Evaluation of The Legacy of The Pension Systems in Northern Cyprus And The Assessment of Current And Prospective Reforms

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ABSTRACT

Pension systems, through pension policies, always need to be designed in order to balance the adequacy of benefits with their affordability considering the possible changes in demographics and the economic and financial circumstances. This thesis analyzes the effectiveness of such policies implemented in North Cyprus. It estimates the fiscal burden of the Pay-As-You-Go (PAYGO) Civil Service Pension and Social Insurance Pension Systems that were closed in 2008 to new members. Furthermore, in the thesis an analysis is made of the sustainability of the 2008 reforms that introduced the new Social Security Pension System with higher contribution rate and retirement age and with lower replacement rates for the newly hired government employees and new private sector workers. The existing members of the old pension systems were grandfathered in terms of the benefits and contributions formulae.

To calculate the overall deficit, estimates are made from the difference between the present values of future contributions and the pension benefits. In this thesis, the annual budgetary impacts of the unfunded pension benefits are also calculated for historical pension systems that are now closed to new entrants. The estimated unfunded cost of the historical pension systems is significant enough to make any marginal policy measure ineffective in eliminating the excessive fiscal burden on the current and future taxpayers for the next three decades.

It is found that either a more radical reform that affects the existing pensioners and contributors to these overly generous pension systems or a partial or complete transition to a defined-contributions system is required. On the other hand, the estimates also reveal that although the newly implemented Social Security Pension System is more promising; provided the size of the labor force expands at a modest rate, in its present form it does not provide a solution to the fiscal problems created by the historical pension systems nor it is sustainable itself.

Keywords: implicit pension debt, pension liabilities, civil service, social insurance, social security

ÖZ

Emeklilik sistemleri, emeklilik politikaları yoluyla, yeterli emekli maaşı verebilmenin yanında demografik, ekonomik ve mali koşullardaki değişiklikleri de dikkate alarak sürdürülebilir bir yapıda tasarlanmalıdırlar. Bu tez çalışması Kuzey Kıbrıs'ta 2008 yılı öncesi işe başlayan kamu görevlileri ve özel sektör (belediyeler ve KİTler dahil) çalışanları için ayrı ayrı uygulanmakta olan emeklilik politikalarının etkinliğini analiz etmektedir. Ayrıca bu çalışma 2008 yılında gerçekleşen ve o tarihten itibaren çalışma hayatına dahil olan tüm kamu ve özel sektör çalışanlarını kapsayan emeklilik reformunun da sürdürülebilir olup olmadığını araştırmaktadır.

Sistemin toplam mali yükünü hesaplayabilmek için mevcut çalışanların emekli olana kadar yapacakları katkılar ve bu kişilerin emekli olduktan sonra ve mevcut emeklilerin hayatları boyunca alacakları emekli maaşları arasındaki farkın bugünkü değeri hesaplanmıştır. Buna ek olarak sistemin bütçe üzerinde oluşturduğu yıllık yük de hesaplanmıştır.

Tahminler emeklilik sistemlerinin yaratmakta olduğu mali külfetin sınırlı politikalarla giderilemeyeceği kadar büyük olduğunu göstermektedir. Mali sorunun ancak mevcut çalışanları ve emeklileri de kapsayacak radikal politikalarla veya sistemin tümden ya da kısmen özel emeklilik sistemine geçişle aşılabileceği bu tez çalışmasında görülmektedir. Bu çalışmadan ortaya çıkan bir diğer sonuç ise 2008 yılından itibaren uygulamada olan

Sosyal Güvenlik Sistemi'nin sorunun çüzümüne yönelik iyileştirmeler içermesine rağmen geçmişten gelen mali yükü gideremememesininin yanında kendisinin de sürdürülebilir olmadığıdır.

Anahtar Kelimeler: örtük emeklilik borcu, emeklilik yükümlülükleri, kamu, sosyal sigorta, sosyal güvenlik

To My Family

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LIST OF SYMBOLS / ABBREVIATIONS

AEP:	Age-earnings premium
APD:	Annual Pension Deficit
CD:	Certificate of Deposit
CSPS:	Civil Service Pension System
DB:	Defined-benefit
DC:	Defined-contribution
EU:	European Union
GDP:	Gross Domestic Product
GRR:	Gross Replacement Rate
IMF:	International Monetary Fund
NEP:	New Permanent Entrants to the Labor Force
NET:	New Temporary Entrants to the Labor Force
NNR:	Net Replacement Rate
OECD:	Organization for Economic Co-operation and Development
PAYGO:	Pay-as-you-go Pension System
PV:	Present Value
PVCNPW:	Present Value Contributions of New Permanent Workers
PVCTW:	Present Value Contributions of Temporary Workers
PVEC:	Present Value Cost of the Existing Contributors
PVEP:	Present Value Cost of the Existing Pensioners
PVGP:	Present Value Cost of the Gratuity Payment

PVPP: Present Value Cost per Person in the System

SIS: Social Insurance System

SSS: Social Security System

TRNC: Turkish Republic of Northern Cyprus

Chapter 1

INTRODUCTION

Public sector pension systems were initially developed to provide old-age and disability income support. The history of public sector pension provision dates back to Roman Empire (Clark and Craig, and Wilson, 2003). They were mainly designed to provide income to people to protect the regime or as an incentive to fight for the regime. The latter was the main cause of the introduction of public sector pension systems in the form of an army pension in the UK and the US. Later, these pension plans replaced the traditionally family support of the elderly.

Wars and failure of capital markets often resulted in the loss of private capital which stimulated the development of public sector supported pensions. The pay-as-you-go (PAYGO) pension plan is a very attractive option especially when the need for financial support of the elderly is immediate but the capital accumulation is not there and there is not sufficient time to accumulate for a funded pension. The era after the World War II is a good example of this period when the PAYGO systems were implemented throughout Europe.

Turkish Republic of Northern Cyprus (TRNC) was established in 1983 after a war that only ended in 1974. After the war, as part of a political strategy, Turkish Cypriots were provided with public sector jobs with too generous pensions and very loose eligibility conditions that counted the years of service in the army with bonuses. 10 years of work service in the public sector was sufficient for people employed prior to 1987 for a full pension. The private sector jobs were filled with immigrants from Turkey who were later given citizenships that increased the total number of pensioners under the social insurance pension system.

The use of Turkish Lira that was losing value every year because of high inflation was another reason for the generosity of the formula defining benefits that was built into the pension system. Any formula that did not put a heavy weight on the income of the final one or two years would result in an inadequate pension. The pension benefits in the TRNC were tied to the inflation-adjusted income right before retirement. Income before retirement as well as the pension benefits after retirement kept increasing not only just with the annual rate of inflation but also with the expansion of the economy. In addition to these, Turkish Cypriots are now living longer compared with the period when the laws first passed. This has increased both the number of pensioners and the amount of pensions paid to them. All these structural problems have led to fiscal imbalances both in annual terms and in present value terms.

The fiscal burden created by these pension plans, until recently, has not been critical as the fall in the rate of inflation from 2003 was accompanied by an economic boom in the country that produced an unexpected increase in revenues. Any shortfall was financed by the financial aid from Turkey. However, with the fall of the rate of economic growth since 2007 and the efforts by the TRNC to become a full member of the EU, the generosity of the pension systems have become an important topic on the budgetary and policy agenda.

The objective of this thesis is to identify the determinants and measure the size of the liabilities created by past public sector pension policies in the TRNC. It also assesses the sustainability of the reformed pension system introduced in the TRNC in 2008. This thesis evaluates each of the pension plans separately and provides an estimation of their annual and present value net cash deficits. It also analyzes possible policy reforms and their effectiveness in solving the fiscal imbalances.

The projections in this thesis are similar to the ones used to establish long-term budgetary targets in the EU. As stated by Franco, Marino and Zotteri (2005), in the EU they include a base case scenario, in terms of eligibility requirements for a full pension and pension benefits to be paid at retirement that covers the parameters in the case if the current policies continue with the existing legislation. The analysis will also consider alternative scenarios for changes in the legislation that could be part of possible system reforms. Such reforms include mainly increasing the retirement age and the contribution

rates and decreasing the pension benefits through replacement rate adjustments due to the changing economic and demographic conditions.

In Chapter 2 a survey of literature on the types of pension plans throughout the world is presented in order to lay a foundation for the analysis that follow. This includes a review of their problems and the recent reforms. An emphasis is placed on the countries of Europe. Here the relevant theoretical and empirical literature (mainly on the PAYGO pension plans) is reviewed. This chapter provides the analytical framework for the analysis of the TRNC pension systems. The critical demographic and legal variables that constitute such pension systems are identified and relationships are defined.

Chapter 3 presents a detailed evaluation of the fiscal burden of the legacy of the civil service pension system (CSPS) that was closed to new entrants after 2008. It demonstrates the magnitude of the annual budgetary pressures created by the historical CSPS. Their implicit liabilities are expressed in present value terms. Using the model developed, for each pension plan each individual under the coverage of this scheme is analyzed. His/her net cost to the system is estimated by subtracting the present value of the benefits to be drawn until their death, and that of their survivors, from the present value of the contributions made until retirement. The methodology in this thesis goes beyond a present value calculation. It incorporates the probabilities of life expectancies for different age groups and makes the necessary adjustments to the estimated present value results. These adjustments are necessary due to the distributions of the timing of

death and the value of survivors' benefits that occur around the expected values for the length of life. Through simulations of the operational models of the pension systems, various reform options are also presented in this chapter.

Chapter 4 thoroughly analyzes the sustainability of the social insurance pension system (SIS) applicable to those employed in the private sector prior to 2008. In this Chapter, a model somewhat similar to the one developed in the previous chapter is designed with the inclusion of the contributions made by the temporary workers from Turkey to estimate the present value and the annual deficits of the social insurance system. The structural problems of the SIS system are described in detail and possible reform options are provided.

In 2008, the old-age pension systems were unified in the country and the coverage was extended to include all the workers employed after 2008. In Chapter 5, the parameters set by the new social security system (SSS) law are employed to analyze the new system, independent of the liabilities of the CSPS and the SIS, to find out whether it is designed in a way to reach a fiscal discipline in the provision of pension benefits for the employees covered by the new pension scheme. It also evaluates the impacts of policy options to accept different sizes of temporary workers to the country under various economic growth assumptions.

The final chapter, Chapter 6, summarizes the core conclusions of the empirical and policy analysis completed in this thesis. In addition, this last chapter sets out a set of possible strategies for moving toward a sustainable and socially sensitive system of old-age support for the TRNC. With Turkey, and implicitly the TRNC, becoming more integrated with Europe and with the labour and financial markets of the world, new options for future TRNC pension policies are emerging.

Chapter 2

SURVEY OF LITERATURE OF ANALYSIS OF PENSIONS AROUND THE WORLD

2.1 Types of Pension Plans

A pension plan is an arrangement that is designed to provide working people with an income when they retire. Pensions have the characteristic for most people of being simply deferred compensation for work done earlier in life. For other people old age pensions can be viewed as a welfare scheme to provide individuals who are less fortunate with a basic level of income to enjoy a standard of living that the rest of society is willing to pay for. Most developed countries have well developed old age support systems to supplement pension systems that are based on work experience.

The various types of pensions are often organized legislatively around a set of "pillars" designed to provide different types of income support (World Bank, 1994). The "first pillar" is often a mandatory, centralized, public pay-as-you-go (PAYGO) pension system. Sometimes due to nature of the government policies (e.g. former Soviet Union or countries with a history of high rates of inflation that destroys institutional forms of saving), this pillar may dominate the overall system. The "second pillar" is often a mandatory, decentralized, but private funded pension, and the "third pillar" is the voluntary form of pension or savings schemes similar to the second pillar. The second

and third forms of pensions along with life insurance plans are often referred to as contractual savings plans. When the financial system has to deal with high and variable rates of inflation then the second two forms of pension systems tend to be rather small. For example, in Figure 2.1 below it can be seen that after a long period of high and variable rates of inflation, the share of total saving held in contractual savings plans in Turkey in 1996 was the lowest out of 30 developed and developing countries. The TRNC has experienced the same high and variable rates of inflation as Turkey because it uses the Turkish Lira as its currency. Therefore, we find in the TRNC that until about 2005 there was almost completely absence of contractual savings instruments available. Hence, the public sector in the TRNC expanded its defined-benefit pay-as-you-go pension systems to fill this role of contractual saving investments that could not develop due to Turkey's inflationary economic policies.

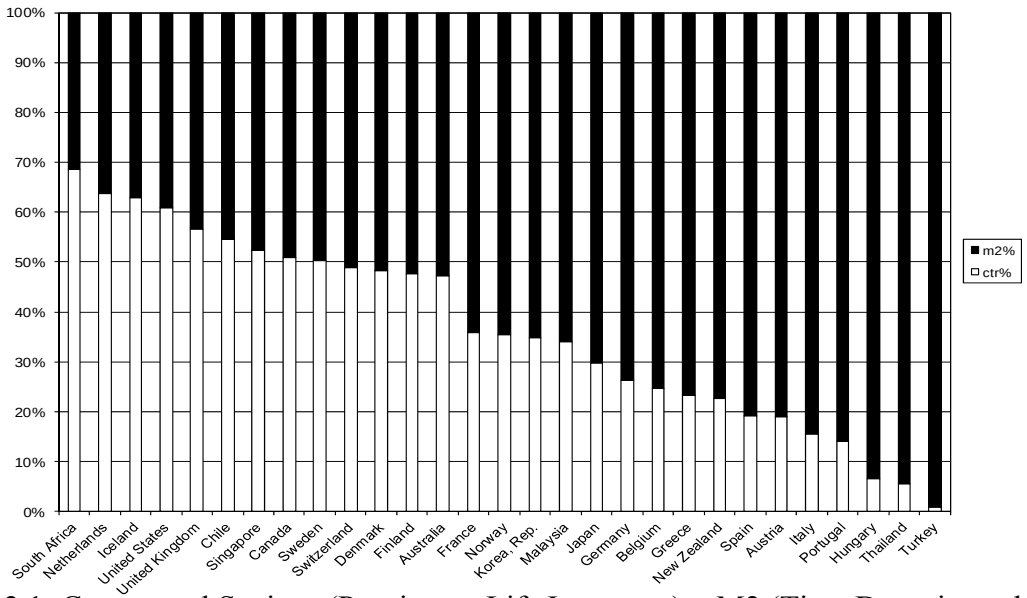

Figure 2.1: Contractual Savings (Pensions + Life Insurance) + M2 (Time Deposits and CDs) as percentage of Financial Assets (1996)
Source: World Bank, 1996
Note: White lines reflect % of total savings that are contractual savings.

Table 2.1: Benefit-determination Taxonomy of State Pension Systems in the EU

	Contribution-based, Flat-rate[1]	Residence-based, Flat-rate1	Notional Defined Contribution[2]	Defined Benefit[3]	Points[4]	Defined Contribution personal accounts2
Austria				X		
Belgium				X		
Greece				X		
Spain				X		
Portugal				X		
Slovenia				X		
Malta				X	X	
France					X	
Germany					X	
Romania						
Luxembourg	X			X		
UK	X			X		
Czech Rep	X			X		
Cyprus	X			X		
Lithuania	X			X		X
Bulgaria				X		X
Hungary				X		X
Ireland	X					
Finland		X		X		
Netherlands		X		X		
Estonia		X		X		X
Denmark		X				X
Sweden		X	X			X
Poland			X			X
Latvia			X			X
Italy			X			

Source: Aaron George Grech, (2010)

[1] Under a flat-rate system, all those who meet the set conditions (either a given amount of contributions paid or a period of residence in a country) get paid the same benefits.

[2] Under a defined contribution system, benefits are determined by the contributions made (and any return on them) and by the expected length of retirement. While in personal account systems, contributions are invested in financial markets, notional account systems are PAYG.

[3] In a defined benefit system, benefits are a ratio of a set salary – the final salary, the average lifetime salary or an intermediate figure - on which contributions were paid.

[4] Under a points system, entitlement is based on pension points accumulated. A year's contribution at the average earnings earns one point. Points are multiplied by a pension value to determine the monthly benefit.

Table 2.1 above classifies the types of public supported pension plans in the European Union countries. Although they vary in design, there are two main types of pension schemes that can be classified according to the rules they have to determine with how the benefits of the pension are defined at the point of retirement: defined-benefit (DB) and defined-contribution (DC). In Table 2.1, we see that almost all the public sector pensions in Europe are of a defined-benefit nature.

All the countries in the EU have pension systems with strong public sector support. This primarily is carried out through the social security systems. The relative importance of occupational and private pension plans varies widely across the jurisdictions. The core of the social security pension system is a statutory earnings-related old-age pension scheme. These public sector schemes are common for all employees or there are a series of schemes representing different sectors or occupational groups (European Commission, 2006).

2.1.1 Defined Benefit Pension Plans

A defined-benefit plan provides pension benefits to an individual on the basis of a formula. This formula is pre-determined and is made up of the contributing individual's number of years of service, wage rate and replacement rate. His expected life after retirement is not a parameter in this system. A pure defined-benefit pension scheme specifies the pension benefits and formulae for their adjustment over time at the point of retirement. The benefits continue until the death of the individual or the survivors if they are entitled to benefits. This means that the replacement rate at the point of retirement is usually independent of the mortality rates. The cost of providing the pension however varies with life expectancy. In some cases adjustments are made for the life expectancy

of the different genders due to their very different mortality rates. A longer retirement duration means that lifetime benefits are higher and cost more. Therefore, it can be said that a DB system is the one at which the pension benefit is directly linked to the contributor's wage rate and the whole risk falls on the employer. The DB plans are provided by the public sector in 17 EU countries as can be seen from Table 2.1 above. In addition, according to OECD (2011), they are mostly the plans in operation in the majority of public sector pension systems in countries throughout the rest of the world.

This kind of pension plan can be funded or unfunded. Blake (2000) explains the main difference between the two as a PAYGO scheme being a social transfer program where resources are transferred from the youth to the old who are living at the same time and the funded pension plan being a saving plan where people invest for themselves when they are young and collect the benefits when they get old.

2.1.1.1 Defined Benefit 'Funded' Pension Plans

In a funded system, the pension benefits and the contributions have to be equal in present value terms over the life-span of the scheme. In other words, workers in this system save for their own retirement during their lives. There are no inter-generational transfers in funded pension systems since each worker pre-funds his or her pension. Theoretically, the contributions saved under the funded system need to be less as they are invested in capital markets and yield a return. At retirement, the benefits are equal to the sum of contributions and the return on these assets.

2.1.1.2 Defined Benefit 'Unfunded' (PAYGO) Pension Plans

Under the unfunded DB plans which are also called the pay-as-you-go (PAYGO) systems, the pension benefits of the retirees are financed by the contributions of the

existing workers and the retirement benefits of the currently working population are to be paid by the future contributors. Noord and Herd (1993) claimed that the reason why these systems were adopted in the post-war period was that PAYGO systems allow governments to establish pension systems without the typical phasing-in lags before potential beneficiaries start to receive benefits that are the characteristics of fully-funded schemes.

The PAYGO system is only affordable if there is sufficient number of members in the labor force contributing sufficient amounts to the pension fund relative to the number of retirees and the pensions they receive. In the case when either the number of retirees or the real growth in pensions over time reaches a critical level relative to the number of working population, considering their productivity and the growth in the amount of contributions, then the system will start to experience financial stress. This can be explained by a simple equation presented by Mylonas and Maissonneuve (1999) where they stated that the necessary condition for a pay-as-you-go system to be in equilibrium is:

$$C/B = d$$

where *C* is the effective contribution rate, *B* is the effective replacement rate, and *d* is the ratio of primary old-age pensioners to contributors.

For example, if of a PAYGO pension plan the contribution rate is 15% and the replacement rate is 60%, there should then be no more than one quarter as many pensioners as contributors to the system.

2.1.2 Defined Contribution Pension Plans

Another type of pension plan is the defined- contribution (DC) which is operative in 11 OECD countries and many developing countries. By definition DC pension plans are funded. In this kind of a pension plan the 'pension wealth' is the accumulation of contributions plus investment returns at the time of retirement. Unlike the DB plan, the pension wealth under the DC plan is independent of the life expectancy. According to the OECD (2011),

> However, as people live longer, pension wealth must be spread over a longer retirement duration. This is clearest in the cases where individuals buy an annuity at the point of retirement. The annuity provider will offer a lower proportion of the lump sum in annual pension benefits as life expectancy increases. But it is also true when people do not buy an annuity: they cannot spend as much per period of their pension accumulation as people live longer over time. (p.88)

As a result, the burden created by unexpected events, such as longer life expectancies, in this case, is passed on to the existing contributors or to the government under public pension systems. It seems that from the suppliers' of the pension point of view, a DC plan dominates the DB plan since it is unlikely to generate deficits and is more flexible in design. This is one of the main reasons why a significant number of countries that are suffering huge implicit public liabilities arising from future pension obligations are either switching to the DC plans or are planning to do so.

2.2 Problems of the PAYGO Pension Plans[5]

Pinera (2004), the President of the International Center for Pension Reform, explains the severity of the fiscal problems created by the PAYGO pension systems by stating that

[5] To see the European Commission's summary for the reasons leading to pension plan problems in general, see Appendix E.

"the PAYGO pension system could turn out to be one of the gravest threats to the single European currency."

Although most of the problems of the pension systems, especially the budgetary short-term pension deficits, seem to be of short-term concern, in fact these challenges faced are long-term issues. As expressed by the OECD (2011)

> there is an obvious trade-off between adequacy and sustainability: higher public pensions deliver larger incomes in old age but cost more. However, if public pensions are at risk of being inadequate, there will be pressure for *ad hoc* increases in pensions or supplementary retirement benefits to prevent old-age poverty. (p.9)

If the pension system in place is a PAYGO type, then if the government is not fiscally responsible, it might give in to these demands and pass on the budgetary problem to future governments.

Most of the governments underestimate (or at least they did until recently) the severity of the fiscal effects of the pension problem as they either focus only on the short-term deficits or do not accurately evaluate the long-term liabilities of such pension plans. Some governments even ignore these liabilities as they most probably will not be the government that has to tackle the problem in future. In other words, they buy peace now and risk the future of even the unborn babies.

It is a well-known fact, however that government sponsored pension liabilities are implicit public debt jeopardizing the financial sustainability of both present and future fiscal discipline in any country. Being unable to take the necessary actions on time can

lead to sudden reforms that may be painful as they have recently been in France, Greece and Hungary.

PAYGO pension plans that are supported by the public sector are the most widely used pension system throughout the EU. Ireland and Luxemburg are the two countries who can keep the promises of a PAYGO system and fund their obligations. On the contrary, countries like France, Greece, Italy, Germany and Spain are among the many EU countries with fiscal imbalances created by current and future pension obligations under their PAYGO systems. The financial state of the PAYGO systems in the EU is alarming. The increasing unfunded liabilities of these pension programs are around 200% of GDP in France and Italy, and more than 150% of GDP in Germany. “This situation is especially difficult in a continent where entitlements are deeply entrenched in a welfare state culture” (Pinera, 2003). There are various factors behind the generosity of PAYGO systems that led to their failure. In general we can summarize them as follows.

1. A PAYGO system will remain solvent if benefits are modest and labour force is growing. In the opposite case, the system will be far from financing itself.

2. It is politically easy to increase future pension benefits because no immediate increase in contribution rate is required. This political behaviour has been observed in many countries.

3. If demographic changes cause the labour force to be reduced, then the pension benefits promised that were thought to be affordable are no longer affordable. Promises will be broken. Also if people live longer, the pension benefits formula will not hold unless contribution rates are also increased.

According to Blake (2000), if a PAYGO system becomes unviable there are a few things that can be done. Either pension benefits will be reduced or retirement age will be increased or the burden of the pension provision under a PAYGO system will be transferred to funded pension schemes.

The Economist (April, 2011), in a special report on pensions, summarized the four main underlying problems behind the fiscal pressures of pensions as 1) the aging populations, 2) the large generation of baby-boomers who are currently retiring, 3) the defined-benefit (DB) schemes of the public sector, and 4) the growing importance of defined-contribution schemes (DC) in the private sector.

