Original Article

Assessing the public pension scheme of the Republic of Cyprus

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ABSTRACT This study focuses on identifying the fiscal consequences of the current public pension scheme of the civil servants in the Republic of Cyprus and the mechanisms of governing the benefits offered to its members. The article explores the implications of the economic impacts of the scheme on the budget expenditures. The projections presented point out the fiscal positions of the scheme under the current arrangements, up to the year 2070. The sustainable fiscal stance and projected liabilities are also presented. The empirical evidence reveals that the public pension scheme in Cyprus can generate undesirable and widely distributed economic impacts. The results suggest that the public pension scheme, if it continues to function on the basis of the existing mechanisms of governance, will affect the whole of the economy in a negative way. The article concludes that effective institutional intervention with successful reforms of the Scheme will benefit the budgetary balance of the Republic of Cyprus. The policy implications are underlined and suggestions are given for the development of the public pension scheme in Cyprus. Finally, it concludes and gives some implications for further research.

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INTRODUCTION

The reforms of social insurance systems and the public pension schemes of the civil servants have been of interest to a number of academic circles, as well as to a number of governments. Specifically, Prof. Barr, N.(2000),¹ Diamond, P. (2002),² Barr, N. and Diamond, P. (2009)³ have determined the requirements for reforming pensions and have developed guidelines for governments that would like to proceed with reforms to their pension systems. John F. Cogan and Olivia S. Mitchel⁴ have proposed to the EU a system of dual arrangement. Palacios, R. and Whitehouse, E.⁵ have studied the public pension schemes of civil servants in different countries, as well as the reforms of the public pension schemes in those countries and suggested a number of structural and parametric changes to the pension schemes of civil servants. Capretta, C.,⁶ in order to study the impacts of population ageing on the sustainability of the pension schemes of the civil servants, proceeded with the appraisal of the reforms of the pension schemes of the civil servants in 12 economically developed countries.

Countries in the EU such as France, the United Kingdom, Finland, Sweden, Germany, Italy, Austria, Greece, Portugal, Spain, the Netherlands, Belgium and Dania have proceeded with reforming the pension schemes of their civil servants. Specifically, as from 1/1/2007, Germany has approved the proposal for developing a pension scheme for the new civil servants of the Federal State. This scheme is fully funded in comparison with the method applied before 2007.

Currently in the Republic of Cyprus, there is a trend towards reforming the Public Pension Scheme of the Civil Servants. In the last actuarial study before ours, which was carried out in 1986 treating 1984 as the base year, the actuary in the report proposed, among others, the extension of the retirement age.

This article concentrates on assessing the Public Pension Scheme of the civil servants of the Republic of Cyprus with a long-term research concentration on the modernization of the Public Pension Scheme of the Republic of Cyprus. Thus, the Scheme can be sustainable in the long

term, free from financial pressures that the rising public benefits exercise on it, as well as the lack of funding and the new demographic facts.

On the basis of economic data (Ministry of Finance, Republic of Cyprus), in 2004 the cost of pensions of the civil servants was 2.3 per cent of the GDP exercising substantial pressures on the public economics of the Republic of Cyprus. It is estimated that by the year 2050, this cost will increase to 2.8 per cent of the GDP of Cyprus.

This article presents part of the results of the grant research project, 'Sustainability and Modernization of the Public Pension Scheme of the Civil Servants in Cyprus'. The research project was financed by the Research Promotion Foundation of Cyprus (RPF) and was carried out during the period 2006–2008.

The current study aims to assess the sustainability of the current Public Pension Scheme of the civil servants of the Republic of Cyprus.

Thus, the objectives of the study are

1. to present the projected fiscal positions under the present arrangement; and
2. to identify the fiscal stance and the projected liabilities.

Following this section of the article, a description of the Public Pension Scheme of the civil servants of the Republic of Cyprus is presented. The reader will be informed about the functioning of the Public Pension Scheme of Cyprus and its major benefits. Then the methodology applied is presented, as well as the demographic and financial assumptions that are taken into consideration in the projections of the study. In the next section, the findings are presented. The article finally concludes giving some suggestions for further research.

A DESCRIPTION OF THE PUBLIC PENSION SCHEME OF THE CIVIL SERVANTS OF THE REPUBLIC OF CYPRUS

The public pension scheme of the Republic of Cyprus⁷ gives pensions to retired civil servants,

as well as to the wives/husbands and under-aged children of the deceased civil servants. The right to be included in the public pension scheme have full-time civil servants, members of the public educational system, members of the police force and the army.

The scheme is financed by the budget of the state on the principle of the Pay as you Go (PAYG) System. Any benefit or lump sum paid by the scheme to its members is not taxable.

In this section of the article, all the provisions of the scheme are presented as they are defined by the Law No. 79(I) of 1997 – ‘the Pensions’ Law of 1997’,⁸ taking into consideration the revised Law of 2005 as it was published in the official newspaper of the Republic of Cyprus, the ‘Cyprus Government Gazette’.

As from 1 July 2008, the retirement age of the civil servants is the 63rd year of age. In the case of the rest of the employees of the state, the retirement age is the 60th year of age. For the policemen, the retirement age is the 55th year of age, whereas the retirement age for the officers of the army is between the 52nd and the 58th year of age according to their rank in the army. Every employee retires during the first day of the month following the month during which the retirement age is reached.

