / Annual GDP Ratios**
(Pension benefits indexed to real wage growth at 2% when GDP growth rates are 4.61%, 3%, and 2%)




The situation is much worse if the real growth rate of GDP were to fall to 2% a year. In this case the historical pension commitments to those retired and currently employed civil servants would absorb over 9% of GDP until 2025 and still over 7% by 2035. Even if the pensions were only indexed to the rate of inflation, our estimates show that the civil servants will be capturing in pension benefits alone over 7% of GDP until 2025 and almost 6% as late as 2035.

**Table 10: Annual Pension Deficit / Annual GDP Ratios**

| | **2012** | **2015** | **2020** | **2025** | **2035** | **2045** |
|---|---|---|---|---|---|---|
| **$g_w$:2%+age premium,GDP:4.61% $g_p$:0%** | 6.66% | 6.29% | 6.03% | 5.70% | 3.72% | 1.42% |

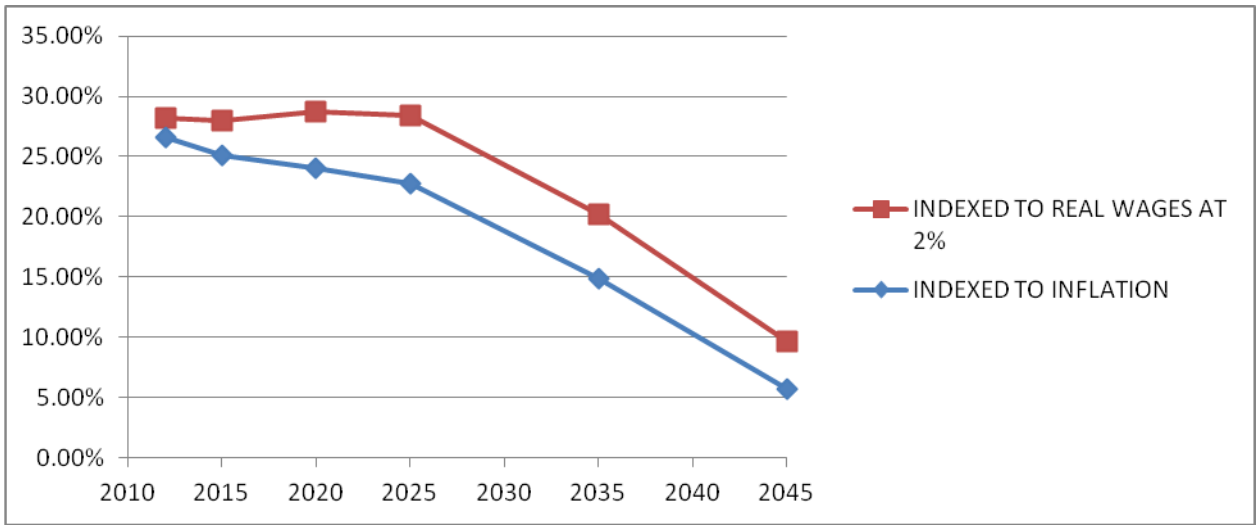
| | | | | | | |
|---|---|---|---|---|---|---|
| **$g_w$:2%+age premium,GDP:3%,$g_p$:0%** | 6.97% | 6.90% | 7.15% | 7.30% | 5.57% | 2.49% |
| **$g_w$:2%+age premium,GDP:2%,$g_p$:0%** | 7.18% | 7.31% | 7.96% | 8.54% | 7.18% | 3.54% |
| **$g_w$:2%+age premium,GDP:4.61%,$g_p$:2%** | 7.06% | 7.02% | 7.19% | 7.11% | 5.06% | 2.41% |
| **$g_w$:2%+age premium,GDP:3%,$g_p$:2%** | 7.39% | 7.70% | 8.53% | 9.11% | 7.58% | 4.21% |
| **$g_w$:2%+age premium,GDP:2%,$g_p$:2%** | 7.61% | 8.17% | 9.49% | 10.65% | 9.77% | 5.98% |

## 8 Impact of Civil Service Pension Payments on the Public Sector Budget in Future Years

When examining the impact of these past pension promises on the public sector budget, we assume that the tax revenues are a function of GDP and tax policies will be in place that will allow the ratio of tax revenues to GDP to remain constant over time. We also assume that the real growth rate of GDP will be sustained at its historical rapid real growth rate of 4.61% per annum. Furthermore, indexation of future pension benefits to the rate of inflation is also among our assumptions (Figure 3 and Table 11).

**Figure 3: Annual Pension Deficit / Annual Tax Revenue Ratios**

(Pension benefits indexed to real wage growth at 2% versus to inflation when GDP growth rate is 4.61%)




According to the estimations for 2012, with the indexation of pensions only to inflation (current stated policy of government), the share of current tax revenues that would be paid out as pension benefits would be 26.83%. If the pension had been indexed to the real growth in wages (the historical practice), then the share of tax revenues to be paid to civil service pensioners would have been 28.42%.

This share of the budget is quite close to the total expenditure made on primary and secondary education in the country (30.37% of tax revenues) and far above the total expenditure made on health care/tax revenues ratio of 14.84% (State Planning Organization, 2010). From Table 11 below, one can see the critical importance that the method of indexation of pension benefits has on determining the future burden of these pension payments on the public sector budget. By 2025, with indexation for only the rate of inflation, these payments will still account for about 19.5% of total government tax revenues.

**Table 11: Annual Pension Deficit /Annual Tax Revenue Ratios**

| | **2012** | **2015** | **2020** | **2025** | **2035** | **2045** |
|---|---|---|---|---|---|---|
| **$g_w$:2%+age premium,$g_p$:0%** | 26.56% | 25.08% | 24.05% | 22.74% | 14.86% | 5.19% |
| **$g_w$:2%+age premium,$g_p$:2%** | 28.16% | 28.01% | 28.69% | 28.38% | 20.21% | 9.61% |

On the contrary, if indexation is made according to the growth in real wages of 2%, the burden will be about 24% which is equal to an increase in the overall fiscal burden of about 23%.

## 9 Conclusions

Our estimations of the unfunded liabilities of the civil service pension systems in North Cyprus reveal that the existing problem is not likely to be solved by the type of traditional policy measures that have been implemented elsewhere in Europe. Various policy implications such as increasing the retirement age, decreasing the basic replacement rate, freezing the real wages and indexing pension benefits to only inflation resulted in only modest improvements in the fiscal burden to be borne over a long period of time.

Overcoming this problem requires more fundamental measures. The collapse of the former Soviet Union and governments of Eastern Europe in the 1990's provide many examples of this kind of a solution to unfunded pension promises. Although labor relations in North Cyprus are dominated by strong unions, it is conceivable that current pensioners and contributors to these pension plans may also be forced to receive fewer benefits by the government breaking its pension promises. However, given that any political solution on the island is likely to require an approval by both sides through a referendum, it is unlikely that any proposal would be agreed to by the residents of North Cyprus if it meant that a significant proportion of the population will suffer drastic losses of future pension benefits. Ultimately, it would appear that outside financial

support will be necessary to get over this fiscal burden before any political solution on the island of Cyprus is likely to be realized.

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Available at: http://apps.who.int/ghodata/?vid=720
[Accessed 18 May 2011].

| 2010 | 2012 | 2015 | 2020 | 2025 | 2035 | 2045 |
|---|---|---|---|---|---|---|
| **994,223** | **2,394,003** | **5,403,978** | **13,579,482** | **26,368,299** | **63,510,550** | **107,040,066** |