Major reforms to the pension systems around the world have been undertaken since 1990's and currently have become one of the most significant agenda items in many countries. Although the reasons behind the need for a reform may differ from country to country, there are many common characteristics. These main common pressures confronting pension reforms with the intention to attain financial sustainability are summarized by Holzmann and Palmer (2006) as short-term and long-term fiscal

pressures, socioeconomic changes and globalization. There is no doubt that the short-term and long-term fiscal pressures are ranking as the first motivation for pension reforms. Short-term fiscal pressures are one of the main triggers behind the pension reforms. They can be best explained by the size of the annual public pension expenditures now and expected in the future expressed as a percentage of GDP. These values are reported in Table 2.2 below.

Table 2.2: Total Pension Expenditure (% GDP) in the EU between 2010–2050

	2010	**2025**	**2050**
Austria	12.8	13.5	12.2
Belgium	10.4	13.4	15.5
Greece[6]	n.a.	n.a.	n.a.
Spain	8.9	10.4	15.7
Portugal	11.9	15.0	20.8
Slovenia	11.1	13.3	18.3
Malta	8.8	10.0	7.0
France	12.9	14.0	14.8
Germany	10.5	11.6	13.1
Luxembourg	9.8	13.7	17.4
UK	6.6	7.3	8.6
Czech Rep	8.2	8.9	14.0
Cyprus	4.8	7.7	14.4
Lithuania	6.6	7.6	8.6
Hungary	11.1	13.0	17.1
Ireland	3.8	5.0	8.4
Finland	11.2	13.5	13.7
Netherlands	7.6	9.7	11.2
Estonia	6.8	5.1	4.2
Denmark	10.1	12.0	12.8
Sweden	10.1	10.7	11.2
Poland	11.3	9.5	8.0
Latvia	4.9	5.3	5.6
Italy	14.0	14.4	14.7
Average	**10.3**	**11.2**	**12.7**

Source: Economic Policy Committee (2006)

[6] According to the original source, the Greek authorities have agreed to provide pension projections in 2006.

This ratio has increased steadily since the Second World War. The increasing burden of pension expenditures persisted in 1980's despite various reforms. The ratio for the 25 EU countries was 10.3% on average in 2004 and is estimated to reach 12.7% by 2050.

Another main reason for the need for reforms is the long-term fiscal pressures that are the accrued liabilities of the pension systems. According to the estimates of Noord and Herd (1993), the present value of pension liabilities of the major seven economies[7] resulting from the pension promises alone ranged between 100% and 200% of GDP in 1990. This ratio was around 217% of GDP (at 3% discount rate) for the EU countries in 2005 values (European Commission, 2006). The following table shows the estimated ratios of the present value (PV) of pension liabilities relative to the GDP for some selected EU countries and United States of America using different discount rates. These figures are estimated by Mink (2006) using the data obtained from the report of European Commission (2006).

[7] United States of America, Canada, Japan, Italy, France, UK and Germany.

Table 2.3: Estimated Implicit General Government Pension Obligations between 2005 and 2050 (as a % of GDP)

	Discount rate 5%		**Discount Rate 3%**	
	2005	**2050**	**2005**	**2050**
Belgium	165	201	208	253
Germany	166	181	207	228
Greece	-	-	-	-
Spain	147	194	186	246
France	190	206	237	259
Ireland	87	129	110	164
Italy	207	213	257	267
Luxemburg	167	217	211	274
Netherlands	118	144	149	182
Austria	187	184	232	230
Portugal	195	257	246	325
Finland	160	184	200	231
Slovenia	181	230	228	291
Euro Area	**174**	**193**	**217**	**243**
UK	102	116	128	146
United States	68	70	85	88

Source: Mink (2006) and European Commission (2006)

More specifically the promises that cause the unsustainability of a PAYGO pension system can be listed as follows:

2.2.1 Age of Retirement

Since 1990's governments have started to end the long-term trend to earlier retirement. One in every two OECD countries has already increased pension ages or plan to do so in the future: 18 countries for women and 14 countries for men. In 2011, the average retirement age for the OECD countries is 62.9 for men and 61.8 for women (OECD, 2011). Until recently, one could find countries in the EU that offer an old-age pension benefit after 15 years of contribution. An individual entering the labour force at the age of 20 is eligible in these countries to draw a pension at the age of 35. Greece is an example of such a country that used to offer retirement even after 13.5 years of contribution until not so long ago.

According to OECD (2011), since 1950 ten countries have reduced the retirement age for men and 13 did so for women. The average fall in retirement age for both men and women was around 2 years from 1949 to 1993 in 30 OECD countries.

The actual practice shows that as population ages then people who are receiving a pension are also continuing to work. In other words the changes being made in recent years to the legislation are actually following the practice of people.

In the same study by OECD (2011) it is also stated that starting from 1990, governments began to pass the relevant laws to increase the retirement age. 14 countries have already increased it for men and 18 did so for women. Until 2010, the average pension age has been raised by 0.5 years for men and 0.8 years for women. The decisions have been taken and the legislation has already been placed to further increase the retirement age by 2050. It is expected that by that time the average pensionable age will be 64.6 for men and 64.4 for women. The retirement age is slightly lower for women mainly because countries like Poland, Turkey and Switzerland still plan to continue with differential retirement ages in the long term.

Table 2.4: Official Retirement (Pensionable) Age for Various OECD Countries

	1958		2010		2050	
	MEN	WOMEN	MEN	WOMEN	MEN	WOMEN
United States	65	65	66	66	67	67
Britain	65	60	65	60	68	68
France	65	65	60.5	60.5	61	61
Germany	63	60	65	60.5	65	65
Italy	60	55	59	59	65	65
Spain	65	65	65	65	65	65
Netherlands	65	65	65	65	65	65
Denmark	65	60	65	65	67	67
Greece	57	57	57	57	60	60
Turkey	-	-	44.9	41	62.3	60.8
Australia	65	60	65	62	67	67
Mexico	65	65	65	65	65	65
Japan	60	55	64	62	65	65

Source: OECD, 2011

The retirement age in many countries has been increased recently or will be increased by 2050 (see Table 2.4). However, the relatively more significant increase in the life expectancies after retirement produces an increasing trend in the number of years for drawing pensions.

Table 2.5: Life Expectancies after Retirement for Various OECD Countries

	1958		2010		2050	
	MEN	WOMEN	MEN	WOMEN	MEN	WOMEN
United States	12.8	15.8	16.8	19.3	17.7	21.9
Britain	11.9	18.9	16.9	24.5	16.9	21.9
France	12.5	15.6	21.7	26.5	24.8	29.5
Germany	14.2	18.1	17.0	20.7	20.3	24.4
Italy	-	-	22.8	27.4	20.9	25.5
Spain	13.1	15.3	17.9	21.8	21.4	25.1
Netherlands	13.9	15.3	17.3	20.4	20.6	23.5
Denmark	13.7	19.3	16.4	19.8	17.2	21.0
Greece	19.9	21.5	24.0	27.1	24.1	28.3
Turkey	-	-	31.1	36.9	22.5	23.2
Australia	12.5	19.4	18.6	24.3	19.7	23.3
Mexico	14.2	14.6	17.2	19.4	18.9	21.9
Japan	14.8	22.8	19.8	26.7	21.6	27.7

Source: OECD, 2011

According to OECD figures (2011), the average retirement age is currently 62.3 for women and 63.5 for men. It is also suggested that in order to control the increasing cost of pension benefits, certain precautions be taken before calculating the effective future retirement age by considering the continuous increase in life expectancy. It is estimated that to keep the number of years of retirement constant throughout the OECD countries, the retirement age needs to be increased to 65.8 for women and 66.6 for men by 2050.

2.2.2 Replacement Rates

The following table demonstrates the generosity of pension systems in the EU based on the replacement ratio. The gross replacement rate that determines the gross pension benefit to be drawn relative to the previous gross wage earned during employment varies significantly among the EU countries. For an average wage earner in the OECD countries, the gross replacement rate provided by public pension schemes diverges from around 100% (Greece) to around 30% (Sweden and Poland). The following table illustrates the gross replacement rates provided by the public sector alone for various OECD countries. When all the pension schemes including public, mandatory private, voluntary defined-contribution and total mandatory schemes are considered, the gross replacement rates for individuals in the OECD countries earning half of the average wage, average wage and one-and-a-half average wage are on average 84.3%, 64.4% and 55.4% respectively.

Table 2.6: Gross Replacement Rates (%) from Public Schemes for Various OECD Countries

	50% of average wage	100% of average wage	150% of average wage
United States	51.7	39.4	35.3
Britain	53.8	31.9	22.6
France	55.9	49.1	41.3
Germany	42.0	42.0	42.0
Italy	64.5	64.5	64.5
Spain	81.2	81.2	81.2
Netherlands	58.5	29.2	19.5
Denmark	64.7	28.9	17.0
Greece	95.7	95.7	95.7
Turkey	76.4	64.5	64.5
Australia	37.9	11.8	3.2
Mexico	30.5	4.0	2.7
Japan	47.9	34.5	30.0

Source: OECD, 2011

The net replacement rate is defined as the net pension benefit received by a retiree after taxes are paid divided by the net of taxes and pension contributions income of the same individual during employment. This means that the net equivalents of the above mentioned figures would approximately be on average 10 % higher as pension benefits are also subject to income tax. The difference between net and gross replacement depends on the related country's tax rates and the rates of other deductions from the gross salary. Considering all the pension schemes, as with the gross replacement rates, the EU27 average net replacement rates for average earners at 74% is significantly higher than the OECD34 average (OECD, 2011).

2.2.3 Increasing Pension Benefit with Years of Service

The replacement rate increases as the number of years of service increases. This is designed as an incentive to keep workers longer in the labour force. However, at the same time it creates a trade-off between the replacement rate and the retirement age. Annuity rates used to calculate the replacement rates for people working longer years

clearly explain this trade-off. OECD (2011) made a hypothetical study using OECD pension models and found out that a delay in the retirement age for the OECD countries increases the replacement rate for an individual by 20%. Doing the opposite decreases it by 15.4%. In other words, currently the replacement rate average in the OECD for an average wage earner is 60% and it is estimated that it will be 72% when the retirement age is 70 rather than 65 and it will fall to 52% with an average retirement age of 60.

2.2.4 Demographic Changes

The other main reason behind the fiscal imbalances of the pension systems is the falling support ratio. This ratio demonstrates the number of contributors for each pensioner in any country. Table 2.7 below shows the changes in this ratio for different periods.

Bongaarts (2004), based on the estimates of the United Nations (2003), claimed that the median age of the population in the developed countries such as North America has increased from 29 years to 37 years since 1950. It is estimated that this figure will increase to 45 by 2050. On the contrary, the respective figure for the developing world is around 24 years. However, the falling fertility and mortality rates in the developing countries are undoubtedly expected to cause a rapidly aging population in these regions leading to a median age of around 36 years in 2050.

Table 2.7: Support Ratio (Dependency Ratio) for Various OECD Countries

	1970	2010	2050
United States	5.3	4.6	2.6
Britain	4.3	3.6	2.4
France	4.2	3.5	1.9
Germany	4.1	3.5	2.3
Italy	5.1	3.0	1.5
Spain	5.6	3.7	1.5
Netherlands	5.3	4.0	2.1
Denmark	4.6	3.5	2.3
Greece	5.1	3.4	1.6
Turkey	10.2	9.8	3.2
Australia	6.5	4.4	2.3
Mexico	10.5	8.6	2.5
Japan	8.2	2.1	1.4

Source: The Economist, 2011

Expenditures are becoming burdensome in most of the countries where the PAYGO pension systems are being implemented as support ratios are decreasing. According to Gokhale (2009), it is the support ratio that shows how secure a pension plan is. Current contributors and taxpayers are bearing a big burden now and it seems that the in the future they will need to work twice as many hours as they work now in order to save for themselves and finance the obligations of the increasing number of retirees.

Sinn (2000) explains the fall in support ratios as the improvements in medical sciences that increase the life expectancies and decline in birth rates in most of the OECD countries over the last few decades.

European Commission (2006) explains the reasons for the changes in support ratios as "In the coming decades, the size and age-structure of Europe's population will undergo dramatic changes due to low fertility rates, continuous increases in life expectancy and

the retirement of baby-boom generation." Rather than the facts that people are living longer and women are now giving less birth as compared with the past since they are heavily participating in the labour force in the recent decades, nowadays the time is coming for the largest single cohort of the labour force, the baby boomers, to retire. This baby-boom generation will increase the number of retirees to draw pension benefits financed by the decreasing number of working population.

2.2.5 Contribution Rates

Pension systems collect their revenues through contributions made by the workers regularly as a predetermined fraction of their income. The amount of contribution paid is determined by the related laws of each country in the form of contribution rate. Table 2.8 below shows the contribution rates for selected EU countries.

Table 2.8: Contribution Rates According to Benefit Coverage, Selected EU Countries (2005)

	Net replacement rate for average income (%)	Old age and early retirement (survivors) (%)	Old age and early retirement, disability (survivors) (%)	Broader coverage (%)
Austria	92.2		22.8	
Belgium	63.1			37.94
Britain	47.6			19.85
Czech Republic	58.2		28	
Estonia	60.9		22	
Denmark	54.1			
Finland	71.5		23.9-28.2	
France	68.8	16.35		
Germany	71.8		19.5	
Greece	99.9		20	
Hungary	90.5	26.5		
Ireland	36.6			12.5-14.75
Italy	88.8		32.7	
Latvia	81.8	20		
Lithuania	71.3		26	
Luxemburg	109.8		24	
Netherlands	84.1		26.2-33	
Poland	69.7		32.52	
Portugal	79.8			34.75
Slovakia	60.2		24	
Spain	88.3			28.3
Sweden	68.2	20.2		

Source: European Commission (2007) and OECD (2005)

Although the contribution rates from country to country differ a lot and are placed on differently defined income and for different kinds of benefits, they range between 12.5% to around 40%[8].

[8] The average contribution rate for the OECD countries performing defined-contribution pension plans is 8.3% of earnings.

2.3 Recent Reforms Undertaken in the EU

Pension obligations are the implicit debt of the pension provider, in the case of a PAYGO pension system they are the implicit debt of the government. Unlike the explicit debts that may lead to a default, however, the implicit debt resulting from generous pension systems can be controlled through pension reforms that change the rules governing the key variables of the pension plans.

According to Bajuk (2009),

> the core of ensuring adequacy of income after retirement in a challenging demographic environment is the adjustment of pay-as-you-go (PAYG) benefits toward affordable replacement rates. It is equally important to offset such adjustments by strengthening incentives for labor market participation and saving. Specifically, this can be done by providing incentives to work longer, increasing the employability of older workers, and improving the efficiency and soundness of capital markets (so that private savings are encouraged). It is important that reforms in all three areas be perceived as part of an integrated strategy aimed at delivering adequate retirement income. (p.4)

Designing an appropriate reform that provides a pension system that is both sustainable and adequate is a difficult task. As put by Grech (2010), employing major cuts in pensions has been considered as the main aspect in pension reforms nowadays. However, this could backfire due to the increasing number of the pensioner population. In other words, if the pensioner population is having difficulty in making ends meet and making the necessary savings for their well-being, the government may be pushed into decisions which lead to spending even more on the social welfare of such people.

Parametric reforms such as cutting pensions or increasing the contribution rates in the form of payroll tax for future benefits can lead to social problems. Holzmann and Hinz

(2005) also emphasized this issue and stated that a pension benefit need be adequate, affordable, sustainable and robust. This can be regarded as a cause for searching for new reform options like the privatization of the pension plans.

Since 1990s major reforms have been undertaken to the pension systems around the EU countries to stop the deteriorating financial strength of their budgets. Reforms included a combination of applying higher contribution rates, raising retirement age to cope up with the increasing life expectancies, cutting benefits through lowering the replacement rates and tightening eligibility conditions. Through these parametric reforms, France, Germany and Italy managed to decrease the implicit pension liability of their pension systems, for the period of 2007-2060, by more than 120% of GDP (IMF, 2011). It is also stated in the same IMF study that the present value reduction in future pension liabilities of countries like Bulgaria, Estonia, Latvia, Lithuania, Hungary, Poland, Romania and Slovak Republic ranges between 48% (Latvia) and 167% (Poland) of their GDP. This improvement in their fiscal status is due to both the parametric reforms mentioned above and the introduction of mandatory, privately-funded individual accounts. As stated by Bajuk (2009), a reform of a PAYGO pension system can have positive effects on individual savings and therefore on the budget of a country when in deficit due to pension obligations it should be accompanied by "a shift to a mixed system with individual accounts."

Schneider (2009) summarizes these reforms as the separation of pension systems from the central government budgets, increasing the retirement age and making the pension benefits more dependent on individual`s contributions during employment. In the same

study, it is stated that the Czech Republic made such a reform in 1994 and at the same time introduced a private pension fund. The retirement age was also increased and benefits to be drawn after retirement were linked to the contributions made during working lifetime in 1996. Other Central European countries followed the Czech Republic and reformed their pension systems in a similar fashion. Hungary, Poland, Estonia, Latvia, implemented pension reforms and partially privatized their systems in 1998, 1999, 2001 and 2002 respectively. Croatia and Bulgaria followed these countries in 2002. After these countries, under the influence of the pension reforms implemented in Latin American countries, Ukraine, Lithuania and Slovakia chose to do same with the intention of attaining more sustainable pension systems.

The transition from one kind of scheme to another is surely painful since the existing pensioners in the unfunded pension plans were promised to collect benefits under the old PAYGO system. The introduction of a funded scheme directs the contributions of the existing workers to a separate fund to finance their pensions in the future. These contributions that were used to finance the benefits of the existing retirees do not serve that function anymore and this leads to a transition deficit as the pension provider needs to finance the retirees from its own budget through extra taxation or borrowing. In other words, moving from an unfunded plan to a funded plan is likely to improve the sustainability of the pension system for the ones in the new pension plan but places a bigger burden on the governments trying to provide benefits of the retirees with the promises made according to the unfunded system.

Blake (2000) puts this as “next generation has to pay twice for its pensions: once in the form of direct contributions into its own pension fund and again in the form of extra taxation to pay for the previous generation’s pensions”. An IMF study (2011) on this issue shows that revenue losses from diversion to funded system from the first pillar range between 43% of GDP and 99% of GDP for some selected Eastern and Central European countries. Table 2.9 below illustrates these ratios.

Switching to a funded system increases and worsens the present value of current and future budgetary balances resulting from PAYGO pension liabilities for the above mentioned countries by 60% of their GDP on average. However, the impact of parametric reforms such as increasing the retirement age has reduced the liabilities by 129% of GDP which yields a net impact of 69% on average.

Table 2.9: Impact of Past Reforms on Open Group Liability[9] 2007-2060
(in % of 2007 GDP)

	Reduction in net open group liability from parametric reform	Revenue Losses from diversion to second pillar	Reduction of net open group liability from overall
Bulgaria	145	45	100
Estonia	94	64	29
Latvia	51	99	-48
Lithuania	81	43	38
Hungary	154	61	93
Poland	230	63	167
Romania	115	49	67
Slovak Rep.	159	53	106
Average	**129**	**60**	**69**

Source: IMF Staff Calculations, 2011

Schneider (2009) summarizes the pension reform performances of 17 EU countries using their annual pension expenditures to GDP ratios in 2050 as an indicator of success or failure. Estimations were made in different years. He chose these countries as they were members of both the EU and the OECD and they "have adopted a wide array of pension reforms, from expansion of the scheme in Portugal to partial privatization in Poland, so the sample captures the main pension trends in Europe." His findings are presented in the Table 2.10 below. Between 1995 -1999, Poland and Italy were the most successful ones in managing to decrease the expected pension expenditures in 2050 by more than 6% of GDP. According to his findings, Portugal will suffer additional significant increases in pension expenditures of its GDP despite the reforms

[9] The open group liability is one of the three pension liabilities (Castellino, 1985). It is the sum of the already accrued entitlements to current and future pensioners plus the projected benefits to be accrued by all future entrants – the present value of all future pension spending. The assumption in this liability is that the existing system will not change in the future, with new entrants subject to the accrual entitlements stated by the current law (IMF, 2011). The other two are the accrued-to-date liabilities and the current workers and pensioners' net liabilities. For more information about these, see Appendix C.

implemented. Finland, Spain, and Germany seem to be consistent reformers who could cut their expected pension expenditures in both 1999 and 2005 estimations. For some countries like Belgium, Austria, the Netherlands, and Portugal, the success of the reforms varies across different periods.

Table 2.10: Pension Reform Index

	Expenditure as % of GDP in 2050 expected in			**Pension Reform Index**	
	1995	**1999**	**2005**	**1999/1995**	**2005/1999**
Belgium	15.1	13.3	15.5	1.8	-2.2
Czech R.	12.0	14.6	14.0	-2.6	0.6
Denmark	11.5	13.3	12.8	-1.8	0.5
Germany	17.5	16.9	13.1	0.6	3.8
Greece	24.0	24.8	24.8	-0.8	0.0
Spain	19.1	17.3	15.7	1.8	1.6
France	14.4	15.8	14.8	-1.4	-1.0
Ireland	3.0	9.0	11.1	-6.0	-2.1
Italy	20.3	14.1	14.7	6.2	-0.6
Hungary	15.0	17.0	17.1	-2.0	-0.1
Netherlands	11.4	13.6	11.2	-2.2	2.4
Austria	14.9	17.0	12.2	-2.1	4.8
Poland	15.0	8.3	8.0	6.7	0.3
Portugal	16.5	13.2	20.8	3.3	-7.6
Slovakia	11.0	12.0	9.0	-1.0	3.0
Finland	17.7	15.9	13.7	1.8	2.2
Sweden	14.5	10.7	11.2	3.8	-0.5
UK	4.1	4.4	8.6	-0.3	4.2

Source: Ondrej Schneider, CESifo Working Paper (2009)

The rest of this thesis turns to the evaluation of the state of the pension systems in the TRNC. This analysis begins with an evaluation of the fiscal burden of the historical public sector supported pension systems that have been operating for the civil service as well as the social insurance system that covered the private sector employees. Following this analysis a series of measures are considered and evaluated that could potentially reduce the fiscal burden of these historical pension systems. The new social security system that was implemented in 2009 is also studied and its fiscal burden and

sustainability is evaluated. A number of potential measures to improve the sustainability of the social security system are also evaluated.

Chapter 3

THE FISCAL BURDEN OF THE LEGACY OF THE CIVIL SERVICE PENSION SYSTEM IN NORTHERN CYPRUS

3.1 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.

3.2 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[10]. 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 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.

[10] 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.

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 Chapter 5 of this thesis.

The purpose of this Chapter 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.

3.3 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 2008, 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%[11] 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%[12]. 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 (NRR). 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%[13]. 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

[11] 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.

[12] 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%.

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

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 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.

3.4 Estimation of the Fiscal Burden of the Civil Service Pensions System

The aim of this chapter is to evaluate the cost of the civil service pensions system as of 2009. 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 3.1 for the base case, the fiscal burden of the existing civil service pensions system is estimated.

Table 3.1: 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[14]
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)
TL / EURO (2009):	1.94

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

[14] 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%.

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[15]. 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 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

[15] 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.

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 3.1.

The second term of equation 3.1 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

$$C_{EP} = \sum_{i=1}^{11,813} \sum_{t=1}^{n} \frac{P_i (1+g_p)^n}{(1+r)^n} + \sum_{s=1}^{7,582} \sum_{t=n}^{n+7} \frac{P_s (1+g_p)^t}{(1+r)^t} \tag{3.1}$$

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 3.2.

$$C_{EC} = -\sum_{i=1}^{11,000} \sum_{t=1}^{R-A} \frac{cW_i (1+g_w)^t}{(1+r)^t} + \sum_{i=1}^{11,000} \sum_{t=R-A}^{(R-A)+n} \frac{MW_i (1+g_w)^{R-A} (1+g_p)^{t-(R-A)}}{(1+r)^t}$$
$$+ \sum_{u=1}^{6,409} \sum_{t=(R-A)+n}^{(R-A)+n+7} \frac{(MW_u (1+g_w)^{R-A} (1+g_p)^{t-(R-A)})}{(1+r)^t} \tag{3.2}$$

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 3.2 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 3.1. 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 3.3 below shows how this cost is calculated.

$$C_{GP} = \sum_{i=1}^{11,000} \frac{W_i(1+g_w)^{R-A}(\frac{1}{12}R_i - 25)}{(1+r)^{R-A}} \tag{3.3}$$

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.