Contributions

Up to a given level of annual remunerations determined by the Department of Social Insurance, the civil servants contribute 0.75 per cent of their annual remunerations to the Public Pension Scheme. Beyond this level of their annual remunerations, the civil servants contribute 1.75 per cent of their annual remunerations to the Scheme.

In case that a contributor to the Scheme dies or for any reason stops to offer his/her services to the public sector, and is not married or is a widow/widower or divorced and died during his service or retired without remarrying, then his/her monthly contributions are returned either to him/her or to his/her legal personal representative.

Each civil servant contributes maximum 400 monthly contributions to the Scheme.

Pension benefits (pension and lump sum)

Pension and lump sum is paid to an employee of the state at retirement under the following circumstances:

- At the retirement age or at a later stage: The pension and the lump sum is paid to the employee in case that the employee has reached the retirement age or has completed at least 5 years or more of service. The pension paid must not exceed in any circumstances $\frac{1}{2}$ of the yearly remunerations of the employee. In the case of a policeman who has been employed for more than 25 years (300 months), his retirement service increases in accordance with his annual service above the 25 years, and with a maximum increase of 60 months.
- When a civil servant is at the 55th year of his age or a policeman is at the 50th year of his age.
- In the case of a voluntary early retirement: According to the revised law of 2005⁸, new members can retire early if they have completed 5 years of service and are not younger than 48 years. To an employee who has retired early, a lump sum is given; however, he/she will start receiving pension only after completing the age of 58 years. In case that there are employees who have been employed before the implementation of the revised law, they may retire early based on the previous regulations (that is, early retirement at the age of 45 years and pension received at the age of 55 years). In case that an employee retires early but has not completed the above terms and has been employed for more than 3 years, then he/she receives a gratuity equal to $\frac{1}{12}$ of the monthly remunerations times the number of months that he/she has been employed.
- Owing to illness: In the case when an employee retires because of illness, he/she is eligible to the benefits that he/she would have received at the retirement age. The retirement pension, however, is estimated according to the length of service as described in the Table 1: In any case, however, the employee must not be credited with more years of service than those

Table 1: Service credited to a retired employee due to illness

<i>Period of completed service</i>	<i>Service credited to the employee</i>
From 5 to 10 years	Double the actual period of service.
From 10 to 15 years	Credited with 20 years of service.
From 15 to 23 years	Credited with 5 extra years above the actual period of service. The total years of service credited must not exceed the 25 years.
From 23 to 30 years	Credited with 2 extra years above the actual period of service. The total years of service credited must not exceed 30 years.

that would have been credited in case that the employee remained employed until the retirement age.

- Owing to physical or mental disability: In case that an employee becomes disabled because of an accident at work, then he/she is eligible to benefits as prescribed when an employee retires at retirement age, without having 5 years of service at the public sector. Moreover, he/she is eligible to a supplementary pension, which is estimated as follows:

Supplementary pension = 5/60 × Annual remuneration (for disability 10–30 per cent)

Supplementary pension = 10/60 × Annual remuneration (for disability 30–50 per cent)

Supplementary pension = 15/60 × Annual remuneration (for disability 50–70 per cent)

Supplementary pension = 20/60 × Annual remuneration (for disability > 70 per cent)

The supplementary pension together with the initial pension of the employee must not exceed the annual remuneration of the employee at the date of his actual retirement.

- In the case of not disciplined behaviour.
- In the case of downsizing:

In the case of downsizing, the employee is eligible to the benefits that he/she would have received in case that he/she would have retired at retirement age. In addition, he/she is eligible

to an additional pension, which is estimated as follows:

Additional annual pension = 1/60 × Annual remuneration × three years completed periods.

- When an employee retires so as to assist in improving the organization of a department of the government.
- For public interest.
- In case of incapability on behalf of the employee to meet his duties.

Gratuities and pensions

In case that an employee retires without completing 5 years of service, then he/she is eligible to a gratuity, which is estimated as follows:

Gratuity = 1/10 × monthly remunerations × number of months employed.

- *Gratuity in case of death:*

In case that an employee dies during his service, then the legal heir receives either a lump sum not greater than the annual remunerations at the day of employment of the employee who passed away, or the lump sum that the employee would have received in case that he/she would have retired due to illness, whichever sum is greater.

- *Pension in case of death:*

In case of death either of a retired civil servant or an employed one, the widow/widower or the children of the civil servant who passed away, receive a pension. The pension is estimated as follows:

Widow pension = 75 per cent × Pension (for service with contributions to the Scheme).

Widow pension = 37.5 per cent × Pension (for service without contributions to the Scheme).

- *Child pension:*

Eligible to a child pension are the acknowledged children of the passed away civil servant who are up to the age of 18. In case that the children of the passed away civil servant are students, then

eligible to a child pension are those who are up to the age of 25.

Child pension is estimated as follows:

Child pension (for every eligible child) = 16.67 per cent × widow pension (when there is a widow with maximum 2 children) or 44.44 per cent × widow pension (when there is no widow with maximum 3 children) or 22.22 per cent × widow pension (when the widow remarries with maximum 3 children).

Pension rises

The pensions are revised twice a year (on 1 January and on 1 July) according to the inflation rate and according to the periodical salary rises.

Advantages of the public pension scheme of the civil servants

The government contributes to the Social Insurance Fund the personal contribution of the civil servant for the Supplementary Pension from Social Insurance Fund.