3.5 The Results of the Analysis

Table 3.2 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%[16]. To begin with, the present value of the cost of the pensioners is calculated to be about 3.3 billion euros while the net fiscal cost of the working individuals in present value terms is estimated to be equal to about 3.2 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 3.2: 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 3.1 to 3.3 as reported in Table 3.2, 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 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

[16] 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%, yielding a real rate of approximately 2% net of inflation in 2010.

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 3.2, 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 3.2, 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 4.00%, and g_p = 0%, retirement age 55) is 2% of the values in Table 3.2, 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 3.2, 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 3.2, column 2, row 2 by 6.5%, and the cost estimates for the currently retired

individuals that are reported in Table 3.2, column 2, row 3 by 4.5%. These adjusted values are presented in Table 3.2, 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[17]. 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.

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.

[17] 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.

3.6 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 3.3.

Table 3.3: 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 2.8% 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 3.4).

Table 3.4: 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 3.5: 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[18].

Table 3.6: Sensitivity Analysis for Growth Rate in Real Wages

	Men	Women	PVGP	PVEC	PVEP	PVT	PVPP	PVT/GDP
1	4.75%	5.00%	924,516,187	3,791,062,077	3,313,147,053	8,028,725,317	352,137	302%
2	**3.75%**	**4.00%**	**794,433,958**	**3,215,410,429**	**3,313,147,053**	**7,322,991,440**	**321,184**	**276%**
3	2.75%	3.00%	685,277,440	2,737,119,395	3,313,147,053	6,735,543,888	295,419	254%
4	1.75%	2.00%	593,457,614	2,338,791,951	3,313,147,053	6,245,396,618	273,921	235%

Table 3.6 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

[18] Changing the discount rate has implications for the values of two adjustments discussed above. For discount rates of 2.0, 2.5, 3.0, 3.5 and 4.0%, 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% respectively.

total pension cost to GDP ratio is reduced to 235% (Table 3.6, 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 3.7 below.

Table 3.7: 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[19].

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 discussed in the chapters that follow.

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 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

[19] 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 -1.0%, 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%, respectively.

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[20]. 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 (Civil Servants Law, 2010). The wages used to project future wage rates are these reduced salaries.

Table 3.8 below shows the fiscal impact over time expressed as ratios of tax revenues and GDP North Cyprus.

[20] The analysis of this new pension plan in terms of the adequacy of its funding rules is the subject of Chapter 5 of this thesis. 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.

Table 3.8: 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%
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 to come 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.

3.7 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 in practice be set at a positive real rate of growth as has been the past experience? 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 productivity changes, 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, after retirement the real wage growth rate is assumed to be 2% plus the seniority increases of 1.75% for men and 2.00% for women for a total of 3.75% and 4.00%, respectively. 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 the real value of pension benefits is assumed to grow at a real rate of 2% per year. Figure 3.1 below shows the movements of the annual pension deficit as compared to GDP in both the base case scenario and in the alternative scenario with a 2.00% real growth per year.

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.

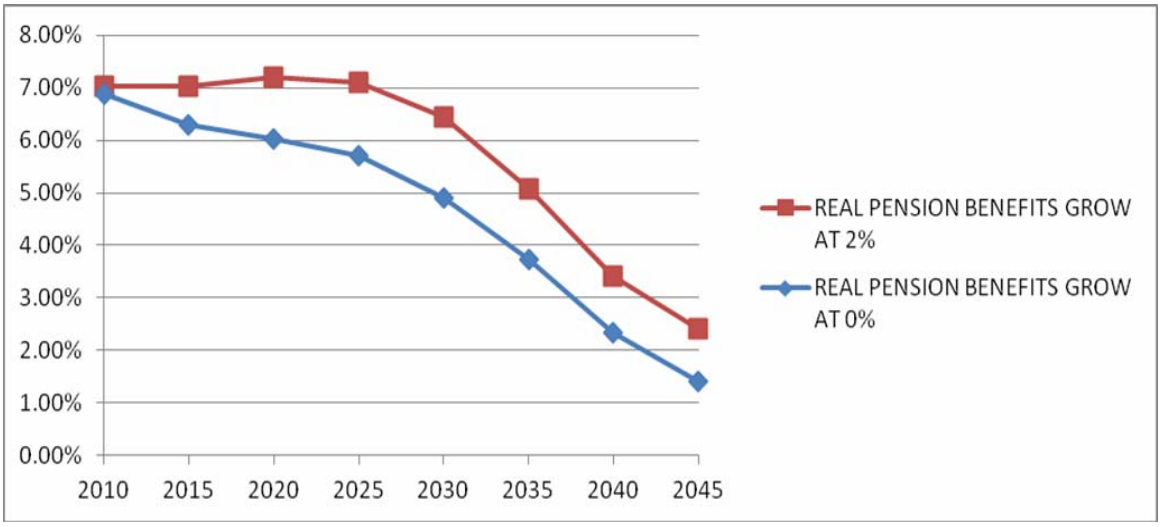

Figure 3.1: Pension Benefit Indexation and the Ratio of Annual Pension Deficit to Annual GDP

The present value of the additional budgetary outlays between the two cases is about 1.6 billion euros in 2009 values[21]. 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 have created is seen in Table 3.9. 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 6.9% and 5.7% 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 subject to the rules of the reformed pension system. The GDP that is used to finance pensions and

[21] In the case that real pension benefits are increased by 3% a year, then the additional cost in present value terms over and above the 0% real growth rate would be about 3.3 billion euros.

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 3.9: Annual Pension Deficit (APD) / Annual GDP Ratios for Different Growth Rates in Real Pensions

Growth in Real Pension	2010	2015	2020	2025	2030	2035	2040	2045
g_p: 0%	6.88%	6.29%	6.03%	5.70%	4.91%	3.72%	2.33%	1.42%
g_p: 2%	7.03%	7.02%	7.19%	7.11%	6.44%	5.06%	3.40%	2.41%

Suppose if instead of the real growth rate of GDP of 4.61% for North Cyprus it is assumed to slow to 3%, while wages continued to grow at a real rate of 3.75% and 4.00% (Figure 3.2). When pension benefits were only indexed to inflation, the members of these pension plans would receive about 7% of GDP until 2025 and 5.6% until 2035 (Table 3.10, row 3). If they were indexed to the growth at a rate of 2% a year, they could be consuming more than 9.1% of GDP until year 2025 and 7.6% until 2035. This is shown in Figure 2 and the accompanying table (Table 3.10, row 5).

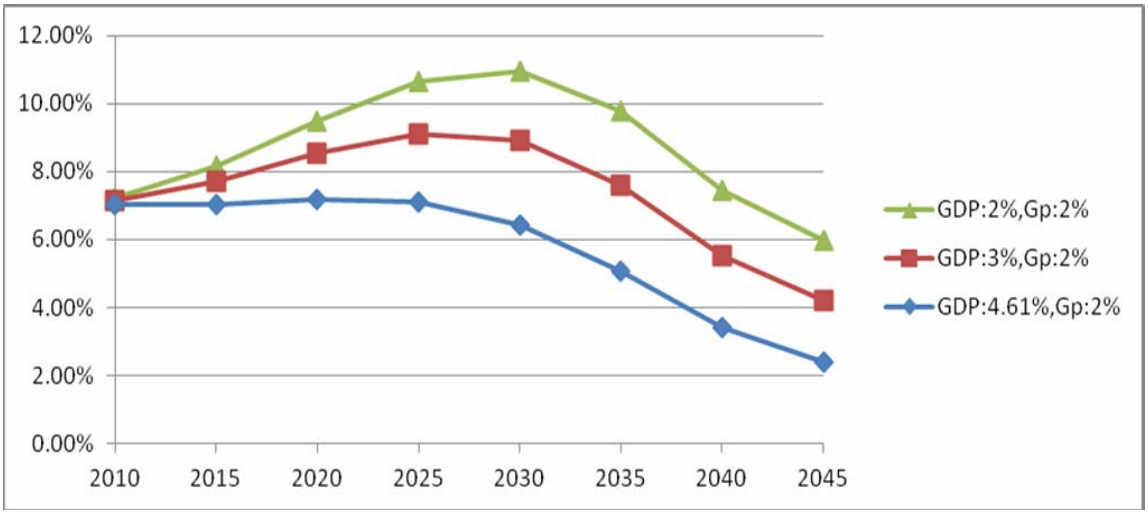

Figure 3.2: Impact of Alternative Growth Rates of GDP on the Ratio of Annual Pension Deficit to Annual GDP

The situation is much worse if the real growth rate of GDP were to fall to 2% a year, while pensions would increase by 2% real each year. In this case the historical pension commitments to those retired and currently employed civil servants would absorb 10.6% of GDP until 2025 and still over 9.7% by 2035 (Table 3.10, row 6). 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 of 8.5% of GDP until 2025 and over 7% as late as 2035 (Table 3.10, row 3).

Table 3.10: Annual Pension Deficit (APD) / Annual GDP Ratios for Different Growth Rates in Real Pensions and GDP

		2010	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
1	**GDP:4.61%, g_p:0%**	6.88%	6.29%	6.03%	5.70%	4.91%	3.72%	2.33%	1.42%
2	**GDP:3%, g_p:0%**	6.99%	6.90%	7.15%	7.30%	6.80%	5.57%	3.77%	2.49%
3	**GDP:2%, g_p:0%**	7.06%	7.31%	7.96%	8.54%	8.34%	7.18%	5.10%	3.54%
4	**GDP:4.61%, g_p:2%**	7.03%	7.02%	7.19%	7.11%	6.44%	5.06%	3.40%	2.41%
5	**GDP:3%, g_p:2%**	7.14%	7.70%	8.53%	9.11%	8.92%	7.58%	5.51%	4.21%
6	**GDP:2%, g_p:2%**	7.21%	8.17%	9.49%	10.65%	10.95%	9.77%	7.45%	5.98%

3.8 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 fairly 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 3.3 and Table 3.11).

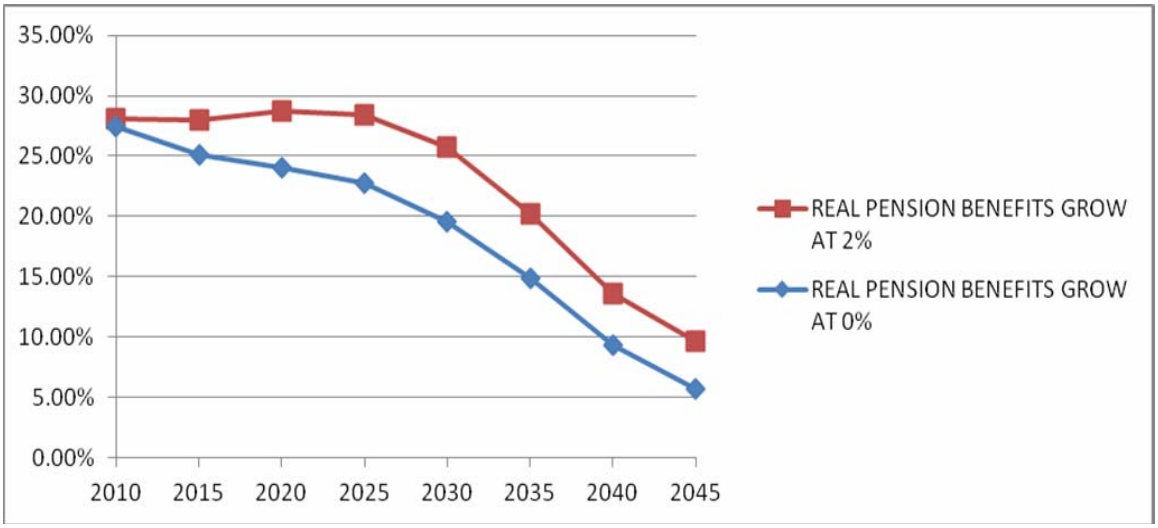

Figure 3.3: Impact of Pension Indexation on Ratio of Annual Pension Deficit to Annual Tax Revenue

According to these estimations, with the indexation of pensions only to inflation (current stated policy of government), the share of current tax revenues in 2015 that would be paid out as pension benefits would be 25.08%. If the pension had been indexed to the real growth in wages (the historical practice), the share of tax revenues to be paid to civil service pensioners would have been 28.01%.

Table 3.11: Annual Pension Deficit (APD) /Annual Tax Revenue Ratios

Growth in Real Pension	2010	2015	2020	2025	2030	2035	2040	2045
g_p: 0%	27.48%	25.08%	24.05%	22.74%	19.59%	14.86%	9.31%	5.68%
g_p: 2%	28.04%	28.01%	28.69%	28.38%	25.71%	20.21%	13.59%	9.61%

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 3.11 above, 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 2030, with indexation for only the rate of inflation, these payments will still account for about 19.6% of total government tax

revenues. On the contrary, if indexation is made according to the growth in real wages of 2%, the burden will be about 25.7%.

3.9 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. The problem of the civil service pension systems in Northern Cyprus is that generous pension promises were used to reward people for activities that had little or nothing to do with traditional government employment. Because the fiscal impact was not immediate, people could be rewarded with the bill only coming due years later, which happens to be now.

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 similar type of 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. It is interesting to note that any political solution on the island is likely to require an approval

by both sides through a referendum. Hence, it is questionable if 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 burden of the legacy of public sector pension promises before any political solution on the island of Cyprus is likely to be realized.

Chapter 4

AN EVALUATION OF THE FISCAL BURDEN AND FUTURE SUSTAINABILITY OF THE SOCIAL INSURANCE AND SECURITY SYSTEMS IN NORTHERN CYPRUS

4.1 Introduction

In North Cyprus, the government sponsored pension system that is applicable to those working in private sector and to those working in the non-civil service component of the public sector is made up of two separate systems: the Social Insurance System (SIS) and the Social Security System (SSS). The former operates under the Social Insurance Law of 1997 and covers only the workers employed prior to 2008. As stated in the World Bank report of 2006, the pension system is one of the largest drains on public finances in the northern part of Cyprus. As a consequence of this reality, in 2007 the pension system was reformed. With the Social Security Law of 2007, a single pension system was established for both new civil servants of the public sector and new private sector workers hired after 2008. Those covered by the old scheme are still subject to the old system and receive their benefits accordingly. Both of these pension systems operate on a PAYGO basis and every year a considerable amount of financial contribution from the central budget is transferred to these schemes to finance their annual deficits.

The purpose of this chapter is to evaluate the fiscal burden and future sustainability of these pension systems in North Cyprus.

4.2 The Structure of Social Security Pension Systems in North Cyprus

In 2009, the government sponsored SIS included 62,184 total contributors and 25,414 pensioners in North Cyprus yielding a support ratio of 2.45:1[22]. According to the statistics obtained from the social security office, in addition to those who retire, on average each year 11,232[23] workers have exited the system and never register again. In other words, this number of people, almost all from Turkey, only contribute and never collect a pension from the system. In this study, these private sector employees are named as 'temporary workers'. The number of permanent workers who are expected to contribute and eventually receive benefits at retirement is therefore approximately equal to 62,184 – 11,232 = 50,952. The non-civil servant permanent contributors employed after 2008 are subject to the new law and are members of the SSS. In our estimations their number is calculated as a number that is equal to the sum of the new retirees each year plus the number of people joining the system as a result of the increase in the labor force. In summary, the non-civil service permanent labor force in 2009 (that were participating in the social security system) is estimated to be made up of about 51,000 permanent members of the labor force and about 11,000 who are members of the labor force on a temporary basis. This group is largely made up of workers employed on a contractual basis from Turkey who leave the island when their job is completed. The size of the permanent labor force will change largely due to the change in the population of the permanent residents and the number of people who are retiring. However, the size of the temporary work force will depend on the demand for labor as investment and

[22] The social security pension information (including individual contributions, declared income, age, sex and annual pensions if already retired) used in this study was obtained from the records of the Social Security Administration of the Turkish Republic of Northern Cyprus.

[23] The average of the last ten years

economic activity fluctuate. The number might be expected to fluctuate significantly over time as has been recently the case.

4.2.1 Benefits Offered

Both systems offer the following benefits:

Work injury and occupational diseases,

Sickness,

Maternity,

Disabilities,

Unemployment,

Marriage,

Old-age pension benefits in the form of monthly payments,

Survivor benefits (for widows).

Our study will focus on the old-age pension and survivor benefits. The former is provided in the form of monthly payments to those eligible workers using a corresponding replacement rate calculated on the basis of years of work and income. Another benefit is the pension provision for payments to be made to surviving widows.

4.2.2 Eligibility Requirements for a Full Pension

The eligibility requirements for full pension benefit under the SIS are as follows;

Retirement at the age of 50;

Contributions for 25 years (9000 working days) of service are required.

Retirement at the age of 55;

Contributions for 20 years (7200 working days) of service are required for women.

Contributions for 25 years (9000 working days) of service are required for men.

Retirement at the age of 60;

Contributions for 12 years (average 150 days per year) of service are required for women.

Contributions for 15 years (average 150 days per year) of service are required for men.

However, the empirical evidence reveals that the people on average retire after a minimum of 25 years of service and at about 55 years of age.

With the new SSS law of 2007, these requirements were tightened. The eligibility requirements to receive a pension benefit under the SSS benefit formula are:

Retirement at the age of 60;

Contributions for a minimum of 25 years of service are required.

Retirement at the age of 63;

Contributions for at least 15 years of service are required.

4.2.3 Contribution Rates

Those self-employed who started contributing prior to 2008 (under the SIS) pay a pension contribution rate of minimum 15% of the monthly income they declare for the benefits offered by the SIS system. On the other hand, workers in this system contribute 8% of their gross salaries for their own pension plan and their employers are obliged to contribute an additional 10% to the workers' pension plan. Of this 18%, 11% is to finance the benefits of old-age, disability and survivors pensions. The remaining 7% is to finance other benefits that are beyond the scope of this study. Workers under the SSS, contribute 12.5% of their gross salaries for the above-mentioned benefits.

4.2.4 Replacement Rate for Old-age Pension Benefit

In North Cyprus, every eligible person receives an old-age pension based on a defined benefit formula that equals to an average replacement rate of 70% of the individual's last working month's salary[24].

Since pension benefits are not subject to income tax in North Cyprus, this rate is a net replacement rate (NRR). 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%[25]. This is significantly higher than the 34 OECD countries' average gross pension replacement rate (for workers with average earnings) of 58.7% (OECD, 2007).

4.2.5 Survivors Benefits

According to SIS, widows receive 50% of the husband's full pension benefits after his death. A man can only get this benefit if he is over 60 years of age and fully dependent on his wife's pension benefit. That is not a common case in North Cyprus because the husbands are normally older than the wives. On the other hand, workers under the new

[24] The actual replacement rate of the pension benefit received by an individual is determined as a function of the number of years that a worker has contributed to the SIS, the best four years earnings out of the last seven years worked, and the ratio of these earnings to the maximum level of income on which social security contributions are paid. In most cases this complex formula works out to a net replacement rate of 70%. In order to check this number, we calculated the ratio of the average pension benefits received in 2009 by those retired in North Cyprus to the average annual declared wage in 2009 by the members of the labour force contributing to the Social Insurance Fund. We find this ratio to be 72%. Hence, in this study we use a replacement rate of 70% of the workers' last annual declared income to estimate the value of annual pension benefits at retirement in all subsequent estimations. It is important to state that for those declaring the minimum wage as monthly income; the replacement can be as high as 97.3% that is the minimum pension paid in the country, no matter how much income you declare, over the minimum wage.
The SSS formula determining the monthly pension benefit is calculated as follows:
Average monthly declared lifetime income (adjusted for inflation) * Replacement rate, where the replacement rate is 2.5% per year of contributions for the first 15 years of work force employment plus 2% for every year of employment after the first 15 years of work.

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

SSS can get the same level of survival benefits as in the SIS no matter what their gender is.

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 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.

4.3 Estimation of the Fiscal Burden of Social Insurance and Social Security Pension Systems

The aim of this chapter is to evaluate the cost of the SIS and the SSS pension systems as of 2009. This assessment is done along several dimensions. As a result of the history of conflict in Cyprus and the strong budgetary support of Turkey, the initial SIS system was designed to be quite generous. A new set of rules or reforms resulted in the formation of the SSS system that applies to all new employees. In the estimations that follow, an evaluation is made of the cost of the legacy (in present value terms) of the

deficit of the SIS system. This evaluation has two components. First, there are those individuals that are already retired and those individuals who are in the labor force and are still eligible to contribute to the SIS system and will retire under that system. The present value of the deficit is a first approximation of the cost of the generosity of the SIS system. Future taxpayers (in the TRNC and Turkey) along with the contributors of the SSS system will have to bear this cost. In a PAYGO system, however, the critical aspect of the financial sustainability of the system is the number of contributors to the system at any given time relative to the number of retirees receiving benefits and the rate of their contributions. In order to conduct the analysis, we need to consider the size of the labor force and its anticipated growth over time. For the existing workers, their rate of contributions will be based on the SIS system while for new members of the permanent labor force they will be contributing according to the new SSS system.

An almost unique feature of the Social Security System going forward is the existence of a large pool of temporary workers from Turkey (approximately 90% men and 10% women) who contribute to the system but do not cost the system anything in terms of future pension benefits. These contributions are a significant amount of the present levels of such workers in the TRNC. However, in the future if the political and economic status of the TRNC were to improve, the contributions of this group could increase substantially.

In this study, 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 (based on the life tables, see Appendix A). Then, the contributions of new permanent

labor force and the new temporary labor force are subtracted from these costs to find the actual annual net cost and the present value of the future net costs until the new permanent entrants start retiring in 2045. Using the parameter values presented in Table 1 below for the base case, the fiscal burden of the SIS and the SSS is estimated and the sustainability of these systems after the 2008 reform is studied.

Table 4.1: Parameter Values for the Base Case Analysis (all 2009 figures)

Number of Permanent Workers TOTAL:	62,184-11,232=50,952
Women:	19,657-1,123=18,534
Men:	42,527-10,109=32,418
Number of Pensioners TOTAL:	25,410
Women:	11,320
Men:	14,090
Expected future annual growth rate of labor force	2%
Number of Temporary Workers	11,232 (last 10 years average)
Women:	1,123
Men:	10,109
Contribution Rate (prior to 2008)	11%
Contribution Rate (after 2008)	12.5%
Retirement age:	55
At 55, expected life expectancy:	25.9 for men, 29.3 for women
Replacement rate:	70%
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):	2%
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)
TL / EURO (2009):	1.94

Our analysis consists of four components. First, an estimation of the present value of the cost of the future pensions payments received by 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 and contributing. The net fiscal burden of the latter component is the difference between the present value of the future contributions made by the people in the social security system minus the present value of the future pension benefits they are entitled to receive. Third, the contributions of the new permanent entrants are estimated annually and in present value terms. Fourth, the annual and present value contributions of the temporary workers that are in the TRNC at any point in time are estimated using different wage rates. These figures are then subtracted from the costs estimated in the first two parts to find the actual net costs.

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 25,410 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. Subtracting the actual age of the individual from the expected life of the same individual gives us the number of additional years that this individual is expected to receive a pension. This variable is denoted as (n) in equation 4.1 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 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 4.1.

The second term of equation 4.1 is to calculate the cost of pensions paid to widows after the death of their husbands. As discussed above, the value of the benefit is equivalent to 7 years of the normal pension benefits received by the deceased spouse.

$$C_{EP} = \sum_{i=1}^{25,410} \sum_{t=1}^{n} \frac{P_i (1+g_p)^n}{(1+r)^n} + \sum_{s=1}^{14,090} \sum_{t=n}^{n+7} \frac{P_s (1+g_p)^t}{(1+r)^t} \tag{4.1}$$

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 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 private sector and are contributing to the Social Insurance Fund. 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 4.2.

$$C_{EC} = -\sum_{i=1}^{50,952} \sum_{t=1}^{R-A} \frac{cW_i (1+g_w)^t}{(1+r)^t} + \sum_{i=1}^{50,952} \sum_{t=R-A}^{(R-A)+n} \frac{MW_i (1+g_w)^{R-A} (1+g_p)^{t-(R-A)}}{(1+r)^t}$$
$$+ \sum_{u=1}^{32,418} \sum_{t=(R-A)+n}^{(R-A)+n+7} \frac{(MW_n (1+g_w)^{R-A} (1+g_p)^{t-(R-A)})}{(1+r)^t} \tag{4.2}$$

where; n is the life expectancy after age of retirement, 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, c is the contribution rate, W is the annual wages, u is 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 50,952 individuals from 2009 until their retirement. The first term of equation 4.2 shows the summation of the discounted value of each private sector worker'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 employee 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 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 employees 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 4.1. 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 next component of our estimate is the contributions of the new permanent workers under the Social Security Law of 2007.

$$C_{NEP} = -\sum_{i=1}^{l} \sum_{t=1}^{R-A} \frac{cW_i(1+g_w)^t}{(1+r)^t} \tag{4.3}$$

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, c is the contribution rate, W is the annual wages, l is the number of permanent workers and NEP stands for the new permanent entrants.

These people enter the system as workers retire and the labor force grows. In this study, we assumed that the labor force grows at a rate of 2% annually. Our next assumption is that these new entrants will receive the average wage in 2009 adjusted for the annual growth in real wages at the time of employment and their annual income will grow by the growth in real wages plus the age-earnings premium rate for seniority assigned for each sex. The econometric analysis we conducted show that the annual income of men and women increase by 2.33% and 1.55% respectively due to seniority[26].

The last component in our study is the contributions of the temporary workers who will not receive benefits as they are not citizens and are expected to leave the country after a short period of work and contribution period.

[26] In our econometric estimation of the age-earnings profile of the private sector labor force in North Cyprus we find that the growth in real wages per year for those employed from ages 20 to 55 attributable to age alone is 2.33% per year for men and 1.55% 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 SIS pension system can expect on average to earn 4.33% more each year if they are a man and 3.55% more each year if they are a woman (for further discussion on our econometric estimates see Appendix B).

$$C_{NET} = -\sum_{i=1}^{k} \sum_{t=1}^{R-A} \frac{cW_i(1+g_w)^t}{(1+r)^t} \quad (4.4)$$

where; g_w is the annual real growth rate of wages (excluding seniority premium), r is the discount rate, R is the retirement age, A is the current age in 2009, c is the contribution rate, W is the annual wages, k is the number of temporary workers and *NET* stands for the new temporary entrants[27].

In the base case scenario, we assumed that the average number of temporary workers is 11,232 and this number will stay constant until 2045. Their annual income at employment is equal to the average annual income of the people contributing in 2009 adjusted for the growth rate in annual real wages. Seniority premium rates are not included in this calculation as the temporary workers are the young people who join the system for a short period of time and then are replaced again with young people.

4.4 The Results of the Analysis

Using the base case parameters presented in Table 4.1 above, we obtained the following results. To begin with, the adjusted present value of the net cash cost of the SIS system and the SSS system over the next 35 years is more than 10 billion euros (Table 4.2, row 5, column 3). This value expressed as a rate of GDP is equal to 392% (Table 4.2, row 7, column 3) of the GDP in 2009. The present value of the cost of financing the cost of the future pension payments made to the existing pensioners alone is estimated to be about 3.6 billion euros (Table 4.2, row 1, column 3). The net of the present value fiscal cost of the future pension benefits, less their future contributions for currently working

[27] Temporary workers from Turkey who contribute to the Social Security system of the TRNC are allowed to convert these years into the years of service for the determination of pensions they receive upon retirement in Turkey. No money, however, is transferred from the TRNC Social Security system to the Social Security system of Turkey.

individuals, in the SIS system, in present value terms it is estimated to be equal to about 9.2 billion euros (Table 4.2, row 2, column 3). These figures clearly show the generosity of the SIS system in North Cyprus. This is mainly due to a 70% net replacement rate and insufficient contributions collected from both the existing contributors and new workers expected to join the system in future. Financial support to the system comes from the contributions of new permanent and temporary workers and of course from the central budget.

Table 4.2: Present Value of the Components of the Deficit of the Pension System

		Before Adjustment	After Adjustment[28]
	1	2	3
1	PV cost of the existing pensioners (PVEP)	3,727,950,945	3,560,193,152
2	PV cost of the existing contributors (PVEC)	9,786,546,733	9,150,421,196
3	PV contributions of new permanent workers (PVCNPW)	2,072,954,373	1,938,212,339
4	PV contributions of temporary workers (PVCTW)	370,283,233	370,283,233
5	PV TOTAL COST (PVT)	11,071,260,071	10,402,118,775
6	PV cost per person in the system (PVPP)	144,984	136,221
7	PV TOTAL COST / GDP	417%	392%

Moving on to the present value of the contributions of permanent new entrants, it can be seen that the PAYGO system in North Cyprus is not designed to effectively finance the retirees' pension benefits from the contributions of those working. The present value of the contributions (until 2045, before an average-aged worker starts collecting benefits) of these workers is about 2 billion euros (Table 4.2, row 3, column 3). This can be compared to the present value of the net cost of those currently working of 9.2 billion euros (Table 4.2, row 2, column 3).

[28] The adjustments in the NPV's are made for the survivor's benefits arising from the death of the SIS member prior to retirement and for the distribution of the age of death around the values of the expected number of years of life. All figures in this paper are adjusted numbers.

Another component of the financing comes from the temporary workers. 370 million euros in present value terms is a net inflow to the system as they do not draw benefits from this system in the future. With the pension plan rules of the SIS and the SSS, the SIS system's liability to each individual in the system (old and new members of the permanent labor force and the retirees) is equal to 136,221 euros (Table 4.2, row 6, column 3).

4.5 Analysis of Policy Options for Reducing the Level of Net Social Security Liabilities

The need for re-reforming these systems is apparent from the results presented in Table 4.2 above. Increasing the retirement age, decreasing the replacement rate, keeping the real wages of the contributors and the benefits received by the pensioners constant in real terms and raising the contribution rates can certainly help to improve the fiscal imbalances of these systems. Following the pattern of the reforms made in other parts of the world, we conducted various simulations of the pension models and estimated the impact of changes in the parameters presented as the base case in Table 4.1. Our first policy tool is the increase in retirement age. At the moment, the retirement age on average is 55 although the law enables the eligible workers to retire at the age of 50. The average retirement age in OECD countries in 2009 was 63.5 for men and 62.3 for women (OECD, 2011).

Table 4.3: Sensitivity Analysis for Retirement Age

		1	2	3	4	5	6	7
		PVEC	**PVEP**	**PVCNPW**	**PVCTW**	**PVT**	**PVPP**	**PVT/GDP**
1	**55**	**9,150,421,196**	**3,560,193,152**	**1,938,212,339**	**370,283,333**	**10,402,118,775**	**136,221**	**392%**
2	60	8,531,907,062	3,560,193,152	1,938,212,339	370,283,333	9,783,604,642	128,121	368%
3	65	6,840,558,172	3,560,193,152	1,938,212,339	370,283,333	8,092,255,752	105,972	305%

Keeping all the other parameters constant, increasing only the retirement age for those in the SIS to 60 or 65 will decrease the present value of total cost to 9.8 (Table 4.3, row 2, column 5) and 8.1 billion euros (Table 4.3, row 3, column 5) respectively. It is important to note that the retirement age for the workers in the SSS system is currently 60 and the TRNC government is now on the verge of increasing it to 60 for those in the SIS system as well. However, our estimates reveal that doing that will decrease the present value of the total cost (PVT) / GDP ratio from 392% (Table 4.3, row 1, column 7) to 368% (Table 4.3, row 2, column 5) which will not be a cure for the fiscal problem. Even a more radical increase of the retirement age from 55 to 65 will not be sufficient to decrease that ratio below 300% (Table 4.3, row 3, column 7) of GDP. This is an important indicator showing that the system needs to be analyzed in a much more detailed way and to determine if the PAYGO system is sustainable in any form in the future.

It is also important to note the trade-off between increasing the retirement age and the replacement rate. Increasing the age of retirement reduces the time a person will draw pension benefits, but actual replacement rate increases as the retirement age increases and hence the amount of pension benefits to be received each month in the future also increases. This trade-off is clearly stated by the OECD. According to OECD pension models, “delaying retirement by five years from age 65 allows for a pension replacement

rate of 72%, compared with 60% at 65. (The rate of 60% was chosen because it is approximately the average replacement rate for people with mean earnings in OECD countries.) Conversely, earlier retirement means that the given budget needs to be spread over a longer period. In this case, retiring five years earlier, at age 60 would result in a replacement rate of 52%" (OECD, 2011).

Table 4.4: Sensitivity Analysis for Replacement Rate

		1	2	3	4	5	6	7
		PVEC	**PVEP**	**PVCNPW**	**PVCTW**	**PVT**	**PVPP**	**PVT/GDP**
1	75.00%	9,878,921,701	3,560,193,152	1,938,212,339	370,283,233	11,130,619,281	145,761	419%
2	**70.00%**	**9,150,421,196**	**3,560,193,152**	**1,938,212,339**	**370,283,233**	**10,402,118,775**	**136,221**	**392%**
3	65.00%	8,421,920,690	3,560,193,152	1,938,212,339	370,283,233	9,673,618,270	126,681	364%
4	60.00%	7,693,420,185	3,560,193,152	1,938,212,339	370,283,233	8,945,117,764	117,141	337%
5	55.00%	6,964,919,679	3,560,193,152	1,938,212,339	370,283,233	8,216,617,259	107,601	309%
6	50.00%	6,236,419,173	3,560,193,152	1,938,212,339	370,283,233	7,488,116,753	98,061	282%

One of the main determinants of the size of the pension benefits to be collected by retirees is the level of the replacement rates built into the pension rules. The magnitude of the fiscal deficit of a pension system is largely determined by the replacement rate formulae especially when the contributions are insufficient. As stated previously, the SIS system pays a replacement rate of 70% on average at a 55 year retirement age, this yields a total net cost of 10.4 billion euros (Table 4.4, row 2, column 5) in present value terms. A possible policy change would be to decrease the replacement rate on those contributing workers in the SIS system who have not yet retired to a level that is equal to the average rate in the OECD countries; that is to 60%. Such a change would decrease the total net cost of the entire pension system to the government by 14% from 10.4 (Table 4.4, row 2, column 5) to approximately 9 billion euros (Table 4.4, row 4, column 5). Considering the pension cost of this group of pension participation alone, their estimated net fiscal cost in 2009 values would decrease from 9.1 billion euros (Table

4.4, row 2, column 1) to about 7.7 billion euros (Table 4.4, row 4, column 1). Furthermore, a 50% replacement rate would reduce the net fiscal cost of this group's pensions to 6.2 billion euros (Table 4.4, row 6, column 1). The overall system would still produce a 7.5 billion euros (Table 4.4, row 6, column 5) deficit which is equal to 282% of GDP in 2009 (Table 4.4, row 6, column 7). Even with such a drastic decrease in the replacement rate, the present value of private sector employees' pension liability to GDP ratio would not be sustainable without outside assistance.

Table 4.5: Sensitivity Analysis for Different Discount Rates

		1	2	3	4	5	6	7
		PVEC	**PVEP**	**PVCNPW**	**PVCTW**	**PVT**	**PVPP**	**PVT/GDP**
1	4.00%	6,837,194,500	3,187,968,612	1,510,878,473	316,187,387	8,198,097,252	107,358	309%
2	3.50%	7,897,142,950	3,365,958,057	1,709,349,357	341,654,545	9,212,097,106	120,637	347%
3	**3.00%**	**9,150,421,196**	**3,560,193,152**	**1,938,212,339**	**370,283,233**	**10,402,118,775**	**136,221**	**392%**
4	2.50%	10,637,426,169	3,772,640,832	2,202,593,605	402,543,308	11,804,930,088	154,592	444%
5	2.00%	12,407,941,347	4,005,560,486	2,508,547,819	438,982,616	13,465,971,398	176,344	507%

In our present value estimates we employed a real discount rate of 3%. However, in other studies of social security systems, researchers or scholars use various real discount rates ranging from 2% to 4%[29]. Table 4.5 above shows how sensitive our findings, under the base case assumptions, are when these rates are used. As one expects, a discount rate of 4% reduces the present value of the total cost of the pension system from 10.4 billion euros (Table 4.5, row 3, column 5) to 8.2 billion euros (Table 4.5, row 1, column 5). On the contrary, a 2% real rate of discount produces a deficit of 13.5 billion euros (Table 4.5, row 5, column 5) in 2009 values. The PVT/GDP ratio varies between 309% (Table

[29] 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%, yielding a real rate of approximately 2% net of inflation in 2010.

4.5, row 1, column 7) and 507% (Table 4.5, row 5, column 7) when the annual net real costs are discounted at 4% and 2% respectively.

Another determinant of the sustainability of the existing system is the rate of growth in real wages to be paid to the contributing employees. This is because the pension benefit is directly tied to the final years declared income before retirement. The data obtained from the Social Security Administration show that the average annual income declared by the contributors is very close to the minimum wage. In 2009, the minimum wage was 8,290 euros whereas the average annual income declared by the existing contributors (who were 68% men and 32% women) was 8,415[30]. This is mainly due to the fact that the minimum wage in North Cyprus is exempted from the income tax. On the basis of this statistical fact, it can be said that the minimum wage is the key determinant of the declared annual income in the private sector. In our base case assumption we used a 4.33% expected increase in real wage rate for men and 3.55% for women. Excluding the annual age-earnings premium for men (2.33%) and for women (1.55%), these figures correspond to a real wage growth of 2% each year. That is a 2% annual real increase in the minimum wage.

Table 4.6: Sensitivity Analysis for Growth Rate in Real Wages

			1	2	3	4	5	6	7
	M	**W**	**PVEC**	**PVEP**	**PVCNPW**	**PVCTW**	**PVT**	**PVPP**	**PVT/GDP**
1	5.33%	4.55%	10,643,577,927	3,560,193,152	2,475,923,066	438,982,616	11,288,865,397	147,834	425%
2	**4.33%**	**3.55%**	**9,150,421,196**	**3,560,193,152**	**1,938,212,339**	**370,283,233**	**10,402,118,775**	**136,221**	**392%**
3	3.33%	2.55%	7,896,768,603	3,560,193,152	1,523,755,830	315,238,020	9,617,967,905	125,952	362%
4	2.33%	1.55%	6,842,000,426	3,560,193,152	1,203,667,172	270,890,863	8,927,635,544	116,912	336%

[30] 8,415 = (8,467*68%) + (8,308*32%), where 8,467 was the average income declared by men and 8,308 was the annual income declared by women.

The table above summarizes the estimated results with different growth rates in real wages. If real wages just grow as a result of seniority, the total net cost of the system will be about 9 billion euros (Table 4.6, row 4, column 5). On the other hand, if the real wages grow at a rate close to the historical growth in GDP; that is about 4.61%, then the present value of the fiscal burden of the system is equal to 11.3 billion euros (Table 4.6, row 1, column 5) which corresponds to a PVT/GDP ratio of 425% (Table 4.6, row 1, column 7). In our base case assumption, this ratio is equal to 392% of the GDP in 2009 (Table 4.6, row 2, column 7).

Table 4.7: Sensitivity Analysis for the Rate of Indexing the Value of Pension Benefits

		1	2	3	4	5	6	7
		PVEC	**PVEP**	**PVCNPW**	**PVCTW**	**PVT**	**PVPP**	**PVT/GDP**
1	4.61%	20,177,463,658	6,789,465,292	2,114,413,461	370,283,233	24,482,232,257	320,608	922%
2	4.00%	17,908,294,911	6,130,341,135	2,072,954,373	370,283,233	21,595,398,439	282,803	813%
3	3.00%	14,970,438,734	5,279,865,325	2,031,495,286	370,283,233	17,848,525,540	233,736	672%
4	2.00%	12,575,019,854	4,577,722,217	1,990,036,198	370,283,233	14,792,422,640	193,714	557%
5	1.00%	10,671,027,644	4,014,417,870	1,958,941,883	370,283,233	12,356,220,398	161,811	465%
6	**0.00%**	**9,150,421,196**	**3,560,193,152**	**1,938,212,339**	**370,283,233**	**10,402,118,775**	**136,221**	**392%**
7	-1.00%	7,887,349,020	3,175,599,202	1,917,482,795	370,283,233	8,775,182,193	114,916	330%

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 findings of our estimations are summarized in Table 4.7 above.

Our base case assumption is that the retirees' pensions will not be increased in real terms. They will just be indexed to inflation although the historical practice was not the case.

It can be seen from the table above that the present value of the deficit reaches a maximum value of 24.5 billion euros (Table 4.7, row 1, column 5), or 922% of GDP (Table 4.7, row 1, column 7) 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 historical real rate of indexation of SIS pension benefits until 2008. The present value of the deficit has a minimum value of 8.8 billion euros (Table 4.7, row 7, column 5), or 330% of GDP (Table 4.7, row 7, column 7), when the real growth rate of pension benefit indexation is taken as a minus 1%, that is; a cut in real pension benefits over time[31].

It is clear from the results above that an increase in the real growth rates of wages for working private sector employees under the SIS and pensions for retirees from the same system 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 civil service pension system applicable to workers in the public sector is covered previously in Chapter 3.

[31] A falling real value of pension benefits is fairly normal in many private pensions around the world as it is believed (and agreed to by unions) that people's expenditure requirements fall with aging. 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 -1.0%, 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%, respectively.

4.6 Analysis of Policy Options for Reducing the Annual Fiscal Burden of the Deficit of the Social Security Systems

To this point, the emphasis of the analysis has been on the size of the implicit debt being created by the historical SIS system. We now want to turn to the practical challenges this PAYGO system creates for the annual public sector budget over the 35 year period from 2010 to 2045. This impact is measured by the proportion of the annual SIS deficit (minus the SSS contributions) to the projected tax revenues in the same future year.

Another critical issue is what proportion of the GDP must be set aside from other people's consumption and saving each year to be used by the retirement community. This is measured as the ratio of the SIS annual deficit (minus the SSS contributions) to the projected GDP of the same year. To ease the understanding of the evolution of these two issues over time, in Table 4.8 below, we only report these ratios for every fifth year.

Table 4.8: Annual Pension Deficit (APD) / Tax Revenue & Annual Pension Deficit / GDP

		1	2	3	4
		APD / TAX REVENUE		**APD / GDP**	
		Without T.W. Contributions	**With T.W. Contributions**	**Without T.W. Contributions**	**With T.W. Contributions**
1	2015	31.99%	30.46%	8.01%	7.63%
2	2020	30.32%	30.02%	7.86%	7.52%
3	2025	30.89%	29.70%	7.74%	7.44%
4	2030	31.81%	30.76%	7.97%	7.71%
5	2035	30.52%	29.60%	7.65%	7.42%
6	2040	20.39%	19.57%	5.11%	4.90%
7	2045	11.80%	11.08%	2.96%	2.78%

Table 4.8 above shows the trend of proportion of the annual pension deficit (APD) to annual tax revenue and to annual GDP over time. The analysis is conducted from two

different perspectives. The first one does not include the contributions of the temporary workers in the calculation of the annual deficit whereas the second one does. The aim here is to show the net impact of the temporary workers on the fiscal sustainability of the system.

An assumption is made that people who were already over 55 in 2009 will retire at different ages before they reach 70[32], and the other existing contributors in the system will retire at an average age of 55. The ratio of the APD / annual Tax Revenue ratios in 2015 will be 31.99% (Table 4.8, row 1, column 1) without the contributions of temporary workers and 30.46% (Table 4.8, row 1, column 2) with these contributions. Under the same assumption, the APD / GDP ratios are estimated to be 8.01% (Table 4.8, row 1, column 3) and 7.63% (Table 4.8, row 1, column 4) with and without the contributions of temporary workers.

Between 2015 and 2040, under the base case assumption, the amount of tax revenue and GDP used to finance the annual cost (cash payments minus cash contributions) of the pension system show a steady downward trend. This is because the number of retirees is replaced with the number of new entrants. The expected growth in labor force whose contributions are used to finance the cost of the PAYGO system counterbalances the growth in real wages of the contributors. Although the ratios are stable, they are high and point out the fiscal unsustainability of the system. Even with the contributions of the temporary workers, the average ratio of APD to Tax Revenue is around 30% (Table

[32] According to our assumption, people who are between the ages of 55 - 59, 60 - 64 and 65 - 69 in 2009 will retire at the ages of 60, 65 and 70 respectively.

4.8, column 2). Expressing these net cash APD's for each year as a ratio of GDP of that year we find that it is about 7.6% in 2015 (Table 4.8, row 1, column 4) and generally trends downward over the next 30 years to become 2.78% of GDP by 2045 (Table 4.8, row 7, column 4)[33].

After 2040, however, the number of retirees who pass away each year relative to the number of new people who retire each year increases as the new permanent workers in the SSS system, under the new law, can only retire at an average age of 60 or above. This increases the dependency ratios for the years between 2040 and 2045. The estimates of the dependency ratios are presented in the Table 4.9 below. In addition to this, our base case assumption that keeps the pension benefits constant in real terms over time reduces the annual deficit to annual Tax Revenues and annual deficit to GDP ratios. Another factor behind this downward movement in these ratios is the survivors benefits paid. It is worth to restate that the widows, who are counted as retirees, receive 50% of the husband's pension benefit. This also decreases the annual pension deficit relative to the number of retirees in the system. In 2040, 19.57% (Table 4.8, row 6, column 2) of annual tax revenue is spent to pay the annual deficit of the SIS pension system. This ratio further decreases to 11.08% (Table 4.8, row 7, column 2) in 2045. When the burden is analyzed as proportion to the GDP, it can be seen that 4.90% (row 6, column 4) in 2040 and 2.78% (row 7, column 4) in 2045 of the country's total income is allocated to finance only the deficit of the SIS pension system.

[33] It is important to note that on average for OECD countries, gross pension spending (before subtracting contributions) on old-age pension benefits and survivors benefits alone was 7% of GDP in 2007 (OECD, 2011).

Table 4.9: Dependency Ratios for the TRNC

		1	2	3	4	5	6	7
		2015	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
1	# of Contributors (with 2%)	67,592	73,565	80,159	87,379	95,417	104,291	114,089
2	# of Contributors (without 2%)	62,184	62,184	62,184	62,184	62,184	62,184	62,184
3	# of Retirees	31,020	35,641	41,720	44,594	50,137	47,709	44,430
4	**Dependency Ratio (with 2%)**	**2.18**	**2.06**	**1.92**	**1.96**	**1.90**	**2.19**	**2.57**
5	**Dependency Ratio (W/out 2%)**	**2.00**	**1.74**	**1.49**	**1.39**	**1.24**	**1.30**	**1.40**

The significance of the growth in labor force can be seen from the table above. In the case where the social security system does not grow and labor force stays the same, the dependency ratios fall below 2.00. Keeping the number of contributors constant at 62,184 yields a dependency ratio of 1.74 in 2020 and decreases thereafter and becomes 1.40 in 2045 (Table 4.9, row 5). This means that the number of contributors to the PAYGO system is only between 2.0 and 1.4 times as large as the number of people drawing pension benefits. The average dependency ratio for the OECD countries was 4.1 and 3.5 for the EU 27 countries in 2010. However, due to the aging population, it is expected that these ratios could fall to as low as 2.00 and 1.8 in 2050 (OECD, 2011) respectively. Unfortunately, North Cyprus is at these crisis levels in 2011.

One of the advantages that North Cyprus economy enjoys is to have ready access to a pool of Turkish labor of a wide range of skills at relatively low wage rates. The vast majority of this labor only remains on the island as long as the job exists. Hence, the level of economic activity can expand and contract without either overheating the labor market or creating widespread unemployment. When there is demand for labor, the workers from Turkey are allowed to come to take jobs and when the economy contracts, the stock of workers decline relatively quickly as a greater number of people return to

Turkey (often in their normal rotation) than in the number of new workers that are given worker permits to come from Turkey to work in the TRNC. These workers receive no pension benefits from the TRNC system, but the years worked in the TRNC can be counted in determining their social security pension in Turkey.

Excluding the temporary workers' contributions from these estimates make the ratio of the deficit to tax revenue and GDP worse. The present value of the contributions to be made by these temporary workers is presented Table 4.10 below.