With regard to the retired employees, only 10.4 per cent receive supplementary pension greater than the benefits offered by the Social Insurance Fund. Of this 10.4 per cent of the total retired employees, most are retired individuals from the public or the semi-public sector.⁹

In addition, the benefits received by the public and the semi-public employees are much higher than the ones received by retired employees from the private sector in the Republic of Cyprus. The pension benefits received by an ex-civil servant by far exceed the benefits received by a retired individual from the private sector, who contributes only to the social insurance fund.

Comparing the present value of the contributions of an employee with the benefits that the employee receives, the contributions of an employee who contributes only to the social insurance fund (employee in the private sector) cover 12 per cent of the benefit received, whereas in the case of the civil servant the contributions of the employee cover only the 3.8 per cent of the benefit received.

As the level of the contributions depends on the maximum remunerations, the civil servant benefits more, owing to the restricted contributions made to both Schemes (Social Insurance Fund and Public Pension Scheme).

METHODOLOGY

For achieving the objectives of the study, two different softwares were developed. The first one is used for projecting the income and expenditure of the Scheme and the second for estimating the cost of the actuarial liability of the Scheme.

The first software aims to project the cash flow of the Scheme (contributions and benefits) for the next 50 years. This software assesses the long-term financial situation of the Scheme and examines the ratio of income to expenditure.¹⁰ This method is mostly used for schemes that are not fully funded.

The second software aims to estimate the cost of the Scheme and the actuarial liability¹¹ at the date of the estimation. This method is mostly used for schemes that are fully funded.

In this section of the article, the functions of both softwares are described. In addition, in Appendix A, the data used for the projections and the estimations are presented. The data are based on the situation of the Scheme as at 31 December 2006 when the research project initially started.

Software for projecting income and expenditure

For estimating the income and expenditure of the Scheme, it is necessary to proceed with demographic and financial projections. Specifically, the demographic projections include the following: (a) projections of the number of civil servants who are covered by the Scheme; (b) projections of the retired civil servants; and (c) projections of the widows and orphans.

The financial projections include:

- (a) projections of wages; (b) projecting the period of employment of the civil servants; and
- (c) projections of benefits.

Different projections are made for men and women because of their demographic differences,

as well as the different levels of each financial benefit that they receive. This differentiation in the estimations makes more accurate projections possible.

Demographic projections

The first stage of the demographic projections includes: (a) the projection of the number of the civil servants covered by the Scheme; (b) projection of the retired civil servants; and (c) the projection of the widows/orphans.

(a) Projection of the number of civil servants covered by the Scheme

The projection of the number of insured employees from one year to another is based on the following:

- the expected number of insured members of the Scheme in each year;
- the number of insured employees of the previous year who are expected to remain insured (that is, not deceased or retired owing to age or disability);
- the number of new insured employees who enter the Scheme (percentage of the new employees who enter the Scheme of the total number of employees of the previous year); and
- the expected age distribution of new employees for every year.

(b) Projection of the retired civil servants

The projection of the number of retired civil servants from one year to another is estimated based on the following:

- the expected mortality, which is differentiated by age and by sex (this is used in order to estimate the number of retired employees who will continue to receive pension);
- the expected probability of new members to retire (this is differentiated according to age and sex, as well as every year owing to the long-term assumption that the retirement age is increased to the 63rd year for certain categories of civil servants).

In Appendix A, data for the retired employees in the year 2006 are presented. These data are used

for the projection of the number of retired employees of the Scheme.

(c) Projection of widows and orphans

The projection for the receivers of pension for widows from one year to another is based on the following:

- the expected mortality, which depends on age (the expected mortality is used in the projection of the widow pensioners of the previous year that will continue receiving widow pension); and
- the expected mortality of the married insured employees and pensioners. This changes according to age and year and is used for the projection of the number of the widow pensioners of the Scheme.

Financial projections

The projection of wages depends on the level of wages of the members of the Scheme at the date of their retirement. Therefore, the second part of the software covers (a) the projection of wages based on the assumptions presented in Tables 2 and 3; (b) the projection of the period of employment of the civil servants; and (c) the projection of benefits (Table 7).

Table 2: Description of assumptions

<i>Demographic assumptions</i>	
Mortality	70% of PA90 with a gradual decrease to 50% in the next 50 years.
Retirement rate	Retirement at normal age with a very low percentage at early retirements.
Entry rate of new members in the scheme	Starting rate of 2.5% with a gradual decrease to 1% in the next 10 years and a final fixed rate of 0.5%.
Entry of new members	According to Table 3.
<i>Financial assumptions</i>	
Percentage rate of investment	5.5%
Salary increase	7%
Increase in the basic salary	4%
Increase in pensions	Public Pension Scheme: 3.5% Supplementary Pension from the Social Insurance Fund: 2%

Table 3: Entry of new members into the scheme

Age distribution	Percentage of new employees in the scheme at each age group (%)
<20	0.00
20–25	20.00
25–30	46.00
30–35	17.50
35–40	9.00
40–45	5.75
45–50	1.75
50+	0.00
Total	100.00

(a) *Projection of wages*

The projection of the average wage at each age level depends on the estimated rate of wage rise, which is expected during the period of the projection. Specifically, the projection depends on

- the general wage rises;
- the wage rises due to inflation; and
- wage rises due to service and promotion.

(b) *Projection of the period of employment of the civil servants*

The projection of the period of employment of the civil servants is necessary because the benefits received are directly related with it. Initially, the period of the service of the members of the Scheme is estimated based on data received from the Department of Public Administration and Personnel of the Ministry of Finance. On the basis of these data, the future expected service until retirement is estimated.