Table 4.10: Change in Stock of Temporary Workers and PVCTW

	1	2
	Stock of Temporary Workers	**PVCTW**
1	**11,232**	**370,299,718**
2	15,000	494,524,196
3	20,000	659,365,594
4	25,000	824,206,993

In the base case with a stock of 11,232 of temporary workers working in the TRNC, the present value of their contributions is 370 million euros. If the level of economic activity in the TRNC were to return to the level that it was in 2005-06, then the stock of this temporary labor force would increase to the 20,000 to 25,000 range once again. In the case that it increases to 20,000 as of 2015, the present value of the temporary workers' contributions (until 2045) is approximately equal to 660 million euros (Table 4.10, row 3, column 2) in 2009 values. If the stock increases to 25,000, then the amount of fiscal relief on the budget is 824 million euros (Table 4.10, row 4, column 2).

The analysis also shows that if the rules in the new SSS system are fully implemented, then overtime the funding burden on the public sector budget begins to look more like a

"normal" European country. Unfortunately, this does not appear to make a significant impact until 30 years have lapsed. There are simply too many relatively young retirees receiving generous pension benefits in the current social insurance system for any set of pension reforms to have significant visible results in less than one generation.

Table 4.11 below shows how much of the total tax revenue will be spent to finance the deficit of the pension system. If the economic performance of the TRNC stays as it is for the next 30 years with the same number of temporary worker employment, the ratio of APD to total tax revenue decreases from 30.46% in 2015 to 11.08% in 2045. However, if the economy expands more rapidly and the demand for more temporary labor increases to 15,000, 20,000 and 25,000 then the corresponding ratios for 2045 are 10.84%, 10.52% and 10.20% respectively. In the case of a more rapidly expanding economy that would require these additional temporary workers then the total amount of tax revenues is also expected to increase faster than with the base case assumptions. In our estimates, the increase in the amount of tax revenue is constant at its historical average at 4.61%. Hence, the ratio of APD to tax revenues will be significantly overstated for the more rapid growth scenario.

Table 4.11: Change in Stock of Temporary Workers and APD / Annual Tax Revenue

		1	2	3	4
		11,232	**15,000**	**20,000**	**25,000**
1	2015	30.46%	29.94%	29.26%	28.58%
2	2020	30.02%	29.56%	28.96%	28.36%
3	2025	29.70%	29.30%	28.77%	28.24%
4	2030	30.76%	30.41%	29.95%	29.48%
5	2035	29.60%	29.29%	28.88%	28.47%
6	2036	28.44%	28.13%	27.73%	27.33%
7	2037	27.21%	26.92%	26.53%	26.14%
8	2038	25.93%	25.64%	25.26%	24.88%
9	2039	21.27%	20.99%	20.62%	20.24%
10	2040	19.57%	19.30%	18.94%	18.57%
11	2041	17.96%	17.69%	17.34%	16.99%
12	2042	16.41%	16.15%	15.81%	15.46%
13	2043	14.22%	13.97%	13.63%	13.30%
14	2044	12.57%	12.32%	11.99%	11.66%
15	2045	11.08%	10.84%	10.52%	10.20%

As can be seen from Table 4.12 below, we also find that the impact of the contributions that are made by the stock of temporary workers while significant in absolute values do not have a dramatic effect on any of the ratios that measure the fiscal burden. Moving from 11,232 to 25,000 temporary workers first reduces the ratio of the APD from 7.63% of GDP to 7.16% of GDP in 2015 (Table 4.12, row 1) and from 2.78% to 2.56% in 2045 (Table 4.12, row 15).

It seems unrealistic that the size of the annual cash deficit of the social security system would continue to be in excess of 11% of annual tax revenues or 2.78% of GDP for the next 25 years. Although it is a political economy question, such a situation would require either an increasing level of budgetary support in real terms or an unprecedented level of sacrifice by current taxpayers to support relatively well-off pensioners.

Table 4.12: Change in Stock of Temporary Workers and APD / GDP

		1	2	3	4
		11,232	**15,000**	**20,000**	**25,000**
1	2015	7.63%	7.50%	7.33%	7.16%
2	2020	7.52%	7.41%	7.26%	7.11%
3	2025	7.44%	7.34%	7.21%	7.08%
4	2030	7.71%	7.62%	7.50%	7.39%
5	2035	7.42%	7.34%	7.24%	7.13%
6	2036	7.13%	7.05%	6.95%	6.85%
7	2037	6.82%	6.74%	6.65%	6.55%
8	2038	6.50%	6.42%	6.33%	6.23%
9	2039	5.33%	5.26%	5.17%	5.07%
10	2040	4.90%	4.84%	4.74%	4.65%
11	2041	4.50%	4.43%	4.34%	4.26%
12	2042	4.11%	4.05%	3.96%	3.87%
13	2043	3.56%	3.50%	3.42%	3.33%
14	2044	3.15%	3.09%	3.00%	2.92%
15	2045	2.78%	2.72%	2.64%	2.56%

A more realistic time horizon for such an adjustment of the social pension system to have taken place might be by 2030, or over the next 18 years.

In Table 4.13, a series of estimations are made for changes in two of the principal policy variables of the social security system, which are the age of retirement and the size of the pension received upon retirement. The latter is defined by the replacement rate of the pension system. A set of simulations are made to find the replacement rate that would yield an APD of 11% of tax revenues or less at different retirement ages[34].

[34] This ratio is the one that can be reached only in 2045 under our base case assumptions and the existing laws. Please see Appendix D for the estimations made for different retirement ages and replacement rates to reach a 5% APD / tax revenue ratio. A cash deficit of 11% of the tax revenues is equal to 2.78% of GDP because tax revenues are assumed to be 25% GDP. The following analysis that is presented in terms of the ratio of APD to tax revenues can equivalently be presented in terms of the ratio of ADP to GDP.

Table 4.13: The Trade-off between Retirement Age and Replacement Rate in order to reach an 11% APD / Tax Revenue Ratio by 2035

		Current SIS and SSS Contributing Participants Excluding Pensioners		**Current SIS and SSS Contributing Participants Including Pensioners**	
		1	2	3	4
	Retirement Age	T.W. Constant (as 11,232)	T.W. Doubles (as 22,464)	T.W. Constant (as 11,232)	T.W. Doubles (as 22,464)
1	55	44.61%	46.83%	28.15%	30.37%
2	60	63.14%	66.02%	41.81%	44.69%
3	65	Under this assumption it is already 2.00%	Under this assumption it is already 0.95%	Under this assumption it is already 9.78%	Under this assumption it is already 8.73%

In the first case only the current working participants of the SIS and the SSS pension schemes are considered in the calculations. It is assumed that the fiscal burden of the existing pensioners is dealt with in another fashion. The results are shown in Table 4.13, columns 1 and 2. If the same number of temporary workers continued to be contributing to the social security system as of now, and the retirement age is allowed to continue at 55 years of age, the replacement rate would have to be cut to about 45% (44.61%) from the current promise of 70% replacement rate (Table 4.13, row 1, column 1). This would mean that in the future the level of pension benefits would have to be reduced to about 60% of their current levels. Under the same assumption where the number of temporary workers is constant, at a retirement age of 60[35], a replacement rate of 63.14% (Table 4.13, row 2, column 3) rather than 70% would yield an 11% APD / tax revenue ratio in 2030. This would only require a reduction in the initial pension benefits of about 13%. If

[35] It is important to note that the retirement age for the SSS contributors has already increased to 60 and it is very likely that very soon it will increase to 60 for the SIS contributors as well.

the retirement age were to be increased to 65 in the near future, our estimations reveal that such a policy change would yield an APD / tax revenue ratio of 2.00% in 2030. Clearly increasing the retirement age is a very effective option for reducing the fiscal gap in the social security system. With such a major reform, a cash balanced pay-as-you-go (PAYGO) system is not quite reached. There still would be an annual cash deficit that would need to be financed by the taxpayers of the country.

If the number of temporary workers were allowed to double and become 22,464, then at retirement ages of 55 and 60 the corresponding replacement rates that would yield an APD to tax revenue ratio of 11% are 46.83% and 66.02% (Table 4.13, column 2) necessitating a reduction in the actual benefits of new retirees of 33% and 6% respectively. It is also estimated that increasing the retirement age to 65 for all the contributors in the system almost satisfies the goal of attaining a zero cash deficit by 2030.

Doubling the number of temporary workers can be possible by economic expansion in the TRNC which would also increase the amount of tax revenues collected annually. Therefore, considering this fact we need to mention that our estimates would be overstated and smaller cuts in the pension benefits would be sufficient to attain 11% APD / tax revenue ratios.

In the second case where the cost of the existing pensioners was also taken into consideration, the existing contributors would need to sacrifice a very significant amount of their future pension benefits in order for the social security system to attain an 11%

APD / tax revenue ratio by 2030. In the absence of a structured welfare system, in the past the SIS system fulfilled this role. It is not sound tax or labor market policies to require that the current and future cost of these rather loose pension arrangements of the past be financed through what is essentially a payroll tax on existing workers. One should not create a major tax distortion in the labor market of the existing contributing workers to finance the budgetary burden created by the existing pensioners under the old SIS system. This burden needs to be considered as a state problem and be financed through general tax revenues. Our estimates regarding the various policies to minimize this burden support this statement. Table 4.13 (columns 3 and 4) summarizes our findings on this issue.

In the case where the number of temporary workers is kept constant, the required cuts in the pension benefits of the existing workers would range from 60% with a required replacement rate of 28.15% when the retirement age is 55 (Table 4.13, row 1, column 3) and 40% with a replacement rate of 41.81% if the retirement age was to increase to 60 years of age (Table 4.13, row 2, column 3). In the case where the retirement age was 65, with a replacement rate of 70%, 9.78% of the total annual tax revenues would need to be spent to finance the annual pension deficit of 2030.

Column 4 of Table 4.13 shows the estimated replacement rates that would yield an 11% APD / tax revenue ratio in 2030 for different retirement ages when the number of temporary workers is doubled. If the number of the temporary workers were to double, then despite minor improvements, the estimated cuts in the replacement rate would still be so significant that the implementation of such a policy would again be unrealistic. At

retirement ages of 55 and 60, the replacement rate needs to be reduced to 30.37% and 44.69% in order to reach the targeted deficit rate in 2030 relative to the annual tax revenue of the same year. A more radical reform of increasing the retirement age to 65 would still produce an APD / tax revenue ratio of 8.73% in 2030 (Table 4.13, row 3, column 4).

It would be a better tax and pension policy if the reforms to the system were to focus on the problem of financing the pensions of current and future workers rather than using the contribution rates of these workers to finance the fiscal imbalances created by the historical politically necessitated decisions.

4.7 Conclusions

In conclusion, it can be stated that in North Cyprus the present value of the burden of the social security deficits of about 10.5 billion euros or 393% of GDP is proportionally the largest for any jurisdiction in Europe. No single policy option can adequately address this problem and any solution will take many years of either sacrifice by the taxpayers or external assistance before a sustainable situation can be reached[36].

The new SSS system has addressed many of the structural issues present in the old SIS system. However, it appears that any long term solution will require either some

[36] It should be noted that the Euro area had an estimated implicit general government pension obligation (civil service plus private coverage of social security) of 217% of GDP in 2005 values (European Commission, 2006). Together with the deficit of the civil service pension system, this ratio is (276% + 393%) 669% of the GDP for the TRNC.

combination of an older retirement age and lower rate of pension benefits or substantial increases in the contribution rates to the system.

Despite the fact that temporary workers who contribute to the system and receive no pensions certainly make a substantial contribution in absolute monetary terms, this subsidy does not have a significant overall effect on the long term sustainability of the SSS system.

Chapter 5

AN ANALYSIS OF THE SUSTAINABILITY OF THE NEW SOCIAL SECURITY SYSTEM

5.1Introduction

In recent years many countries within the EU have undertaken fundamental reforms of their PAYGO pension systems. Their main target was to protect their systems against the aging population that is creating too many pensioners relative to the number of contributors. Demographic changes undoubtedly increase the size of the public pension liabilities as a proportion of GDP as the dependency ratios increase. However, this is not the only reason behind the mounting implicit public debt created by pension systems. Structural problems in the design of the pension systems also play an important role in creating the massive accrued pension liabilities in many countries. Pension reforms have been implemented throughout the EU and elsewhere and many more are still being discussed for the future.

The reforms have mainly focused on three pension policy areas. Firstly, the retirement age has been increased. This has been necessary because the life expectancy for almost all Europeans is increasing. In some cases the pension systems could not afford to pay the pensions for longer periods after retirement without increasing the contribution rates. As this was often not politically or economically desirable, a more acceptable option for dealing with the solvency problem has been to increase the age that people can retire and

receive a full pension. Secondly, in some cases the contribution rates were increased to provide sufficient funds to finance the pension benefits of the existing retirees. The third set of reforms have been to readjust the replacement rate formulae to make the pension benefits affordable and at the same time promote private savings through tax assistance for defined contribution pension plans. A fourth element of some of the reforms of the PAYGO systems has been to limit the size of the public sector PAYGO pensions systems and instead promote funded pension plans of either a defined contribution or defined benefit type (Chile, UK).

The TRNC is not an exception in this regard. The liabilities of the existing pension systems in the TRNC are also not only the results of demographic changes[37] but also the product of the inadequately designed social insurance (1976) and civil service (1977) pension schemes. Until 2008, there were two main pension schemes in the country. The Social Insurance System (SIS) that was designed to provide pension benefits for the privately employed people and the Civil Service Pension System (CSPS) which covered the public sector workers who were employed as civil servants. Both pension systems were defined benefit pay-as-you-go (PAYGO) systems. Over time a number of changes were made in both systems with the intention to reduce the fiscal burden imposed on the taxpayers. None of these measures were successful so in 2008 the government of the TRNC, with the assistance of the World Bank and the Turkish government, reformed the pension system as a whole and launched a unified Social Security Pension System (SSS)

[37] See Appendix A for the change in life expectancy for Cyprus over time.

for all the employees (public and private) as well as the self-employed people in the country.

The three major pension changes that were implemented by the EU countries were also the primary measures undertaken in the TRNC. The reforms regarding the old-age and survivor benefits are outlined in Table 5.1 and the sections that follow.

5.1.1 Retirement Age

Under the old CSPS and SIS systems, people who satisfy certain criteria could retire at an age of 50 or even below. The average retirement age, however, was 55 for both civil servants and workers in the private sector. With the new SSS system, the retirement age for the new entrants has been increased to a minimum age of 60. Although this number is still below the EU average of 63 for men and 62 for women, it is a significant step in attaining a more sustainable pension system. The increase in the age of retirement, however, does not play an important role towards minimizing the burden created by the existing pensioners and contributors who are still subject to the old laws and who will collect their benefits accordingly.

Table 5.1: The Summary Comparison of the 2008 Pension Reform and the Old Pension Systems

	Civil Servants pre 2008	**SIS System**	**SSS System**
Coverage	-Civil servants only	-Public and Private Sector employees, -Self employed	-Civil servants, -Public and Private sector employees, -Self employed
Eligibility requirements for a full old-age pension	-Pre 1987, no age requirement, -10 or 15 years of service, -Post 1987, 55 years of age and 25 years of service, -Post 1987, 60 years of age and 15 years of service -Mandatory retirement age is 60	-50 years of age and 25 years of contribution, -55 years of age and 15 years of contributions, -60 years of age and 12 years of contribution, minimum 1800 days of contribution (for women), -60 years of age and 15 years of contribution, minimum 2250 days of contribution (for men)	-60 years of age and 25 years of contribution (with reduced replacement rate), -63 years of age and 15 years of contribution (with reduced replacement rate)
Survivors benefits	-If the number of years of service is less than 20 years, calculated over 20 years, -If it is more than 20 years, then calculated over those years 50% of the husband's pension benefit is paid to the widow, -25% for each child, -If there are no children receiving survivors benefit, widow gets 2/3, -If no wife, each child gets 50%. However, the payments cannot exceed the father's pension	-If the number of years of contribution is more than 15, than the widow receives a pension over 25 years, -50% of the husband's pension benefit is paid to the widow, -25% for each child, -If there are no children receiving survivors benefit, widow gets 2/3, -If no wife, each child gets 50%. However, the payments cannot exceed the father's pension, -The husband can get survivor benefit if he is over 60 and was fully dependent on his wife's pension.	-The widow (men or women) gets a survivor benefit, -If the spouse dies while working, 60% of the minimum wage is paid to the widow every month, -If the spouse dies after a contribution of 1800 days, then the widow gets a pension over 5400 days, -If the spouse dies after a contribution of 3600 days, then the widow gets a pension over 7200 days, -If the spouse dies after a contribution of 5400 days, then the widow gets a pension over 9000 days, -25% for each child, -If no wife, each child gets 50%. However, the payments cannot exceed the father's pension
Calculation of the old-age pension benefit	-Last month's salary * Number of months in service * 0.75 / 484 (55.79% over 30 years of service)	-The highest 4 years' salary in the last 7 years of work adjusted for the average highest declarable salary, formulas and tables (we used 70%)	-(Average monthly income)x (Monthly replacement rate), -Monthly replacement rate is 2.5% for each year for the first 15 years of contribution and 2% for each year after 15, -Average monthly income is adjusted for each monthly income throughout the working history
Contribution Rates (for old-age and survivors benefits)	-Men 9%, Women 5%	-11%	-12.5%
Declarable Income	-No limit	-Min: minimum wage, -Max: 5 times minimum wage	-Min: minimum wage, -Max: 7 times minimum wage

5.1.2 Contribution Rate

Civil servants under the CSPS system contribute 5% (women) and 9% (men) of their gross monthly income for their future pensions. People in the private sector, on the other hand, contributed 11% of their monthly gross income for their future old-age pension and survivor benefits. With the new law (SSS), these rates have been unified and increased to a rate of 12.5% of the monthly gross salary for all the new entrants with no exceptions. Such a policy change aims to fix the fiscal imbalance as the ratios of APD / tax revenue ratios were very significant. Our estimates reveal that more than 50% of the annual tax revenues will need to be used to finance the annual deficit created by the CSPS and the SIS systems for each year for the next 30 years period.

5.1.3 Replacement Rate and the Calculation of Pension Benefits

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

The new system determines the basis of pensionable income differently. In the new SSS system, the declared incomes of the contributor relative the average income of all contributors in the corresponding year throughout his or her working life are taken into

account and then the overall average (excluding the last year prior to retirement) is multiplied by a replacement rate. This replacement rate is found after multiplying the first 15 years of service by 2.5% and adding a 2% for every additional year of service to that sum.

5.2 A Model of Social Security Pension System Outcomes

Because a PAYGO system is not a funded pension plan the contribution of any single individual or age cohort of individuals do not finance their own pension benefits. The basic principal of a PAYGO pension system is that the pension benefits of one generation are funded by the contributions of the next generation. Hence, the long run financial solvency of the SSS will depend on the generosity of the pension promises that are made, the rate of SSS contributions of the labor force, and in addition the rate of growth of the labor force over time. In chapter 4 the question of the long term solvency of the combination of the historical SIS system and the new SSS system was discussed and found that with the present rates of contribution a large element of government subsidy was required to meet the obligations of the combined SIS and SSS systems.

A narrower question is addressed here. Would the contributions that an individual is required to make under the rules of the new SSS system be sufficient to fund the benefits that this promised by the SSS pension system, if a real rate of return of 3% could be earned on the invested contributions? In other words, could the new SSS system be converted into a funded defined benefit pension plan? Many such reforms have been carried out in this direction where an unfunded PAYGO system was partially or wholly

converted into a funded pension plan, with transition provisions for those in the historical PAYGO systems.

To simulate the effects of the new social security rules, we have constructed a theoretical model of the SSS system. As discussed above the parameters that determine a person's pension benefit is the length of time an individual works and contributes to the SSS pension plan, the wages earned by the individual relative to the average wages each year of his fellow members of the labour force, and the average wage of the entire labour force one year before the person retires. The wage history of a member of the pension plan and the relationship of the wages of the individual and those of the other members of the plan are illustrated in Figure 5.1. All the parameters of the model can be changed to simulate their impacts.

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

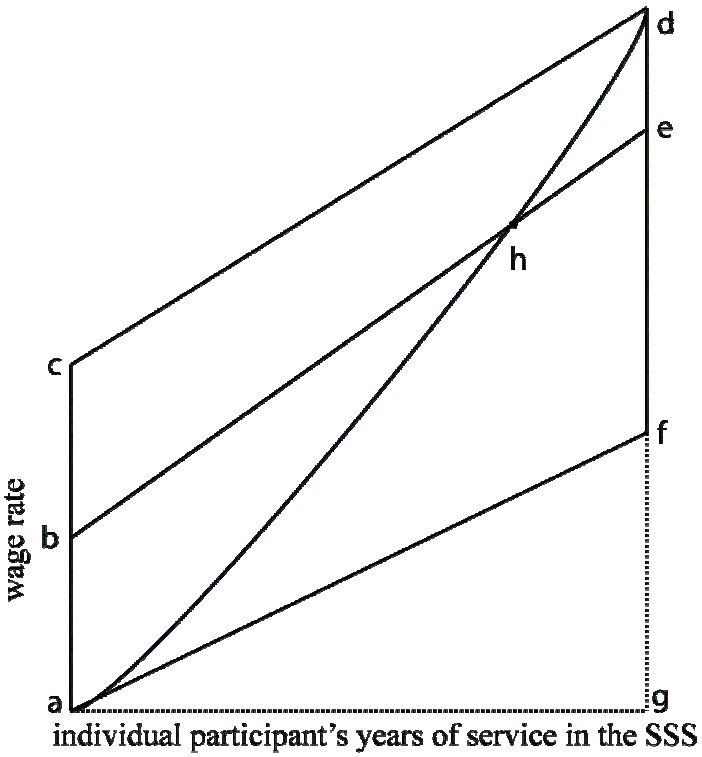

Figure 5.1: A Model of Wage Rates of Individual Participant and Distribution of Wage Rates Relevant to the SSS Pension System

According to our model, as illustrated by Figure 5.1 every new SSS participant upon entering the labour force receives a basic salary W_a denoted as point (a) in the figure above. At that moment in time, there are other people in the system with different seniorities receiving higher wages which are the products of the basic wage times the age-earnings premium for every year of work experience. The person who has the maximum number of years of experience therefore receives a wage of (W_c) which is equal to

$$W_c = W_a(1+aep)^{ys-1} \tag{5.1}$$

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

In Figure 5.1, the line *ahd* illustrates the time path of an individual's wage over time as he or she gains seniority and moves towards retirement. Every year, his salary will grow by the real annual growth in wages that the whole labour force receives that increased the basic wage, plus an additional real annual growth, *aep*, for seniority. The growth of basic wage over time is shown by the path along the line *af*. The component of an individual's wage arising from the age-earnings premium is illustrated by the distance between the line *ad* and line *af*. At the point of retirement after *g* years of service, the basic wage rate in the economy will be at point *f* and the cumulated impact on the individual's wage rate from the age-earnings premium can be shown as the distance *fd* in Figure 5.1. The value of *aep* is estimated from age-earnings profile of the SSS labour force. The wage in time period t of the typical participant is denoted as W_t, and at any point in time t is:

$$W_t = W_a\left(1+g_{wc}\right)^i\left(1+aep\right)^i \tag{5.2}$$

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

According to the SSS law, (unlike the old SIS law where the pension benefits were directly tied to an individual's last highest four-year salaries), the monthly pension currently will be determined by the multiplication of a rate with the general average monthly wage rate of the total labour force. In other words, a typical individual will receive his pension benefit on the basis of the wage denoted in the figure as (e), that is;

the general average monthly wage rate of total labour force one year prior to the typical pensioner's retirement. This rate is estimated as the basic wage rate growing at the real annual increase in wage rate times a factor (F) which is the average of the age-earning premiums of all the workers in any given period of their service. If we assume that the distribution of seniority across the labour force is uniform then the average monthly wage for the labour force at any given point in time in an individual participants working history is therefore;

$$W_e = \sum_{t=0}^{ys-1} W_a \left(1 + g_{wp}\right)^t F \tag{5.3}$$

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

$$F = \sum_{i=0}^{ys-1} \left(1 + aep\right)^i / ys \tag{5.4}$$

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

5.3 Modelling the Social Security Pension System

According to the SSS law, the monthly pension to be received by a pensioner is calculated by multiplying the general average monthly wage of the labour force one year prior to that individual's retirement (l_e) with the replacement rate (r) formulated by the law that depends on the number of years of service times a rate, denoted as *p*, in equation 5.5.

$$p = \sum_{i=0}^{ys-1} \frac{w_c (1+g_{wc})^i (1+aep)^i}{w_a (1+g_{wp})^i \sum_{j=0}^{ys-1} (1+aep)^j / ys} \tag{5.5}$$

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

$$p = \sum_{i=0}^{ys-1} \frac{W_i}{AverageW_e i} /(ys-1) \tag{5.6}$$

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

r = [Years of service up to a max of 15 * 2.5%) +

((total number of years of service – 15) * 2%))]*p

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

$$m = l_e * r \tag{5.7}$$

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

5.4 Estimates of the Net Cost of Social Security Pension System

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

$$PVC_{tmp} = -\sum_{t=1}^{R-A} \frac{cW_{tmp}(1+g_w)^t(1+g_{aep})^t}{(1+r)^t} + \sum_{t=R-A}^{(R-A)+n} \frac{r_{tmp}W_e(1+g_{wp})^{R-A-1}(1+g_p)^{n-(R-A)}}{(1+r)^t} + \sum_{t=(R-A)+n}^{(R-A)+n+7} \frac{W_u(1+g_p)^{n-(R-A)}}{(1+r)^t} \quad (5.8)$$

where, n is the life expectancy after age of retirement, g_w is the annual real growth rate of wages, g_p is the annual growth rate of pension benefits , r is the discount rate, R is the retirement age, A is the current age at time of employment, c is the individual's plus employer's contribution rate to the pension part of the social security pension system, W_{tmp} is the annual wage of a typical pensioner during employment, W_e is the annual average wage rate of the labor force, g_{wp} is the annual real growth in average wage rate of the labor force, W_u is the annual pension of the married typical male pensioner at time of his death, r_{tmp} is the replacement rate and PVC_{tmp} stands for the present value of a typical male pensioner's pension liability (cost).