(c) *Projection of benefits*

The demographic projections in combination with the projection of wages and the projection of the period of service are used for the projection of benefits. Specifically, the projection of the retirement pension includes the following two components:

- The benefit, which was paid to the current retired pensioners. This is the total amount of retirement pension, which was paid during the previous year, and adjusted according to the pension rises and the relevant mortality.
- The benefit, which is paid to the new retired pensioners.

The projections also take into consideration the benefit received as a supplementary pension from the Social Insurance Fund.

Software for estimating the actuarial liability

According to the provisional law for establishing, registering, functioning and supervising the pension funds, such a fund must be fully funded. The Public Pension Scheme of the Republic of Cyprus is not in this category, but for the objectives of the study both the actuarial responsibility and the cost of the Scheme are estimated.

The *actuarial liability* is the present value of the benefits, which correspond to the service of the members of the Scheme and have been earned by the date of the estimate.

Normal contribution rate is the percentage rate of contribution, which is necessary to cover the cost of the benefits for the service after the estimation date.

The difference between the actuarial liability and the assets of a fund is the actuarial surplus or deficit.

According to the International Financial Reporting Standards (IFRS 19), the method used for financing the fund must be the Projected Unit method.¹² It is 'Projected', because it takes into consideration the projected assumptions until retirement in estimating the value of the benefits. It is 'Unit', because it studies the cost of one-year future employment. The method presumes that the Fund will continue to accept new members.

The method used also differentiates the benefits that have been accumulated until the date of the estimation (and the capital/provident that has been accumulated in order to cover these benefits) from the benefits that will arise as a result of the future employment. The first group of benefits emerges from the actuarial liability and the second group of benefits emerges from the normal rate of contribution that must be paid to cover the cost of benefits that will arise from future employment.

The main long-term financial objectives of the Fund are:

- to ensure that the available capital is sufficient to cover the value of the benefits for the service that has already been offered, taking into consideration the projected final wages; and

- to ensure that the normal rate of contribution is sufficient to cover the benefits that will arise from the future service.

The Actuarial estimation is carried out in three stages as explained below:

(a) *Stage one – Past service*

The first stage is carried out in order to identify whether the accumulated funds at the date of estimation are sufficient to cover the accumulated benefits (that is, the benefits that have been accumulated for the service offered up to the date of the estimation).

The actuarial value of the benefits (actuarial liability) is then compared with the actuarial value of the accumulated funds.

The objective of stage one is to estimate the monetary value of the benefits that will arise in the future, as a result of the service offered up to the estimation date. This will enable us to estimate the necessary funds required to cover the value of the benefits that have been accumulated up to the estimation date. The estimation takes into consideration any wage rises that will emerge in the future.

Therefore, stage one determines the value of any difference between the actuarial liability and the available funds for covering the responsibilities of the Fund.

(b) *Stage two – Normal contribution rate*

At this stage, the normal contribution rate is estimated. This is the rate that is necessary to cover the cost of benefits for the service that will be offered after the estimation date.

This contribution rate is estimated for each employee by differentiating the present value of the expected benefit that will be accumulated within the year after the estimation date (taking into consideration any wage rises until the retirement date, the date of death or the date of withdrawal from the service) from the present value of the annual wage.

This method used for financing the Fund estimates an average contribution rate for the whole Fund, as a percentage of the total overall wages of the members of the Fund. This

contribution should be sufficient to cover the cost of the benefits that will be accumulated in the year after the estimation date.

(c) *Stage three – Disposal of the actuarial surplus and financing the actuarial deficit*

At this stage, the normal contribution must be regulated so as to eliminate any difference (positive or negative) between the assets of the Fund and the actuarial value of the benefits as described in stage one.

This kind of regulation can take the form of a lump sum paid (or returned if it is appropriate), during a fixed time period or even the regulation of the normal contribution rate during an appropriate time period.

As was already mentioned, the Projected Unit Method assumes that the Fund will continue to accept new members. The normal contribution rate will not be strongly affected if the distribution of the members according to sex, age and wage is stable. However, the normal contribution rate will be strongly affected if the distribution of the members changes substantially from one estimate to another. This may happen, for example, in case that a substantial number of either new or old members of the Fund enter it or leave it.

For the objectives of this study, the demographic and financial assumptions considered¹³ were provided by the Ministry of Finance of the Republic of Cyprus.

In the next section of the article, the findings are presented.

FINDINGS

In this section of the article, we present the results of the actuarial estimates. The projections cover a period of 60 years. Table 4 gives the results for the first 4 years in a sequential form and then for every 5–10 years. An analysis of the expenditure for the Public Pension Scheme as a percentage of the GDP is made as well.

Demographic projections

The demographic projections cover the employed civil servants, the civil servants in pension and the widow/widower and orphans who receive pension benefits.

Table 4: Demographic projections 2007–2070

	2007	2008	2009	2010	2015	2020	2030	2040	2050	2060	2070
Employed civil servants	31 752	32 503	33 123	33 735	35 891	37 723	40 877	42 999	45 244	47 622	50 065
Civil servants in pension	12 465	12 895	13 448	13 990	16 370	17 735	19 275	24 212	28 285	30 788	33 085
Beneficiaries of widow/widower and orphan pension	2443	2571	2698	2826	3507	4228	5536	6347	6891	7730	8677

Source: Treasury of the Republic of Cyprus and authors' projections.

Table 5: Ratio of the employed civil servants to the retired civil servants

	2007	2008	2009	2010	2015	2020	2030	2040	2050	2060	2070
Ratio of protection	2.1	2.1	2.1	2.0	1.8	1.7	1.6	1.4	1.3	1.2	1.2

Source: Treasury of the Republic of Cyprus and authors' projections.

Table 6: Projection of total wages and average annual wage (£ – Cyprus Pounds)¹⁴

	2007	2008	2009	2010	2015	2020	2030	2040	2050	2060	2070
Total annual wages	654.6 million	710.9 million	760.4 million	806.7 million	1032.9 million	1327.5 million	2117.2 million	2836.5 million	4077.5 million	6173.4 million	9168.1 million
Average annual wage	20617	21872	22957	23914	28779	35189	51795	65965	90124	129635	183126

Source: Treasury of the Republic of Cyprus and authors' projections.

The demographic assumptions made for the projections of the retired civil servants, and the employed civil servants consider the possibilities of occurrence of facts such as the possibility of death and retirement, the rate by which the number of the civil servants increases, the age distribution of the new employed civil servants and the age difference between men and women.

It is estimated that the number of the employed civil servants up to the year 2017 will be increasing by 1 per cent per year and is then stabilized to 0.5 per cent increase per year.

The ratio of the employed civil servants to the retired civil servants (ratio of protection) is low. Currently, there are two employed civil servants for every retired employee (see Table 5).

In the future, it is estimated that the ratio of the employed civil servants to the retired ones will decrease because of the following factors: (a) the pension scheme reaching its maturity, (b) the decreasing rate of the civil servants who enter the

public service and (c) the rise of the life expectancy rate.

Financial projections

The financial projections cover (a) projection of wages; (b) projection of benefits; and (c) projection of contributions. All the financial projections are in real values and not in nominal values.

Projection of wages

In Table 6,¹⁴ the projections of the total annual expenditure for wages are presented together with the level of average annual wage up to the year 2070. The projected values are estimated based on data from the Ministry of Finance and the assumptions for wage increases due to inflation, general wage increases and annual rises of wages.

Projection of benefits

In Table 7, the projection for benefits (pensions and lump sum benefits) of the public pension

Table 7: Projection for benefits 2007–2070 – (£ million)

	2007	2008	2009	2010	2015	2020	2030	2040	2050	2060	2070
Pensions for retirement	129.9	137.2	146.0	155.6	210.8	263.8	413.8	869.3	1407.4	2049.6	3002.7
Pensions to widow/orphan	16.4	19.2	22.2	25.3	44.5	68.7	125.8	200.1	338.0	597.5	948.4
Total pensions	146.3	156.4	168.2	180.9	255.3	332.4	539.6	1069.5	1745.4	2647.1	3951.1
Lump sum benefits	41.1	46.0	59.3	62.8	76.4	93.4	193.9	360.4	405.0	573.2	964.6
Total expenditure	187.4	202.4	227.5	243.7	331.6	425.8	733.6	1429.8	2150.4	3220.3	4915.7

Source: Treasury of the Republic of Cyprus and authors' projections.

Table 8: Projection of contributions 2007–2070 (£ million)

	2007	2008	2009	2010	2015	2020	2030	2040	2050	2060	2070
Contributions	4.9	5.4	5.8	6.3	8.1	10.6	17.5	21.9	30.2	45.4	67.5

Source: Treasury of the Republic of Cyprus and authors' calculations.

Table 9: Projection of the pay as you go cost 2007–2070

	2007	2008	2009	2010	2015	2020	2030	2040	2050	2060	2070
Pay as you go cost	28.6%	28.5%	29.9%	30.2%	32.1%	32.1%	34.6%	50.4%	52.7%	52.2%	53.6%

Source: Treasury of the Republic of Cyprus and authors' projections.

scheme given and to be given to its beneficiaries is presented.

Projection of contributions

The civil servants contributions are for the pensions for widows/widowers and orphans. The contribution rate is 0.75 per cent of the annual wages and for up to a wage ceiling as it is determined by the Social Insurance Law. Beyond this wage ceiling, the contributions increase to 1.75 per cent of the annual total amount of the employees' wages.

In Tables 8 and 9, the projection of the employees' contributions is presented based on the data given by the Department of Treasury and the authors' own projections.

PAYG cost

The PAYG cost is the percentage of the current employees' wages that would have been necessary to be paid as a contribution within a given calendar year in order to cover the total annual cost of pensions and benefits to the Public Pension Scheme.

Although the public pension scheme is financed by the budget of the government, it is useful to study the cost of expenditure as a percentage of the civil employees' wages. This can give us the contribution that is necessary to cover the total annual expenditure of the Scheme in case that the pensions were financed by an independent fund.

The projection for the PAYG cost is presented in Table 9.

The mean of the PAYG cost for the period 2007–2070 is 43.2 per cent.

A well-known method of partial finance is the method of scaled premium. This system was initially implemented in 1958 and then was extensively used by the International Labour Office for the sustainability studies of the Social Insurance Fund.

According to this method, the percentage of contribution is set for a period of a financial balance (15–20 years), so that the contributions and the income from the investments are sufficient to cover the expenditure of the scheme including the administrative costs. During this set period, the reserves of a Fund should

Table 10: Pay as you go cost for different time periods

<i>Time period</i>	<i>Pay as you go cost (%)</i>
2007–2020	31.1
2007–2030	31.3
2007–2040	35.1
2007–2050	38.9
2007–2060	41.4
2007–2070	43.2

Source: Treasury of the Republic of Cyprus and authors' Projections.

not be decreasing. The main advantage of this method is the stability of the percentage rate of contribution for a long period of time, which gives to the government the time needed to plan the next increase of the percentage rate of contribution having in mind the hypothesis that the pensions will be financed by an independent fund.