The first term of equation 5.8 measures the present value of the pension contributions made by an individual, the second term measures the present value of the pension benefits received based on the number of years the individual is expected to live, given his age at retirement, and the third term measures the cost of the pension received by the spouse in the event of the prior death of the husband.

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

These parameter values are substituted into expressions 5.1 to 5.7 and yield the following values for F, and p for male workers.

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

5.4.1 The Subsidy or Deficit in Social Security Pension System for Male Members

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

The value of the deficit or required subsidy of the pension plan per individual as compared to a fully funded pension system is estimated as the present value of the value of the pension an individual receives upon retirement less the present value of the pension contributions the pension plan member pays during his working life. All the estimates are expressed in terms of the price level as of 2009. The result is the present value of the deficit or surplus of the pension system associate with a single male individual at the point in time when they start work.

Table 5.2 below summarizes the present value of contributions less benefits of a typical pensioner over his life time for different retirement ages and different number of employment years.

Rows 1 and 2 compare the situations under the SIS and the SSS systems. Recall that under the SIS system the average retirement age is 55. So, a typical pensioner's net present value cost to the system is equal to 135,563 euros using a 3% discount rate (Table 5.2, row 1, column 7) if when he begins working in the labour force he earns the minimum wage. The same individual's cost is equal to 84,005 euros (Table 5.2, row 2, column 7) under the new law with the same number of years of employment. Hence we can see that these measures have reduced the present value of the deficit of the pension system for a member by 38%.

Table 5.2: Results (for Men) under the Base Case Scenario when the starting wage (W_c) of our participant is equal to the basic starting wage W_a and p=1

	Gender	Years of service to retirement	Average wage as proportion of basic (minimum) wage (F)	Retirement age	Replacement rate of average SS wage (r)	Replacement rate of last salary of retiree	Life expectancy at retirement age	PV of deficit (euros)
		1	2	3	4	5	6	7
1	M	30	-	55[38]	-	70.0%	25.9+7=32.9	-135,563
2	M	30	1.42	55	67.5%	48.6%	25.9+7=32.9	-84,005
3	**M**	**25**	**1.34**	**60**	**57.5%**	**43.6%**	**21.6+7=28.6**	**-64,601**
4	M	35	1.52	60	77.5%	53.0%	21.6+7=28.6	-85,599
5	M	30	1.42	65	67.5%	48.6%	17.6+7=24.6	-64,915
6	M	40	1.62	65	87.5%	57.0%	17.6+7=24.6	-82,822
7	M	35	1.52	70	77.5%	53.0%	13.8+7=20.8	-60,535

This decrease in the present value of the deficit is mainly due to the lower replacement rate of 43.6% rather than the SIS replacement rate of 70%, and the higher contribution rate of 12.5% as compared to the 11% in the old SIS system. However, it is clear that the proposed rate of contributions are not sufficient to allow a fully funded SSS pension system to be set up for the future participants of the public pension scheme.

Table 5.2, row 3 shows the case under the new SSS law where the retirement age is 60 and minimum number of years of employment for a full pension is 25 years. In this case, (Table 5.2, row 3, column 4), a typical pensioner receives a monthly pension equal to 57.5% of the general average monthly income of the labour force one year prior to his retirement. This amount is equal to 43.6% (Table 5.2, row 3, column 5) of that individual's last year monthly wage prior to his retirement. The present value of the benefits drawn minus the contributions made by this typical pensioner using a real

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

interest rate of 3% is a net deficit of 64,601 euros per individual in 2009 values (Table 5.2, row 3, column 7).

Table 5.2 also shows the present value of the cost of a typical pensioner for different retirement ages, with different numbers of years of service and life expectancies. It can be seen that as the number of years of service increases and the individual retires at an age of 65 years or less, the present value of the cost of the SSS pension also increases. This happens because the replacement rate is directly tied to the number of employment years. There is an incentive for workers to retire at 65 rather than at 60 as the present value of the subsidy the person receives from the general budget is maximized at 35 years of service with a retirement at age 65 (Table 5.2, columns 1 and 7). If one has to work until age 70 to obtain 35 years of service, they would be better off to retire at age 65 with 30 years of service than at 70 with the larger number of years of service.

When we change the assumption that a typical pensioner starts with the basic salary equal to the average wage rate in the country and make our estimations on the assumption that he earns 50% more than the average basic wage at time of first employment. In such a case, differences in results mainly come from the change in the value of the *p* parameter. As W_c increases, the *p* also increases. With a W_c 50% higher than W_p, we now have a *p* rate of 1.5 instead of 1 and we get the results as shown in Table 5.3 below.

In all cases we find that the deficit of the pension plan increases by 50% over the case where the individual is starts working at the standard starting wage by approximately.

The rate of subsidy required is directly proportional to the average wage rate of the individual relative to that of the rest of the labour force.

Table 5.3: Results (for Men) under the Base Case Scenario when W_c is 50% higher than W_a and p=1.5

	Gender	Years of service to retirement	Average wage as proportion of basic (minimum) wage (F)	Retirement age	Replacement rate of average SS wage (r)	Replacement rate of last salary of retiree	Life expectancy at retirement age	PV of deficit
		1	2	3	4	5	6	7
1	M	30	-	55	70.0%	70.0%	25.9+7=32.9	-203,345
2	M	30	1.42	55	101.0%	49.2%	25.9+7=32.9	-128,162
3	**M**	**25**	**1.34**	**60**	**85.0%**	**43.6%**	**21.6+7=28.6**	**-96,901**
4	M	35	1.52	60	115.9%	53.7%	21.6+7=28.6	-130,638
5	M	30	1.42	65	101.0%	49.2%	17.6+7=24.6	-99,179
6	M	40	1.62	65	130.8%	57.6%	17.6+7=24.6	-126,480
7	M	35	1.52	70	115.9%	53.7%	13.8+7=20.8	-92,601

The present value of the implicit subsidy in 2009 euros that is now given to each member of the labour force through the SSS system as they enter the labour force ranges between about 60.5 thousand euros and 85.5 thousand euros when the individual's wage over his working years averages out to be the same as the labour force average (Table 5.2, column 7). In the case that the man's wage is 50% higher on average over his working life than a typical member of the labour force, then the cost of the required subsidy ranges between about 92 thousand euro and 130 thousand euro (Table 5.3, column 7).

We can see from Table 5.4, column 7 that when an individual's starting wage is twice the minimum wage and they maintain this relatively higher wage throughout their working life then the range values for the present value of the implicit subsidy (or grant) in 2009 prices is between 123 thousand and 175 thousand euros.

Table 5.4: Results (for Men) under the Base Case Scenario when W_c is 100% higher than W_a and p=2

	Gender	Years of service to retirement	Average wage as proportion of basic (minimum) wage (F)	Retirement age	Replacement rate of average SS wage (r)	Replacement rate of last salary of retiree	Life expectancy at retirement age	PV of deficit
		1	3	4	5	6	7	8
1	M	30	-	55	70.0%	70.0%	25.9+7=32.9	-271,127
2	M	30	1.42	55	134.7%	49.2%	25.9+7=32.9	-170,882
3	**M**	**25**	**1.34**	**60**	**113.3%**	**43.6%**	**21.6+7=28.6**	**-129,201**
4	M	35	1.52	60	154.5%	53.7%	21.6+7=28.6	-175,184
5	M	30	1.42	65	134.7%	49.2%	17.6+7=24.6	-132,239
6	M	40	1.62	65	174.4%	57.6%	17.6+7=24.6	-168,640
7	M	35	1.52	70	154.5%	53.7%	13.8+7=20.8	-123,468

When the starting wage of the individual is two times the minimum wage and they maintain this higher relative wage through their working years then the pension they will receive when they retire has built into it an implicit public sector subsidy of between 185 thousand and 261 thousand euros (Table 5.5, column 7).

What is surprising is that in each case the implicit subsidy under the SSS system is only between 45% and 65% of what it would have been under the old SIS system (row 1, column 7 in each table compared with other values in column 7 of each table).

Table 5.5: Results (for Men) under the Base Case Scenario when W_c is 200% higher than W_a and p=3

	Gender	Years of service to retirement	Average wage as proportion of basic (minimum) wage (F)	Retirement age	Replacement rate of average SS wage (r)	Replacement rate of last salary of retiree	Life expectancy at retirement age	PV of deficit
		1	2	3	4	5	6	7
1	M	30	-	55	70.0%	70.0%	25.9+7=32.9	-406,690
2	M	30	1.42	55	202.0%	49.2%	25.9+7=32.9	-256,323
3	**M**	**25**	**1.34**	**60**	**170.0%**	**43.6%**	**21.6+7=28.6**	**-193,802**
4	M	35	1.52	60	231.8%	53.7%	21.6+7=28.6	-261,275
5	M	30	1.42	65	202.0%	49.2%	17.6+7=24.6	-198,359
6	M	40	1.62	65	261.6%	57.6%	17.6+7=24.6	-252,961
7	M	35	1.52	70	231.8%	53.7%	13.8+7=20.8	-185,202

5.4.2 The Subsidy or Deficit in Social Security Pension System for Female Members

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

$$PVC_{tfp} = -\sum_{t=1}^{R-A} \frac{cW_{tfp}(1+g_w)^t(1+g_{aep})^t}{(1+r)^t} + \sum_{t=R-A}^{(R-A)+n} \frac{r_{tfp}W_e(1+g_{wp})^{R-A-1}(1+g_p)^{n-(R-A)}}{(1+r)^t} \quad (5.9)$$

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

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

For female members of the labour force who retire with 30 years of service at 55 years of age we find that the present value of the subsidy needed to fund this pension is 66,825 euros. This is in the case where the female member just receives a starting wage equal the standard wage of W_a (Table 5.6). This cost is just 66% as much as what the fiscal cost would be under the previous SIS system (Table 5.6, rows 1 and 2, column 7). The required subsidy is also only about 80% as large as it is for a male member of the SSS

(See Table 5.2 above). This difference reflects the cost of providing the survivors benefits received by spouses that accrues mainly to widows, and is an additional cost to the pension plans of male members.

In this case the range of the implicit subsidy extends from a value of 36 thousand Euros for a female who retires at an age of 70 with 35 years of contributions to a high of 66.8 thousand Euros for the case of woman retiring at 55 years of age with 30 years of experience. In comparison, for men the value of the subsidy ranges from 60.5 thousand to 85.5 thousand euros.

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

Table 5.6: Results (for women) under the Base Case Scenario when $W_c = W_a$ and p=1

	Gender	Years of service to retirement	Average wage as proportion of basic (minimum) wage	Retirement age	Replacement rate of average SS wage (r)	Replacement rate of last salary of retiree	Life expectancy at retirement age	PV of deficit
		1	2	3	4	5	6	7
1	W	30	-	55	70.0%	70.0%	29.3	-100,917
2	W	30	1.26	55	66.9%	54.0%	29.3	-66,825
3	**W**	**25**	**1.21**	**60**	**57.0%**	**47.7%**	**24.7**	**-51,129**
4	W	35	1.31	60	76.8%	59.8%	24.7	-64,215
5	W	30	1.26	65	66.9%	54.0%	20.3	-44,975
6	W	40	1.37	65	86.7%	65.3%	20.3	-53,875
7	W	35	1.31	70	76.8%	59.8%	15.9	-36.180

As in the case of the male members of the SSS pension system, the women who earn higher wages receive proportionally larger amounts of subsidy from the fiscal system, or

alternatively from the younger contributing members in the system if their contribution rates are increased in the future. With wage rates that are on average 50% greater the minimum wage, the subsidy is about 50% greater than the base case (Table 5.7, row 7). When the woman's salary is double of the base case, then the subsidy is approximately doubled (Table 5.8, row 7).

Table 5.7: Results (for Women) under the Base Case Scenario when W_c is 50% higher than W_a and p=1.5

	Gender	Years of service to retirement	Average wage as proportion of basic (minimum) wage	Retirement age	Replacement rate of average SS wage (r)	Replacement rate of last salary of retiree	Life expectancy at retirement age	PV of deficit
		1	2	3	4	5	6	7
1	W	30	-	55	70.0%	70.0%	29.3	-151,375
2	W	30	1.26	55	100.3%	54.0%	29.3	-100,238
3	**W**	**25**	**1.21**	**60**	**85.5%**	**47.7%**	**24.7**	**-76,694**
4	W	35	1.31	60	115.2%	59.8%	24.7	-96,322
5	W	30	1.26	65	100.3%	54.0%	20.3	-67,463
6	W	40	1.37	65	130,1%	65.3%	20.3	-80,813
7	W	35	1.31	70	115.2%	59.8%	15.9	-54,270

Table 5.8: Results (for Women) under the Base Case Scenario when W_c is 100% higher than W_a and p=2

	Gender	Years of service to retirement	Average wage as proportion of basic (minimum) wage	Retirement age	Replacement rate of average SS wage (r)	Replacement rate of last salary of retiree	Life expectancy at retirement age	PV of deficit
		1	2	3	4	5	6	7
1	W	30	-	55	70.0%	70.0%	29.3	-201,833
2	W	30	1.26	55	138.8%	54.0%	29.3	-133,651
3	**W**	**25**	**1.21**	**60**	**114.0%**	**47.7%**	**24.7**	**-102,258**
4	W	35	1.31	60	153.6%	59.8%	24.7	-128,430
5	W	30	1.26	65	133.8%	54.0%	20.3	-89,951
6	W	40	1.37	65	173.4%	65.3%	20.3	-107,750
7	W	35	1.31	70	153.6%	59.8%	15.9	-72,360

While it appears that it is the well-off men that are receiving the largest amount of subsidy from either the government or the young contributors to the SSS system, this is somewhat misleading. It is the well-off widows of the well-off male pensioners who are

pushing up the cost of the male pension plans under the SSS system. If we consider the case below in Table 5.9 of a woman earning three times the standard wage to start with. The amount of subsidy she potentially receives ranges from 100 thousand euros to 200 thousand euros (Table 5.9, column 7). The comparable numbers for a male worker earning the same salary through their working life are 185 thousand to 261 thousand (Table 5.5, column 7). The differences between the woman and men subsidies of between 61 thousand and 85 thousand euros are the cost of providing the spousal benefits to the widows of the high earning male workers.

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

Table 5.9: Results (for Women) under the Base Case Scenario when W_c is 200% higher than W_a and p=3

	Gender	Years of service to retirement	Average wage as proportion of basic (minimum) wage	Retirement age	Replacement rate of average SS wage (r)	Replacement rate of last salary of retiree	Life expectancy at retirement age	PV of deficit
		1	2	3	4	5	6	7
1	W	30	-	55	70.0%	70.0%	29.3	-302,750
2	W	30	1.26	55	200.7%	54.0%	29.3	-200,476
3	**W**	**25**	**1.21**	**60**	**171.0%**	**47.7%**	**24.7**	**-153,387**
4	W	35	1.31	60	230.4%	59.8%	24.7	-192,645
5	W	30	1.26	65	200.7%	54.0%	20.3	-134,926
6	W	40	1.37	65	260.1%	65.3%	20.3	-161,625
7	W	35	1.31	70	230.4%	59.8%	15.9	-108,540

For those females who work outside of the household, they will have their own set of SSS pension benefits, and if their husband dies before they do, which is likely, the widows get to enjoy both their own pension plus the survival benefits of their deceased husband's pension. In this case they enjoy the subsidy of, say 80 thousand euros, in present value terms on their own pension plan, plus another subsidy of 61 to 85 thousand euros from the subsidy given to their ex-husband's pension plan to pay for their survival benefits. In addition, these benefits are particularly important to those widows that have enjoyed a higher family income while their husband was alive.

5.5 Contribution Rates and Social Security Pension System Sustainability as a Funded Pension System

We now turn to the analysis of the final element is the pension formula and that is the rate of contribution or the proportion of the annual salaries that employees and employers pay to fund the pension benefits received by the retired members of the SSS system. Under the new SSS system the combined contribution of the employee and the

employer that goes toward the funding of the retirement pensions is 12.5% of the individual's declared income for purposes of social security. We now ask, what is the contribution rate that would enable the TRNC Social Security Administration to fully prefund the retirement benefits of individuals if the retirement age were 60 or alternatively 65 years of age and the years of service in which they contributed to their retirement fund ranged from 25 to 40 years. The results of these simulations are presented in Table 5.10.

Table 5.10: Contribution Rates Yielding a Zero Present Value of Lifetime Liability of Pension Plan (at a discount rate of 3%)

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

The rate of contribution through the working life of male and female individuals that would be necessary to fund the benefits promised by the SSS system are shown in Table 5.10 columns 3 and 4. For those wishing to retire at age 60 after working for 25 years the required contribution rates for men and women would be 42.3 and 38.5%, respectably, of earnings during their working life that is covered by the SSS pension system. This would require a 238 % and 200% increase in the contribution rates of men and women, respectively, over what is now required by the SSS system. If the man or woman were to work of 35 years and retired at age 60 then the contribution rates that would be required to finance the pension benefit promised by the SSS system would be 38.5 and 34.6% or increases of 200 and 176%, respectively.

If the retirement age were raised to 65 years, as is common around the world, and worked 30 years before retirement, then the contribution rate required to cover the pension benefit promises would need to be 36.6% for men and 31% for women. Finally, if these individuals retired at 65 years of age after working 40 year, the normal situation in countries such as Canada or the US, then the required contribution rates would need to be increased to 33.6 and 28.3% or increases of 168 and 124%, respectively.

From this analysis it suggests that the contribution rates would need to be increased probably far above what people are willing to pay for their future, and uncertain, pension benefits. Evasion in paying the higher contribution rates would likely become widespread. Hence, a comprehensive reform of the SSS system is required that will reform all three key aspects of the SSS rules, namely; increase the age of retirement, reduce the generous benefit formulae still further and require a greater contribution to be made by the participants in the plan. The only other alternative is to continue with substantial budget support of the SSS system from the government of Turkey.

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

to 4%. To test out the sensitivity of the estimations above of the funding requirements of the SSS system in the TRNC the estimations reported are all carried out once again using a real discount rate, or assumed rate of return on invested contributions of 4%. The results are presented Table 5.11.

Table 5.11: Contribution Rates Yielding a Zero Present Value of Lifetime Liability of Pension Plan (at a discount rate of 4%)

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

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

For women the estimated rate of contribution, averaged over the four cases, is 27.25%, requiring an increase of 128% on top of the current rate of SSS contributions. This increase is about 17% less than the average required increase in the contribution rates when the assumed future rate of return on invested contributions was 3%. Even when making an optimistic assumption about the rate of return of invested funds, the contribution rates required to fund the generous pension promises of the SSS system would require massive increases of contribution rates to the order of 230% of what they are now.

5.6 Impact of Temporary Workers on Pensions

From the analysis above one can see the tremendous benefit that the temporary workers coming to work in Northern Cyprus from Turkey have in relieving the burden of the SSS system. While they are in Northern Cyprus they are contributing to the SSS pension fund, but they receive no pension benefits from the TRNC when they leave before retirement. The pension credits they earn in the TRNC allow them to enhance their pensions in Turkey without any cost to the TRNC SSS system. In addition, because they do not stay in the TRNC to retire they do not have to be subsidized to collect the pension benefits that have been promised to them by the SSS rules.

In this section, however, we want to examine whether a large increase in the number of temporary workers, for example to meet the needs of a construction boom, would affect the pension entitlements of those North Cyprus workers who are retiring at the same time. The presence of the temporary workers who come and earn the basic wage, but accrue no seniority premium, will have two offsetting impacts on the pension rights of those seeking to retire in the TRNC. First, because these workers are an additional block of low income workers, they will have lower than average wages on which a person's replacement rate is based. Second, this additional number of temporary workers will lower the average wage in the economy that is used to benchmark the wage of the person going to retire and hence increased the value of the parameter p used in the pension formulae.

First, the base case is considered with no temporary workers present in the calculation of both p and F.

CASE A: Without Temporary Workers:

Labour Force = 50,952 (only permanent workers)

Total Wages = 50,952 * 1.34 * basic (minimum) wage = 68,276 basic (minimum) wages

F = 68,276 / 50,952 = 1.34

CASE B: With 11,232 Temporary Workers:

Labour Force = 50,952 (permanent workers) + 11,232 (temporary workers) = 62,184

Total Wages = 68,276 + (11,232 * 1) = 79,508 basic (minimum) wages

F = 79,508 / 62,184 = 1.28

CASE C: With 22,464 Temporary Workers:

Labour Force = 50,952 (permanent workers) + 22,464 (temporary workers) = 73,416

Total Wages = 68,276 + (22,464 * 1) = 90,740 basic (minimum) wages

F = 90,740 / 73,416 = 1.24

As we can see from the calculations for cases B and C above, the new temporary workers enter the system with the lowest starting wage without the age-earnings premium. This decreases the general average monthly wage of the labour force. However, this increases the *p* for a typical pensioner by the same proportion. Therefore, the present value of the cost of this individual to the system does not change, no matter

what the W_c/W_p ratios are. There is no indirect impact of the size of the temporary workers on the pension benefits enjoyed by those who are retiring under this system.

However, the direct impact of the contributions of these temporary workers decreases the overall burden of the SSS on the budget as these workers make pension contributions that are directly proportional to the number of temporary workers who are working in the TRNC. They make contributions but do not draw pension benefits from the system.

Chapter 6

IMPLICATIONS OF ANALYSIS FOR PENSION AND ECONOMIC POLICIES IN THE TRNC

The results of the analysis carried out separately for civil servants, the private sector participants in the SIS and the new SSS system are now combined, and their implications for future pension and fiscal policies are discussed.

An important feature of the publicly sponsored pension systems of a country is the overall fiscal burden they impose on the public finances of a country over time. A characteristic of such pensions systems is that while the promises of pension benefits are made at an early stage in their evolution, their cash costs only grow through time as the system matures when more of the participants of the plan move from being contributors to beneficiaries of the system.

It is 35 years since the social security systems were set up in Northern Cyprus so they are now well into their mature state. Also until about 2005, high and variable rates of inflation have been the dominant economics variable that has affected both the value of the contributions and the payouts of the system. Prefunding of such pension in Turkish Liras was impossible; hence, the structure of the pension system was designed on a Pay-as-you-go (PAYGO) basis.