Although in the case of the public pension scheme of Cyprus this system cannot be applied, it is useful to study the PAYG cost for different time periods (see Table 10).

Actuarial liability and normal percentage rate of contribution

According to the Law, every pension fund at a given moment must have available assets that will enable it to meet its responsibilities. However, the Pension Scheme of the Civil Servants is exempted from the Law, because it is financed on a PAYG basis and is not fund based. For the objectives of this study, however, we have estimated the financial situation of the Public Pension Scheme by applying pre-financed method assuming that the Scheme is financed by an independent fund. In such a case, a fund to be able (a) to cover all the biometric risks (death, disability and longevity), (b) to guarantee a given return on investment and (c) to guarantee given defined benefits must have adequate reserves for covering these risks.

These reserves must be estimated and managed by an actuarial according to the actuarial method and according to the following principles:

1. An actuarial estimate of the minimum reserve taking into consideration the level of the contributions and the benefits.

2. The reserves must be adequate for covering the pensions and the increased responsibilities of the Scheme towards the scheme members.
3. The economic and the demographic assumptions made must take into consideration, wherever possible, an adequate margin of any possible unexpected discrepancies.
4. The maximum interests to be considered in the assumptions must be chosen based on the return of the current assets of the Scheme and the return on future investments.

On the basis of the analysis of the data given by the Ministry of Finance and the Department of Treasury of the Republic of Cyprus, and the software developed for the purposes of this study, we estimated the actuarial liability of the hypothetical fund and the normal percentage rate of the contribution that must be paid for covering the benefits of the Scheme.

Actuarial liability for past service

The actuarial liability represents the present value of the benefits granted to the current civil servants according to the length of their service and until the estimated date plus the pensions that are given to the current pensioners.

The actuarial liability is presented in Table 11 and includes the current civil servants and the current pensioners.

As the Scheme does not have any reserves, as it should have had if there was an independent fund, the actuarial responsibility is the actuarial deficit.

Actuarial liability for future service

This study also estimates the actuarial liability for past and future service of the existing civil servants and the existing retired pensioners.

Table 11: Actuarial liability as at 31/12/2006 for past service

<i>Actuarial liability</i>	<i>£</i>
Current civil servants	3 060 000 000
Retired pensioners	1 659 000 000
Beneficiaries of widow/ widower and orphan benefits	163 000 000
Total/actuarial deficit	4 882 000 000

Source: Authors' calculations.

Table 12: Actuarial liability as at 31/12/2006 for past and future service

	£
Actuarial liability for past and future service	7 668 000 000
Present value of contributions	90 000 000
Actuarial deficit	7 578 000 000

Owing to the fact that the future service of the civil servants is taken into consideration, it is necessary to deduct the present value of the future contributions of the civil servants. The results are presented in Table 12.

Contribution rate – Future service

The normal contribution rate is the percentage rate of contribution that is necessary to cover the cost of the benefits given to the civil servants after the estimated date. Currently, the normal contribution rate (according to the study) is 36.5 per cent of the wages excluding the 13th salary.

According to the method of financing the Scheme and the assumptions made for this study, the normal contribution rate must remain fixed if the age distribution, the sex distribution and the wage distribution also remain fixed.

The revised contribution rate, which is the sum of the normal contribution rate (36.5 per cent) and the percentage rate required to finance the actuarial deficit (70.4 per cent) according to the estimates of this study, is 106.9 per cent of the total wages.

Public economics and the financial liabilities of the Scheme

Regarding the level of the wages of the civil servants, Cyprus is third in the European Union. In the report of the Ministry of Finance for the Stability Programme,¹⁵ it is mentioned that the wages as a percentage of the GDP is 17 per cent. Regarding the present study, the wages as a percentage of the GDP is only 7.2 per cent. This is so because only the full-time civil servants are considered, without taking into consideration the part-time civil servants. That is why the wages as a percentage of the GDP are much lower.

The high wages together with the generous benefits, which the Public Pension Scheme offers,

substantially increase the cost of the Scheme and the expected future expenditure.

Current expenditure as a percentage of GDP

According to the data of the Central Bank of Cyprus in 2006, the GDP was £8.380 billion (see Table 13).

If the Scheme should have been fully funded, then the actuarial liability should have been substantial in relation to the GDP of Cyprus.

Projection of expenditure and GDP

According to data from the Ministry of Finance, the long-term projections of the GDP of Cyprus (up to 2060) in real prices of 2007 are given in Table 14. The projections are based on the methodology that is adopted by the Commission of Economic Policy of the EU. The long-term assumptions are determined by the convergence programme of the EU.¹⁶

The above data are in real prices, and the impact of inflation, which is expected to be around 2 per cent, is not included. It is observed that the GDP increases by a high percentage rate. Specifically, for the period 2010–2020, if the inflation rate is also included, the GDP will increase by 6.3 per cent per year.

In this study, the expenditures in prices of 2007 and as a percentage of the real GDP are given in Table 15.

Table 13: GDP, pension expenditure and actuarial liability – 2006

	£	% of GDP
GDP	8 379 700 000	—
Actuarial liability	4 882 000 000	58.2
Expenditure in 2006	1 812 730 000	2.2

Table 14: Real increasing rate of GDP and real GDP in prices of 2007

Time period	Real increasing rate of GDP (%)	Real GDP in prices of 2007 (£ in billion)
2010–2020	4.3	12.8
2020–2030	3.1	18.2
2030–2040	2.5	23.6
2040–2050	2	29.4
2050–2060	1.8	35.2
2010–2060	2.7	—

Table 15: Expenditure as a percentage of GDP in prices of 2007

	2007	2008	2009	2010	2020	2030	2040	2050	2060
Expenditure as a % of GDP in prices of 2007	2.1%	2.1%	2.2%	2.2%	2.1%	2.2%	2.8%	2.8%	2.9%

Table 16: Expenditure as a percentage of the government's income 2006–2011 (£)

	2006	2007	2008	2009	2010	2011
Government income	3569735906	4092425688	4226254249	4542507812	4844089499	5160812579
Expenditure of the public pension scheme	181272937	187432000	202433000	227485000	243712000	274994000
Expenditure as a % of the government's income	5.1%	4.6%	4.8%	5.0%	5.0%	5.3%

The expenditures as a percentage of GDP are expected to remain at high levels. For this reason, the trend of the expenditures, especially after the period 2011–2012, must be very closely studied. During the period 2011–2012, the transition into the 63rd year of retirement will be completed and the existence of real data will give us an indication of the behaviour of the civil servants regarding the retirement age and the impact of the cost of pensions on the economics of Cyprus.

Expenditures and incomes

Apart from the relationship of the expenditure and the GDP, this study examines the relationship of the expenditure with the government's income. From the data that are presented in the programme of stability, the study makes a comparison of the expenditure of the Scheme with the income of the Government.

In Table 16, the real income, the expenditure of the Public Pension Scheme and the expenditure as a percentage of the real income are presented.

CONCLUSIONS AND SUGGESTIONS FOR FURTHER RESEARCH

The Public Pension Scheme of the civil servants exercises substantial pressures upon the public economics of the Republic of Cyprus. In 2006, the expenditures of the Scheme were

Table 17: Sensitivity of the cost of the scheme relative to the increasing rate of GDP

	<i>Long-term expenditures of the scheme as a % of GDP</i>
Projection of GDP – According to the Ministry of Finance (before the economic crises)	2.8
Projection of GDP by 0.5% lower increasing rate	3.3
Projection of GDP by 1% lower increasing rate	3.9
Projection of GDP by 1.5% lower increasing rate	4.5

Source: Authors' calculations.

2.2 per cent of the GDP. It is expected that the expenditures of the Scheme will follow an increasing trend and until the year 2040 they will be 2.8 per cent of the GDP. Owing to the fact that the real trend of the GDP is difficult to be estimated, it is scientifically necessary to observe the sensitivity of this rate relative to the increasing rate of the GDP. In Table 17, it can be observed that in case that the expected rate of GDP is not attained, then the cost of the Scheme can fluctuate between 2.8 and 4.5 per cent of GDP.

Probably a better index of the cost of the Scheme can be its cost as a percentage of the payroll of the government and especially as a percentage of the retirement remuneration. As a percentage of the retirement remuneration, in 2006 the cost of pensions was 26 per cent and is

expected to increase to 50 per cent by the year 2040.

The present value of the accumulated pension benefits of the current pensioners and of the current civil servants is estimated to be 8.34 billion euros. If it were to develop an independent fund for covering the pensions, this should be endowed with an amount of 8.34 billion euros, plus a long-term financial contribution of 37 per cent of the retirement remunerations. The development of such a fund is impossible as the method of financing the Scheme is based on the PAYG System and the development of such a fund would possibly have had direct and serious negative impacts on the public economics. In any case, however, the above-mentioned statistical analysis can be used as an index of the financial cost of the Scheme.

The issues that lead to high expenditures of the Scheme can be identified in the following:

- The civil servants do not contribute to the Scheme. The contribution of 0.75 per cent that they make was supposed to cover 50 per cent of the cost of the widow pension. However, at present this cost has increased to 7 per cent and therefore their contribution must increase to 3.5 per cent.
- The pensions are revised based on the inflation rate and on the general wage rises that are given to the employed civil servants.
- The retirement age is not increased from the 60th to the 63rd year of age for all the civil servants.
- Other problems identified can be the early retirement without a parallel actuarial decrease in pensions.

Changes in the above-mentioned issues will lead to a decrease in the annual expenditures of the Scheme and will make it sustainable in the long term. More than that, they will assist in decreasing the gap between the benefits offered by the Social Insurance System to the employees in the private sector and the benefits that the Scheme offers to the retired civil servants.

Finally, we may underline that in other EU countries there is a trend in reforming the public

pension schemes of the civil servants. The major reforms that are identified are the contribution of the civil servants to the financing of the pension schemes, and the introduction of other schemes in the form of provident funds (Defined Contribution) for the new civil servants.

A trend that is worthwhile to mention and which can be an issue for further research is the complete elimination of the public pension scheme for the civil servants and the development of one pension fund for all the employees of the country both in the public and in the private sector. Robert Palacios and Edward Whitehouse (2006) have compared schemes within the same country covering private sector workers as well. They also reviewed key policy issues related to pension schemes covering civil servants and other public sector workers. In particular, they have identified that there is little justification for maintaining parallel schemes in the long run.