Unlike funded pension plans, a PAYGO system does not require that actuarial estimates be made on a regular basis of the funding requirements of the plan. Such actuarial calculations would tell the sponsor(s) of the plan how much they need to invest now in order to be able to meet the obligations they have promised through the rules of the plan. A PAYGO system instead tries to pay the current benefit payouts from the contributions collected from current workers. However, that does not lessen the economic burden of the pension system on the non-pensioned residents of the society; it just shifts the burden over time.

Earlier in chapters 3 and 4 actuarial estimates were made separately of the present value of the deficits of the historical civil service and social insurance systems under a wide range of assumptions. The present value of the deficits associated with the existing pensioners and members of these pension plans expressed in 2009 euro values is 17.7 billion in total. This is made up of 7.3 billion in deficit for the civil servants and 10.4 billion for the members of the SIS system, including the contributions of the new entrants. Here they are brought together in Table 6.1 for the base case assumptions and reported as a proportion of GDP.

Under the base case assumption where the retirement ages for the existing contributors in both civil service and social insurance systems the ratio of the deficit to GDP is 668%. This number is almost three times higher than the EU average of 217% (European Commission, 2006). According to the 2005 estimates of the European Commission, the highest ratios in the EU were 246% for Portugal and 237% for France. Mylonas and Maisonneuve (1999) in an OECD working paper reported that this ratio was over 200%

for Greece. Gokhale (2009) estimated the ratio of total government implicit liabilities to GDP in these countries (this includes many additional items such as conventional government financial debt, and future costs associated with their health systems to be 549% for France, 492% for Portugal and 875% for Greece. In the same Cato Institute study by Gokhale, the average ratio of the all of the various fiscal imbalances to GDP in the EU area was recorded to be 434% in 2004.

As can be seen from the table below, the ratio of pension liabilities alone to GDP for in the TRNC is 54% bigger than the average of the ratio of all the fiscal imbalances to GDP for the countries in the EU.

One possible way of reducing this ratio for the TRNC would be to increase the retirement age from 55 to 60 (the current law for new entrants into the SSS system) or to 65 (the EU target retirement age) for the existing contributors of the historical civil service and SIS systems. The analysis reported in Table 6.1 rows 2 and 3 shows that such changes in the pension plan rules would decrease the ratio of the present value of deficit to GDP from 668% to 643% and to 573%, respectively. Although a decrease of about 25% and 95% of GDP is a significant change, such a policy decision alone does not solve the problem of the massive liabilities facing future taxpayers in the TRNC. Other aspects of pension promises or rules will also be needed to be taken into consideration if this burden is to be greatly reduced.

Table 6.1: Ratio of Present Value Total Liability of the Current Civil Service, Social Insurance and Social Security Pension Systems to GDP (2009) for Different Retirement Ages

Retirement Age	CSPS	SIS and SSS	TOTAL
55	276%	392%	668%
60	275%	368%	643%
65	268%	305%	573%

In making these estimates, an appropriate financial rate of discount must be selected. The results reported in Table 6.1 used a real (net of inflation) discount rate of 3%, a rate that reflects the average real discount rate used by actuaries estimating the present value of such pension liabilities in Europe (Queisser and Whitehouse, 2006 and Brown, Clark and Rauh, 2011). To check on the sensitivity of the results for the TRNC the above estimates were recalculated using real discount rates from 2 to 4%. For the case when the discount rate is sent at 2%, the ratio of the present value of the pension liabilities to GDP rises to 849% from the base case of 668%, and for a 4% real discount rate the ratio falls to 535% of GDP (Table 6.2 column 4).

Table 6.2: Ratio of Present Value Total Liability of the Current Civil Service, Social Insurance and Social Security Pension Systems to GDP (2009) for Different Discount Rates

Discount Rate	CSPS	SIS and SSS	TOTAL
4.00%	226%	309%	535%
3.50%	249%	347%	596%
3.00%	276%	392%	668%
2.50%	306%	444%	750%
2.00%	342%	507%	849%

In conducting the estimates reported in this chapter the assumed rate of real growth of GDP over the next 40 years is assumed to be equal to the historical average for the TRNC of 4.61%. This is a rather high growth rate to assume for such a long period of time, while at the same time it is assumed that real wages would only be growing on

average at a real rate of 2 %[39]. This base case assumption might be unrealistically low if the labor force is not growing rapidly, and maybe too high if the growth in GDP is coming to a large extent by immigration and the subsequent expansion in the labor force.

To test out the sensitivity of the estimates to various rate of the real growth in the wages of individuals (in addition to the seniority premiums), within the constraint of a 4.61% growth in GDP, the analysis has been conducted using real rates of growth of real wages from the extreme of 0% on the low side to a high rate of real growth rate of 3%. In each of these cases the assumption is made that after retirement the pensions are only maintained at the constant real value (full adjustment for inflation only) they were at the point of retirement.

The results (Table 6.3 column 4) show that with a 3% real growth in wages (similar to what has been the actual practice in the past in the TRNC) the ratio of the present value of the pension liabilities to GDP would increase from 668% to 727%. Alternatively, if the real wages of individuals grew at 0% (nominal wages grew at the rate of inflation) then this ratio would fall to 571%. The liabilities would still be far above the EU average. It is clear that in order to address the size of the liabilities, other more fundamental changes are required.

[39] The growth in real wages due to seniority increases does not increase the average real rate of growth of wages for the economy. Each year people retire with high wages while new entrants enter the labor force with relatively low wages. The seniority premiums are thus offset in the economy's total wage bill by the process of retirees from labor force and new hires. Of course, this only holds exactly if the size of the overall labor force is not changed

Table 6.3: Ratio of Present Value Total Liability of the Current Civil Service, Social Insurance and Social Security Pension Systems to GDP (2009) for Different Rates of Growth in Real Wage Rates

Growth in Real Wage Rates	CSPS	SIS and SSS	TOTAL
3.00%	302%	425%	727%
2.00%	276%	392%	668%
1.00%	254%	362%	616%
0.00%	235%	336%	571%

Note: The growth in real wages is in addition to seniority premium, the seniority premiums are for civil servants 1.75% for men and 2.00% for women, for private sector, they are 2.33% for men and 1.55% for women.

In the TRNC, the indexing formulae for pension benefits after retirement are not well defined in law. In practice the pensioners obtained full indexation for inflation plus a real increase in wages equal to what members of the labor force got. This averaged to be approximately 2 or 3% a year real increase.

Table 6.4 shows the dramatic effect of changing the indexation formulae for the monthly pension benefits after retirement. If the average real growth rate is 2% (the assumed average growth in real wages) then the present value of the deficit to GDP raises from 668 % to 915% an increase of 247% of GDP. If the real increase in pension benefits given by the government is 3% then the ratio increases to 1088% or an increase of 420% of GDP. These results point out how critical this variable is to the overall fiscal burden of the pension system. As it is often a political ploy to raise pension benefit prior to an election, we can see how damaging this practice can become to future generations of taxpayers who are saddled with this burden for years to come.

Table 6.4: Ratio of Present Value Total Liability of the Current Civil Service, Social Insurance and Social Security Pension Systems to GDP (2009) for Different Rates of Adjustment in the Real Value of Pension Benefits

Adjustment in Real Value of Pension Benefits	CSPS	SIS and SSS	TOTAL
4.61%	540%	922%	1,462%
4.00%	486%	813%	1,299%
3.00%	416%	672%	1,088%
2.00%	358%	557%	915%
1.00%	312%	465%	777%
0.00%	276%	392%	668%
-1.00%	245%	330%	575%

Note: In this table, it is assumed that pensions will be adjusted for the rate of domestic inflation in addition to any real adjustment in the amount of pension benefit.

Thus far the analysis has dealt with the long term implications of the pension systems in the TRNC. The examination will now focus on the impact on the annual budgets of the TRNC in the immediate time horizon as well over longer time spans. Adding together the annual fiscal burdens of the civil service with the SIS and SSS systems, it is found that in 2015 the amount of the deficit of the combined systems will absorb 56.16% of all the tax revenues raised by the tax system in the TRNC. For the next 15 years, until 2030, it is expected that the subsidy will continue to be above 50% of tax revenues, and for the next 20 will move along a decreasing trend until in 2045, it reaches 19.94% of the total tax revenues. After this year, the ratio is expected to increase again as the new entrants to the new SSS system will start retiring and drawing pension benefits.

This means that unless Turkey is willing to expand its contribution to fund the public sector budget of TRNC or drastic action will be forced on the TRNC budget makers to continue funding the TRNC pension systems. Such options are rather limited and include the cutting of the wage bill of the public sector (that is bloated with excess

hires), and/or all public sector enterprises that are incurring losses (for social or non-social reasons) to be put on a private for-profit basis.

Expressed as a ratio of GDP, the budgetary subsidy to the pension systems ranges from 14.07% of GDP in 2015 to 11.88% in 2035 and to 5% in 2045. This reflects the proportion of GDP that needs to be allocated, essentially to the consumption of the elderly (or not so elderly) in the TRNC. In order for the country to grow it will need to make investments. Hence, if additional capital accumulation is to take place it will be critical to encourage foreign investment or to receive fiscal transfers from Turkey to offset this dramatic transfer of resources to TRNC pensioners.

Table 6.5: Total Annual Pension Deficit (APD) / Tax Revenue & Total Annual Pension Deficit / GDP Ratio

	APD / TAX REVENUE	**APD / GDP**
2015	56.16%	14.07%
2020	55.31%	13.86%
2025	53.97%	13.62%
2030	52.85%	13.24%
2035	47.42%	11.88%
2040	32.04%	8.02%
2045	19.94%	5.00%

Another problem that many European and other advanced countries are facing is the aging of their overall populations. The demographic trends are such that people are living longer, hence, drawing pension benefits longer, while the labor force is not growing in a corresponding fashion to support such a growing population of pensioners. The demographics in the TRNC are such that by 2015, just three years from now, there will be only two members of the labor force supporting one pensioner. In Europe, which has long recognized this trend as being a serious problem, the support ratio currently is

slightly more than 3.5 labor force member per pensioner (Germany 3.5, France 3.5, UK 3.6 Spain 3.7, Greece 3.4, Netherlands 4.0, and Turkey 9.8, Economist 2011).

The TRNC as a small country is attractive to immigrants and workers. However, if it wishes to solve this problem through immigration it with have to change a number of its current policies. For example, Canada has increased its population through immigration by about 1% each year for the past 50 years. Similarly, cities such as New York and Toronto have experienced very rapid changes in population over time, through immigration. However, the nature of the population, and the culture of the region has also changed a great deal in the short run, but perhaps less in the longer run. Canada has experience massive inflows of immigrants in the past that now make up what known as Canadian culture. This is an option that the TRNC will have to face very soon. At the present time there are labyrinths of regulations that discriminate against non-citizens in the operation of businesses or employment. If the government and the current TRNC residents have any plans for fixing the support ratio problem in this way, they will have to re-examine these policies carefully.

Table 6.6: Support Ratios for the TRNC

	2015	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
Dependency Ratio (with 2%)	2.18	2.06	1.92	1.96	1.90	2.19	2.57
Dependency Ratio (w/out 2%)	2.00	1.74	1.49	1.39	1.24	1.30	1.40

Table 6.6 shows the likely effects of a policy change on the support ratio. A policy that results in keeping the growth of labor force constant over time would yield a ratio of 1.40 contributors per a retiree by 2045. This would cause serious fiscal problems over the existing ones. However, a 2% increase in the labor force would improve the ratio from 2.18 in 2015 to 2.57 in 2045. This improvement comes from the increase in the

permanent members of the labor force. In addition to this, if appropriate policies are implemented to increase the number of temporary workers, with no pension rights, the support ratio is expected to improve further and approach the EU average over time.

In 2008 the TRNC undertook a reform of both its Civil Service pension systems and its private sector coverage through the Social Insurance System. A new pension plan was constituted, the Social Security System (SSS), to which all new employees in both the civil service and the private sector would become participants. The SSS system implemented a series of significant reforms that are examined in detail in chapter 5.

To see if the reforms went deep enough to make it long run sustainable a set of actuarial estimations were carried out to determine if the contributions over a participants working life would be sufficient to finance the pension promises through a fully funded pension plan. To carry out these estimations a real rate of return (or a discount rate) of 3% has been used.

Table 6.7: Present Value Cost of a Pensioner under the New SSS Pension System at Different Starting Wage Rates (euros 2009)

Income Level	Men	Women
$\mathbf{W_c = W_a, p=1}$	64,601	51,129
$\mathbf{W_c = 1.5W_a, p=1.5}$	96,901	76,694
$\mathbf{W_c = 2W_a, p=2}$	129,201	102,258
$\mathbf{W_c = 3W_a, p=3}$	193,802	153,387

In Table 6.7 the results of these estimations are reported by income level. For individuals who start their employment earning just the average starting wage, p=1, or 670 euros per month in 2009 prices, the present value of the funding deficit for men is 64,601 euros, and for women, 51,129 euros. The present values of the funding shortfalls

increased to 193,802 euros and 153, 387 euros, for men and women, respectively, when their initial starting salaries were 3 times the average starting salary in the country, or 2010 euros per month. Not only is the new system not fiscally neutral, but it provides a proportionally higher subsidy to high income works relative to the subsidy given to lower income workers. This is an odd design, as usually in most countries of the world the first tier of pensions that are designed to give minimum income support in old age receive greater public support than the pensions of better off individuals. In the reformed SSS system in the TRNC, the opposite appears to have been the guiding policy.

A further examination of the SSS allows us to estimate what would be the required contribution rates, expressed as a percentage of wages that would equate the present value of contributions to the present value of the pension benefits. In Table 6.8 the contribution rates required to fund the basic system that is now law, where people retire at age 60 with 25 years of experience, would be between 33.5% and 42.3% for men and 30.7% and 38.5% for women. This is compared to the legal contribution requirement of 12.5%. In Europe the simple average rate of the contribution rates is 25%. (European Commission 2007 and OECD 2005)

Given the weak administration for the enforcement of tax payments in the TRNC, it is highly unlikely that such contribution rates would be voluntarily made by participants if the systems remained as a PAYGO system where the individuals' pension benefits are not tied directly to the amount of the contributions they make. There might be some chance of raising the rates substantially if the pension system were a defined

contribution system where the participants had an actual claim on the contractual savings made through this avenue.

This leads to the policy consideration that perhaps the TRNC should consider the development of policies that would allow its residents to receive tax deductions if they contribute to private pension plans that adhere to certain standards instead of contributing only to the public system. Such a provision was part of the pension reforms implemented in the UK. The advantage of such private defined contribution plans is that they are portable. A resident of the TRNC would not lose pension benefits if they moved from the TRNC on either a temporary or permanent basis. Given the nature of employment in a globalized world, and the very small size of the TRNC, such a pension system would be of great benefit to TRNC citizens. Already today, many TRNC professionals move out of the TRNC to work for a number of years. At the present time there is no effective way to continue in the same pension system when one's career objectives are best served by movements across labor markets.

Hence, in addition to increasing the retirement age and reducing the pension benefit formulae, it might be welfare improving if the opportunity were given for people to opt partially or wholly out of the public PAYGO system. However, in its present very subsidized state, few informed people are likely to want to leave the PAYGO system. However, already 15 countries have taken this route for pension reform, including Poland and Sweden (Pinera, 2001)

Table 6.8: Contribution Rates as a percentage of Gross Wages Yielding a Zero Present Value of Lifetime Liability of the SIS Pension Plan (at discount rates of 3% and 4%)

Discount Rate	Men	Women
3%	42.3%	38.5%
4%	33.5%	30.7%

In terms of mobility of labor markets, the TRNC provides a very fertile set of work opportunities for a wide range of skilled and unskilled workers from Turkey. As discussed previously, these workers pay social security contributions and their pension years of service earned in the TRNC are recognized as years of service by the Social Security System of Turkey. However, Turkey presently does not require the Social Security System of the TRNC to transfer the contributions made to the TRNC SIS or SSS systems to its Social Security System when the person becomes eligible for a pension benefit in Turkey.

On theoretical solution to the SSS problems in the TRNC would be to encourage more workers to come from Turkey on temporary bases. In table 6.9 the estimates are reported on the present value of the contributions made by the estimated current stock of temporary workers, 11,232, and it this stock were increased up to 25,000 workers. The present value of these contributions ranges from 370 million euros with 11,232 temporary workers, to 824 million if the TRNC relaxed its work permit regulations to allow 25,000 to work in the TRNC at any given time.

Table 6.9: Present Value of Contributions by Different Stock of Temporary Workers to the SSS Pension System

Stock of Temporary Workers	PVCTW
11,232	**370,299,718**
15,000	494,524,196
20,000	659,365,594
25,000	824,206,993

Given the magnitudes of the deficit of the TRNC pension system, it is clear that the benefits that the TRNC would receive through inviting a much larger stock of temporary workers to join the labor force in the TRNC will not significantly alleviate the problems created by the historical pensions systems, or those about to be created by the new SSS system. A more fundamental restructuring of the pension systems is required for sustainability of the old age support system and the fiscal solvency of the country.

Furthermore, if such a large proportion of the GDP of the TRNC is been allocated to support the non-working population of the TRNC, it will be necessary to bring large amounts of foreign capital and foreign ownership for the economy in order to achieve a rate of capital accumulation that is necessary to have an acceptable rate of future economic growth in the TRNC. The fiscally unsustainable civil service and social security pensions systems that were created to give TRNC citizens an incentive to stay on the Island during its years of uncertainty have created financial and fiscal pressures that are the driving forces behind major policy decisions concerning population, social and budgetary finances that are likely to reshape the nature of the TRNC society for decades to come.

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APPENDICES

Appendix A: Life Expectancy in 1990, 2000 and 2009 and Probability of Dying for Cyprus (World Health Organization, 2011)

MALE

Time Period	Age Group	nMx - age-specific death rate between ages x and x+n	nqx - probability of dying between ages x and x+n	lx - number of people left alive at age x	ndx - number of people dying between ages x and x+n	nLx - person-years lived between ages x and x+n	Tx - person-years lived above age x	ex - expectation of life at age x
2009	<1	0.00454	0.00452	100000	452	99593	7822847	78.2
	1-4	0.00004	0.00016	99548	15	398154	7723253	77.6
	5-9	0.00012	0.00062	99532	61	497509	7325099	73.6
	10-14	0.00014	0.00071	99471	70	497180	6827590	68.6
	15-19	0.00078	0.00389	99401	387	496037	6330410	63.7
	20-24	0.00059	0.00295	99014	292	494340	5834373	58.9
	25-29	0.00094	0.00468	98722	462	492455	5340032	54.1
	30-34	0.00113	0.00562	98260	552	489920	4847577	49.3
	35-39	0.0009	0.0045	97708	439	487442	4357656	44.6
	40-44	0.00167	0.0083	97269	807	484325	3870214	39.8
	45-49	0.00211	0.0105	96461	1012	479776	3385889	35.1
	50-54	0.00324	0.01607	95449	1534	473409	2906113	30.4
	55-59	0.00545	0.02691	93915	2527	463256	2432704	25.9
	60-64	0.01056	0.05146	91388	4703	445182	1969448	21.6
	65-69	0.01524	0.0734	86685	6363	417519	1524265	17.6
	70-74	0.0271	0.1269	80323	10193	376131	1106746	13.8
	75-79	0.04532	0.20352	70130	14273	314967	730615	10.4
	80-84	0.08681	0.35666	55857	19922	229480	415648	7.4
	85-89	0.15398	0.5559	35935	19976	129735	186168	5.2
	90-94	0.25286	0.71893	15959	11473	45375	56433	3.5
	95-99	0.38444	0.81952	4486	3676	9562	11058	2.5
	100+	0.54117	1	810	810	1496	1496	1.8

2000	<1	0.00548	0.00545	100000	545	99509	7490337	74.9
	1-4	0.00027	0.00109	99455	108	397561	7390828	74.3
	5-9	0.00014	0.00071	99347	71	496558	6993267	70.4
	10-14	0.00021	0.00105	99276	104	496119	6496709	65.4
	15-19	0.00086	0.00428	99172	425	494796	6000590	60.5
	20-24	0.00112	0.00559	98747	552	492354	5505795	55.8
	25-29	0.00183	0.00912	98195	896	488734	5013441	51.1
	30-34	0.00075	0.00375	97299	365	485581	4524708	46.5
	35-39	0.00123	0.00615	96934	596	483178	4039127	41.7
	40-44	0.0017	0.00845	96337	814	479651	3555949	36.9
	45-49	0.00332	0.01646	95523	1573	473684	3076298	32.2
	50-54	0.00392	0.0194	93950	1823	465195	2602614	27.7
	55-59	0.00797	0.03909	92127	3601	451634	2137420	23.2
	60-64	0.01409	0.06805	88526	6024	427570	1685786	19
	65-69	0.01791	0.08569	82502	7070	394835	1258216	15.3
	70-74	0.03498	0.16084	75432	12132	346830	863381	11.4
	75-79	0.06463	0.27821	63300	17610	272473	516551	8.2
	80-84	0.14165	0.52302	45689	23897	168706	244078	5.3
	85-89	0.26647	0.79964	21793	17426	65398	75372	3.5
	90-94	0.43028	0.93913	4366	4101	9530	9974	2.3
	95-99	0.59639	0.96586	266	257	430	443	1.7
	100+	0.70956	1	9	9	13	13	1.4
1990	<1	0.01196	0.01183	100000	1183	98935	7385381	73.9
	1-4	0.00042	0.00167	98817	165	394872	7286445	73.7
	5-9	0.0003	0.00152	98652	150	492884	6891574	69.9
	10-14	0.00025	0.00126	98502	124	492199	6398689	65
	15-19	0.00074	0.00368	98378	362	490984	5906490	60
	20-24	0.00119	0.00593	98016	581	488626	5415506	55.3
	25-29	0.00105	0.00525	97435	511	485894	4926880	50.6
	30-34	0.00073	0.00366	96923	354	483729	4440986	45.8
	35-39	0.00144	0.00715	96569	691	481117	3957257	41
	40-44	0.0019	0.00948	95878	909	477118	3476140	36.3
	45-49	0.00213	0.01059	94969	1006	472331	2999022	31.6
	50-54	0.00632	0.03113	93963	2925	462504	2526691	26.9
	55-59	0.00782	0.03833	91038	3489	446469	2064187	22.7
	60-64	0.0165	0.07925	87549	6939	420400	1617717	18.5
	65-69	0.02263	0.1071	80611	8633	381470	1197318	14.9
	70-74	0.03645	0.16702	71977	12022	329833	815848	11.3
	75-79	0.07509	0.3161	59956	18952	252399	486015	8.1
	80-84	0.13559	0.50632	41004	20761	153116	233616	5.7
	85-89	0.22505	0.72011	20243	14577	64771	80500	4
	90-94	0.34333	0.84565	5666	4791	13955	15729	2.8
	95-99	0.48144	0.89652	875	784	1629	1774	2
	100+	0.62051	1	90	90	146	146	1.6

FEMALE

Time Period	Age Group	nMx - age-specific death rate between ages x and x+n	nqx - probability of dying between ages x and x+n	lx - number of people left alive at age x	ndx - number of people dying between ages x and x+n	nLx - person-years lived between ages x and x+n	Tx - person-years lived above age x	ex - expectation of life at age x
2009	<1	0.00184	0.00183	100000	183	99835	8301370	83
	1-4	0.00007	0.00027	99817	27	399202	8201535	82.2
	5-9	0.0001	0.00052	99790	52	498819	7802333	78.2
	10-14	0.00004	0.00021	99738	21	498636	7303514	73.2
	15-19	0.00022	0.00112	99716	111	498304	6804878	68.2
	20-24	0.00009	0.00045	99605	45	497913	6306574	63.3
	25-29	0.00023	0.00115	99560	115	497513	5808661	58.3
	30-34	0.0004	0.00199	99445	198	496732	5311148	53.4
	35-39	0.00049	0.00246	99248	244	495628	4814415	48.5
	40-44	0.00087	0.00433	99003	429	493945	4318788	43.6
	45-49	0.00115	0.00574	98575	566	491459	3824843	38.8
	50-54	0.00178	0.00885	98009	868	487876	3333384	34
	55-59	0.00318	0.01576	97141	1531	481881	2845507	29.3
	60-64	0.00478	0.0236	95611	2256	472414	2363627	24.7
	65-69	0.00737	0.03617	93355	3377	458331	1891213	20.3
	70-74	0.01452	0.07004	89978	6302	434133	1432882	15.9
	75-79	0.03204	0.14833	83675	12411	387349	998749	11.9
	80-84	0.06524	0.28048	71264	19988	306351	611401	8.6
	85-89	0.12269	0.46945	51276	24072	196202	305050	5.9
	90-94	0.21306	0.64989	27204	17680	82982	108848	4
	95-99	0.34167	0.778	9524	7410	21687	25866	2.7
	100+	0.50601	1	2114	2114	4179	4179	2