For the successful implementation of the reforms of the Public Pension Scheme in Cyprus, it is necessary to implement a strategy that will adopt the following stages in the reforming process:

- identify the problem and accept its existence;
- determine the causes of the problem;
- develop alternative reforms;
- inform the civil servants;
- achieve cohesiveness;
- implement the reforms; and
- assess and control the reforming process.

The article contributes to the academic society and the community of the Republic of Cyprus in a way that the results of the research project presented in this article may enable the decision makers responsible for determining policies, as well as the social partners, to have a better picture of the situation and of the efficiency of the Public Pension Scheme of the Civil Servants, as well as to raise their awareness of the possible long-term risks that the economy of the Republic of Cyprus will face. This may result in a productive dialogue between the Government and the interested social partners, in an effort to implement an efficient and operationally

applicable programme for reforming the Public Pension Scheme of the Republic of Cyprus that will make it economically sustainable for the benefit to the community of Cyprus.

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APPENDIX A

Table A1: Members of the public pension scheme of the civil servants of the Republic of Cyprus by age distribution as in 2006

<i>Age distribution</i>	<i>Men</i>			<i>Women</i>		
	<i>Total number of members in the scheme</i>	<i>Average period of service</i>	<i>Average monthly salary</i>	<i>Total number of members in the scheme</i>	<i>Average period of service</i>	<i>Average monthly salary</i>
<20	4	0.6	785	2	0.1	635
20–25	540	2.0	794	179	1.7	680
25–30	1867	4.7	870	2095	2.8	945
30–35	2408	8.0	1060	2688	6.5	1150
35–40	1897	10.8	1319	2200	9.5	1261
40–45	1543	13.4	1543	2016	10.8	1433
45–50	2281	18.3	1737	2240	13.6	1671
50–55	2348	22.2	1915	2387	17.1	1908
55–60	2278	26.0	2211	1558	19.5	2096
60–65	292	30.7	2455	118	19.8	2262
65+	2	34.7	5279	0	0.0	0
Total	15 460	15.1	1534	15 483	11	1465

Table A2: Retired employees by age distribution as in 2006

<i>Age</i>	<i>Men</i>		<i>Women</i>	
	<i>Number of retired employees</i>	<i>Average monthly pension</i>	<i>Number of retired employees</i>	<i>Average monthly pension</i>
30–35	4	428	0	0
35–40	1	743	2	201
40–45	6	148	2	314
45–50	50	1007	10	400
50–55	198	919	38	436
55–60	939	813	358	841
60–65	2693	882	1118	899
65–70	2377	762	747	722
70–75	1402	821	373	775
75–80	762	818	192	804
80–85	407	782	62	660
85–90	182	713	24	770
90–95	53	639	20	655
95–100	16	706	2	412
>100	6	385	6	479
Total	9096	820	2954	808

Table A3: Receivers of widow/orphan pension by age distribution as in 2006

<i>Age</i>	<i>Number of widows/ orphans</i>	<i>Average monthly pension</i>
<35	15	264
35-40	14	319
40-45	20	195
45-50	40	197
50-55	89	308
55-60	174	433
60-65	256	621
65-70	297	612
70-75	417	499
75-80	347	461
80-85	325	377
85-90	188	348
90-95	109	300
95+	30	303
Total	2321	457

APPENDIX B

Table B: Mortality – PA90

<i>Age</i>	<i>Men</i>	<i>Women</i>	<i>Age</i>	<i>Men</i>	<i>Women</i>
30	0.000584	0.000301	66	0.027296	0.013291
31	0.00057	0.000301	67	0.029778	0.014797
32	0.000613	0.000332	68	0.032479	0.016471
33	0.000666	0.000371	69	0.035416	0.018331
34	0.000725	0.000413	70	0.038608	0.020396
35	0.000791	0.000461	71	0.042075	0.022689
36	0.000864	0.000514	72	0.045838	0.025233
37	0.000947	0.000573	73	0.04992	0.028053
38	0.001041	0.000639	74	0.054346	0.031179
39	0.001149	0.000712	75	0.059139	0.034641
40	0.001274	0.000794	76	0.064326	0.038472
41	0.001419	0.000885	77	0.069935	0.042708
42	0.001589	0.000987	78	0.075992	0.047387
43	0.001788	0.0011	79	0.082528	0.052551
44	0.002022	0.001227	80	0.089572	0.058243
45	0.002298	0.001367	81	0.097153	0.06451
46	0.002623	0.001524	82	0.105301	0.0714
47	0.003006	0.001699	83	0.114047	0.078963
48	0.003456	0.001895	84	0.123418	0.087253
49	0.003984	0.002112	85	0.133444	0.096321
50	0.004601	0.002354	86	0.14415	0.106223
51	0.005318	0.002624	87	0.155561	0.117011
52	0.006147	0.002925	88	0.167699	0.128736
53	0.007099	0.003261	89	0.18058	0.141448
54	0.008184	0.003634	90	0.194221	0.155192
55	0.009412	0.004051	91	0.208629	0.170007
56	0.010789	0.004515	92	0.223809	0.185924
57	0.012321	0.005031	93	0.23976	0.202968
58	0.013517	0.005607	94	0.256471	0.22115
59	0.014765	0.006247	95	0.273928	0.240469
60	0.016127	0.006961	96	0.292106	0.26091
61	0.017612	0.007755	97	0.310973	0.282443
62	0.019232	0.00864	98	0.330491	0.305019
63	0.020997	0.009624	99	0.350609	0.328574
64	0.02292	0.010719	100	0.371274	0.353024
65	0.025015	0.011937	101	1	1