2000	<1	0.00519	0.00516	100000	516	99535	7903110	79
	1-4	0.00025	0.00099	99484	99	397698	7803575	78.4
	5-9	0.00023	0.00114	99385	113	496643	7405877	74.5
	10-14	0.00015	0.00074	99272	74	496176	6909234	69.6
	15-19	0.00036	0.00178	99198	176	495552	6413057	64.6
	20-24	0.00061	0.00304	99022	301	494359	5917505	59.8
	25-29	0.00059	0.00296	98721	292	492876	5423146	54.9
	30-34	0.00043	0.00215	98429	211	491617	4930270	50.1
	35-39	0.00082	0.00409	98218	402	490084	4438654	45.2
	40-44	0.00083	0.00415	97816	406	488066	3948569	40.4
	45-49	0.00226	0.01123	97410	1094	484315	3460504	35.5
	50-54	0.00272	0.01352	96316	1302	478325	2976188	30.9
	55-59	0.003	0.0149	95014	1415	471532	2497863	26.3
	60-64	0.00569	0.02807	93599	2627	461426	2026331	21.6
	65-69	0.01007	0.04911	90972	4468	443689	1564905	17.2
	70-74	0.02431	0.1146	86504	9913	407737	1121216	13
	75-79	0.04401	0.19825	76591	15184	344993	713479	9.3
	80-84	0.11243	0.43882	61406	26947	239666	368485	6
	85-89	0.23744	0.74497	34460	25672	108120	128819	3.7
	90-94	0.41451	0.92379	8788	8119	19586	20699	2.4
	95-99	0.59824	0.96683	670	647	1082	1113	1.7
	100+	0.71377	1	22	22	31	31	1.4

1990	<1	0.00976	0.00967	100000	967	99130	7823167	78.2
	1-4	0.0003	0.0012	99033	119	395846	7724038	78
	5-9	0.00016	0.00082	98914	81	494368	7328192	74.1
	10-14	0.00009	0.00044	98833	44	494057	6833824	69.1
	15-19	0.00029	0.00145	98789	143	493590	6339768	64.2
	20-24	0.00032	0.0016	98646	158	492838	5846178	59.3
	25-29	0.00027	0.00135	98489	133	492112	5353340	54.4
	30-34	0.00026	0.00131	98356	129	491457	4861229	49.4
	35-39	0.00102	0.00508	98227	499	489887	4369771	44.5
	40-44	0.00094	0.0047	97728	459	487490	3879884	39.7
	45-49	0.00176	0.00878	97268	854	484205	3392395	34.9
	50-54	0.00289	0.01433	96414	1382	478614	2908189	30.2
	55-59	0.00488	0.02412	95032	2293	469428	2429575	25.6
	60-64	0.00661	0.03252	92739	3016	456157	1960147	21.1
	65-69	0.01028	0.05009	89723	4494	437382	1503991	16.8
	70-74	0.02607	0.12236	85229	10429	400074	1066609	12.5
	75-79	0.05486	0.24121	74800	18042	328896	666535	8.9
	80-84	0.11981	0.46099	56758	26165	218378	337639	5.9
	85-89	0.2272	0.72449	30593	22164	97555	119261	3.9
	90-94	0.37405	0.88129	8429	7428	19859	21706	2.6
	95-99	0.53465	0.93103	1001	932	1742	1846	1.8
	100+	0.66349	1	69	69	104	104	1.5

Appendix B: Econometric Analysis for Age-earnings Premium

$Y = \alpha + \beta 1X + \beta 2\ X^2 + \square$ where Y is the annual income and X is the age.

MEN, member of Civil Service

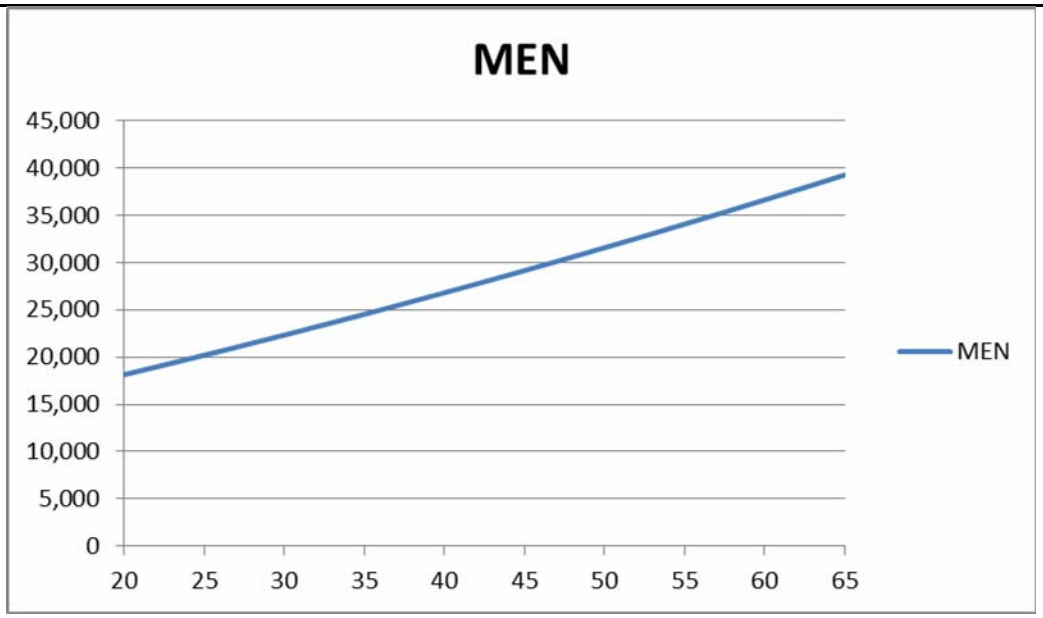
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.55
R Square	0.31
Adjusted R Square	0.31
Standard Error	5602.21
Observations	6407.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2.00	88508556367.46	44254278183.73	1410.06	0.00
Residual	6404.00	200987800901.93	31384728.44		
Total	6406.00	289496357269.40			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	10641.4	1533.91	6.94	0.00	7634.51	13648.4	7634.51	13648.45
X Variable 1	345.94	77.66	4.45	0.00	193.69	498.19	193.69	498.19
X Variable 2	1.45	0.96	1.51	0.13	-0.43	3.33	-0.43	3.33



Age	Growth in Real Wage Rate due to Seniority	Estimated Wage
19		17,738
20	2.27%	18,140
21	2.23%	18,546
22	2.20%	18,954
23	2.17%	19,365
24	2.14%	19,779
25	2.11%	20,196
26	2.08%	20,616
27	2.05%	21,039
28	2.02%	21,465
29	2.00%	21,893
30	1.97%	22,325
31	1.95%	22,759
32	1.92%	23,197
33	1.90%	23,637
34	1.87%	24,080
35	1.85%	24,526
36	1.83%	24,975
37	1.81%	25,427
38	1.79%	25,881
39	1.77%	26,339
40	1.75%	26,799
41	1.73%	27,263
42	1.71%	27,729
43	1.69%	28,198
44	1.67%	28,670
45	1.66%	29,145
46	1.64%	29,623
47	1.62%	30,104
48	1.61%	30,588
49	1.59%	31,074
50	1.58%	31,564
51	1.56%	32,056
52	1.55%	32,552
53	1.53%	33,050
54	1.52%	33,551
55	1.50%	34,055
56	1.49%	34,562
57	1.48%	35,072
58	1.46%	35,584
59	1.45%	36,100
60	1.44%	36,619
61	1.42%	37,140
62	1.41%	37,664
63	1.40%	38,191
64	1.39%	38,722
65	1.38%	39,255

Average Age-earnings Premium: 1.75%

WOMEN, member of Civil Service

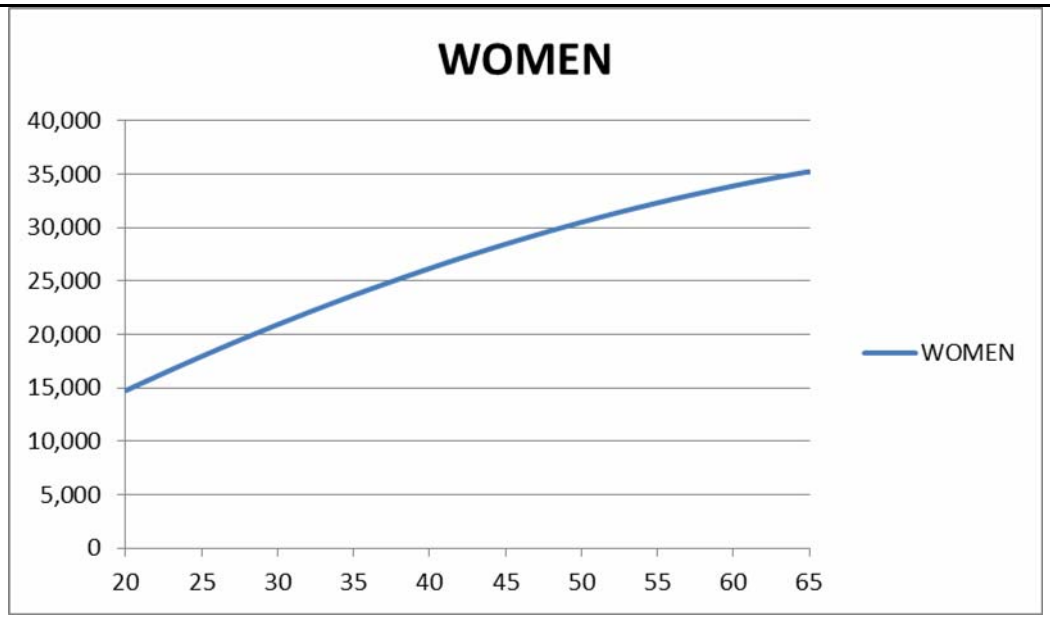
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.61
R Square	0.38
Adjusted R Square	0.38
Standard Error	4788.11
Observations	4589.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2.00	63818560961.61	31909280480.81	1391.84	0.00
Residual	4586.00	105138566424.38	22925984.83		
Total	4588.00	168957127385.99			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-395.79	1536.00	-0.26	0.80	-3407.09	2615.52	-3407.09	2615.52
X Variable 1	849.61	79.77	10.65	0.00	693.23	1005.99	693.23	1005.99
X Variable 2	-4.64	1.01	-4.59	0.00	-6.62	-2.66	-6.62	-2.66



Age	Growth in Real Wage Rate due to Seniority	Estimated Wage
19		14,073
20	4.75%	14,741
21	4.47%	15,401
22	4.22%	16,051
23	3.99%	16,692
24	3.78%	17,324
25	3.59%	17,946
26	3.42%	18,559
27	3.25%	19,163
28	3.10%	19,757
29	2.96%	20,343
30	2.83%	20,919
31	2.71%	21,485
32	2.59%	22,043
33	2.49%	22,591
34	2.39%	23,130
35	2.29%	23,659
36	2.20%	24,180
37	2.11%	24,691
38	2.03%	25,193
39	1.95%	25,685
40	1.88%	26,168
41	1.81%	26,642
42	1.74%	27,107
43	1.68%	27,562
44	1.62%	28,009
45	1.56%	28,445
46	1.50%	28,873
47	1.45%	29,291
48	1.40%	29,700
49	1.35%	30,100
50	1.30%	30,491
51	1.25%	30,872
52	1.20%	31,244
53	1.16%	31,606
54	1.12%	31,960
55	1.08%	32,304
56	1.04%	32,639
57	1.00%	32,964
58	0.96%	33,281
59	0.92%	33,588
60	0.89%	33,885
61	0.85%	34,174
62	0.82%	34,453
63	0.78%	34,723
64	0.75%	34,983
65	0.72%	35,235

Average Age-earnings Premium: 2.00%

MEN, member of Private Sector

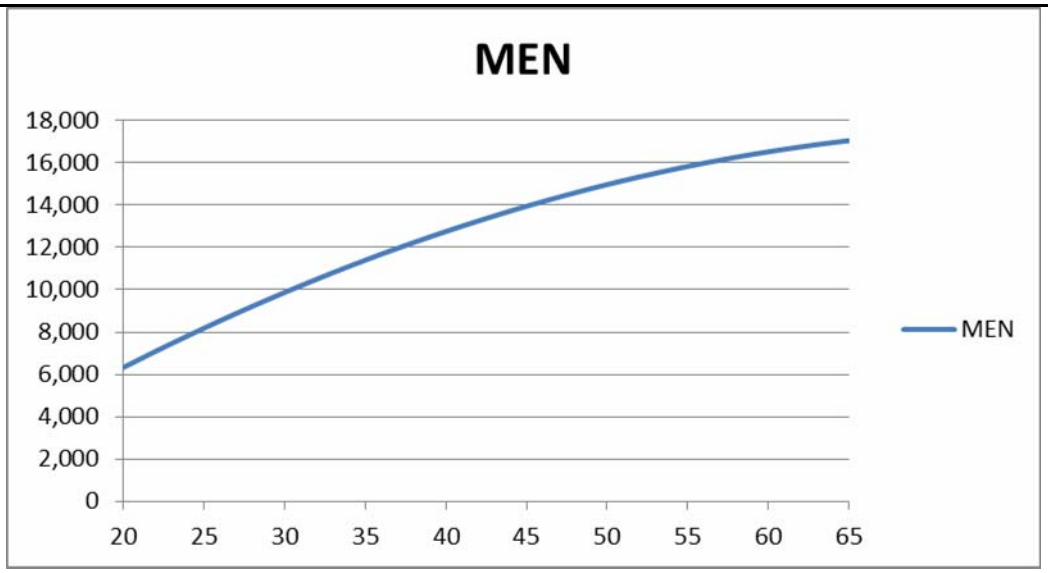
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.36
R Square	0.13
Adjusted R Square	0.13
Standard Error	6394.45
Observations	42253.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2.00	256788617986.36	128394308993.18	3140.07	0.00
Residual	42250.00	1727557929382.11	40888945.07		
Total	42252.00	1984346547368.47			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-2732.1	493.76	-5.53	0.00	-3699.98	-1764.4	-3699.98	-1764.40
X Variable 1	519.84	24.86	20.91	0.00	471.11	568.58	471.11	568.58
X Variable 2	-3.32	0.30	-11.10	0.00	-3.90	-2.73	-3.90	-2.73



Age	Growth in Real Wage Rate due to Seniority	Estimated Wage
19		5,948
20	6.57%	6,338
21	6.06%	6,722
22	5.61%	7,099
23	5.22%	7,470
24	4.87%	7,834
25	4.56%	8,191
26	4.28%	8,542
27	4.03%	8,886
28	3.80%	9,223
29	3.59%	9,554
30	3.39%	9,878
31	3.21%	10,196
32	3.05%	10,507
33	2.90%	10,811
34	2.75%	11,108
35	2.62%	11,399
36	2.49%	11,684
37	2.38%	11,962
38	2.27%	12,233
39	2.16%	12,497
40	2.06%	12,755
41	1.97%	13,006
42	1.88%	13,251
43	1.80%	13,489
44	1.71%	13,720
45	1.64%	13,945
46	1.56%	14,163
47	1.49%	14,374
48	1.42%	14,579
49	1.36%	14,777
50	1.30%	14,968
51	1.24%	15,153
52	1.18%	15,331
53	1.12%	15,503
54	1.06%	15,668
55	1.01%	15,826
56	0.96%	15,978
57	0.91%	16,123
58	0.86%	16,262
59	0.81%	16,393
60	0.76%	16,519
61	0.72%	16,637
62	0.67%	16,749
63	0.63%	16,854
64	0.59%	16,953
65	0.54%	17,045

Average Age-earnings Premium: 2.33%

WOMEN, member of Private Sector

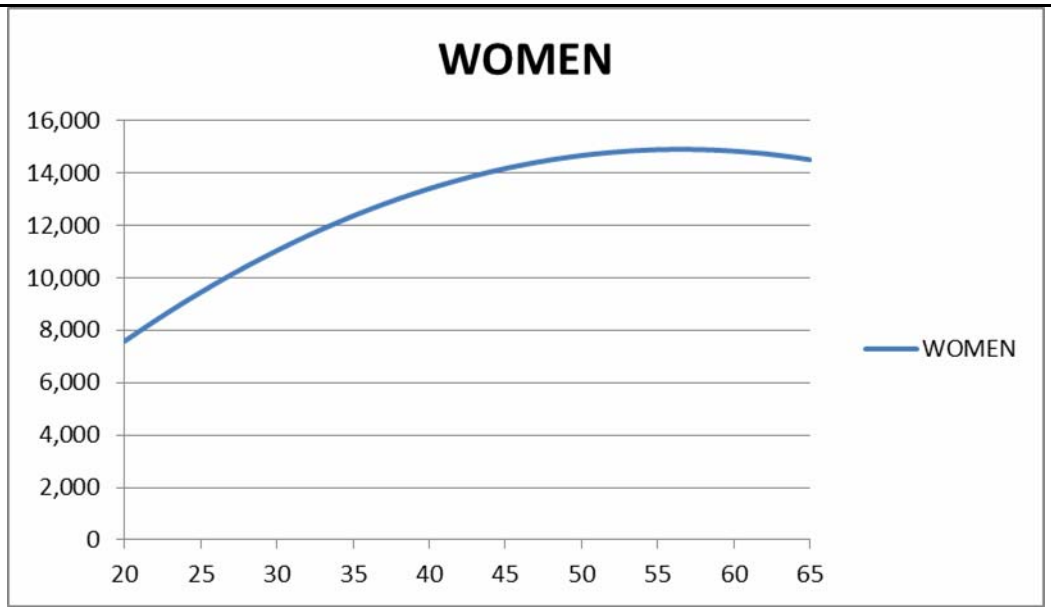
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.26
R Square	0.07
Adjusted R Square	0.07
Standard Error	6568.08
Observations	19601.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2.00	60536784799.29	30268392399.64	701.64	0.00
Residual	19598.00	845451664767.18	43139691.03		
Total	19600.00	905988449566.47			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-2615.9	769.27	-3.40	0.00	-4123.78	-1108.1	-4123.78	-1108.10
X Variable 1	619.75	38.97	15.90	0.00	543.36	696.13	543.36	696.13
X Variable 2	-5.48	0.47	-11.62	0.00	-6.41	-4.56	-6.41	-4.56



Age	Growth in Real Wage Rate due to Seniority	Estimated Wage
19		7,180
20	5.65%	7,586
21	5.21%	7,981
22	4.81%	8,365
23	4.46%	8,738
24	4.14%	9,101
25	3.86%	9,452
26	3.60%	9,792
27	3.36%	10,121
28	3.14%	10,439
29	2.94%	10,747
30	2.76%	11,043
31	2.58%	11,328
32	2.42%	11,603
33	2.27%	11,866
34	2.13%	12,119
35	1.99%	12,360
36	1.87%	12,591
37	1.74%	12,810
38	1.63%	13,019
39	1.52%	13,217
40	1.41%	13,403
41	1.31%	13,579
42	1.21%	13,744
43	1.12%	13,898
44	1.03%	14,040
45	0.94%	14,172
46	0.85%	14,293
47	0.77%	14,403
48	0.69%	14,502
49	0.61%	14,590
50	0.53%	14,667
51	0.45%	14,733
52	0.37%	14,789
53	0.30%	14,833
54	0.22%	14,866
55	0.15%	14,888
56	0.08%	14,899
57	0.00%	14,900
58	-0.07%	14,889
59	-0.15%	14,868
60	-0.22%	14,835
61	-0.29%	14,791
62	-0.37%	14,737
63	-0.44%	14,672
64	-0.52%	14,595
65	-0.60%	14,508

Average Age-earnings Premium: 1.55%

Appendix C: Three Pension Liabilities

1) *Accrued-to-date liabilities*: these represent the present value of pensions to be paid in the future on the basis of accrued rights; neither the future contributions of existing workers, nor the accrual of new rights by them are considered.

2) *Current workers and pensioners' net liabilities*: in this case it is assumed that pension schemes continue their "existence until the last contributor dies, while no new entrants are allowed"; both the future contributions of existing members and their new rights are therefore allowed for under current rules.

3) *Open-system net liabilities*: these also include the present value of contributions and pensions of new workers under current rules; the range of options extends from including only children not yet in the labour force to an infinite perspective.

The three pension liabilities definitions share the pensioners' liabilities component, but differ as to the workers' component. More specifically, the first definition includes only the present value of accrued-to-date benefits of present workers. The second one also refers to the future contributions and the future benefits of present workers. The last definition also considers the benefits and contributions of people who have not yet entered the labour market.

In other words, the last two definitions differ from the first one because they also account for new expected net rights of a closed and of an open system, respectively. Therefore, these indicators can play a role in the assessment of the perspectives of pension schemes. Moreover, as new net pension rights can be estimated for different generations of born and unborn citizens, they can be useful in assessing the role of the public sector in determining the distribution of resources.

Source: *Pension Expenditure Expenditure Projections, Pension Liabilities and European Union Fiscal Rules* by Franco, Marino and Zotteri, Banca d'Italia (2005).

Appendix D: Retirement Age – Replacement Rate Trade-offs in order to reach a 5% APD / Tax Revenue Ratio by 2035

		1		2	
		Current SIS and SSS Contributing Participants Including Pensioners		**Current SIS and SSS Contributing Participants Excluding Pensioners**	
	Retirement Age	T.W. Constant (as 11,232)	T.W. Doubles (as 22,464)	T.W. Constant (as 11,232)	T.W. Doubles (as of 22,464)
1	55	15.44%	17.67%	31.91%	34.13%
2	60	25.35%	28.23%	46.68%	49.56%
3	65	49.24%	53.80%	Under this assumption it is already 2.00%	Under this assumption it is already 0.95%

Appendix E: Factors Increasing the Pension Spending in General

The factors driving the increases in pension spending can be further analysed by decomposing the results of the projections into four main explanatory factors, namely:

- *A dependency effect (or a population ageing effect)*, which measures the changes in the dependency ratio over the projection period as the ratio of persons aged 65 and over to the population aged 15 to 64;

- *an employment effect* which measures changes in the share of the population of working age (15 to 64) relative to the number of the employed, i.e. an inverse employment rate;

- *a take-up effect of pensions*, which measures changes in the share of pensioners relative to the population aged 65 and over. In effect, it measures the take-up of pensions relative to the number of old people. For some countries, the reported number of pensioners represents the number of pensions rather than the number of pensioners. However, this bias should not affect the evolution in the take-up ratio over time;

- *a benefit effect*, which captures changes in the average pension relative to output per employed person. Average pension and output per worker, approximating the average wage, are measured each year of the projection exercise for the total population of pensioners and employees. Thus, the benefit ratio also captures changes in the structure of the respective population groups, in addition to the assumed increases in pensions due to the indexation rules, the maturation of the pension system and longer contribution periods as well as in wages due to the assumptions of labour productivity growth rates. In particular, it should be noted that the benefit ratio does not measure the level of the pension for any individual relative to his/her own wage and, hence, is not equivalent to a replacement rate indicator.

The following equation is used:

Pension Expenditure/GDP =

Pop>65/ Pop(15-64)
X
Pop (15-64)/ EmplNo
X
PensNo/Pop>65
x
PensExp/PensNo/GDP/EmplNo

Source: *The impact of ageing on public expenditure: projections for the EU25 Member States on pensions, health care, long-term care, education and unemployment transfers (2004-2050),* the European Commission (2006).