

**THE EFFECTS OF SOCIAL SECURITY SYSTEMS ON
MACROECONOMIC PERFORMANCE:
A CROSS-SECTIONAL ANALYSIS**

A Master's Thesis

by

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Ankara
August 1999

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The Institute of Economics and Social Sciences
of
Bilkent University

by

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In Partial Fulfillment of the Requirements for the Degree of
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in

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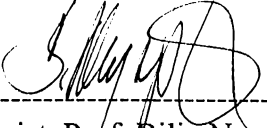
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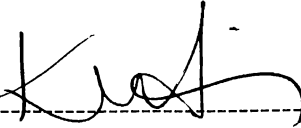
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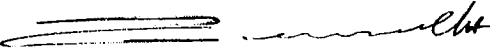
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ABSTRACT

THE EFFECTS OF SOCIAL SECURITY SYSTEMS ON MACROECONOMIC PERFORMANCE: A CROSS-SECTIONAL ANALYSIS

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Developments in demographic factors affect the magnitude of several Social Security attributes, and have recently lead many countries to reform their systems. The most marked one of such reforms is the transition from Pay-as-you-go (PAYG) based systems to funded systems. This thesis discusses the effects of social security systems on a country's macroeconomic performance by means of a cross-sectional study. It examines five main macroeconomic indicators: GDP growth rate, budget deficit, private saving rate, unemployment and inflation. It does so by using both their main macroeconomic determinants and the relevant social security attributes, such as dependency ratio, social security deficit, retirement ages, contribution rates, and public spending on social security. Our main conclusion is that many social security attributes significantly affect macroeconomic indicators.

Keywords: Social Security System, GDP growth rate, private saving rate,
budget deficit, unemployment, inflation, macroeconomic performance

ÖZET

SOSYAL GÜVENLİK SİSTEMLERİNİN MAKROEKONOMİK PERFORMANSA ETKİLERİ: BİR ZAMAN KESİTİ ANALİZİ

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Demografik faktörlerdeki değişim, birçok sosyal güvenlik sistemi göstergesinin yarattığı etkileri değiştirmiş ve pekçok ülkeyi sistemlerinde reform yapmaya yönlendirmiştir. Bu reformlardan en fazla dikkati çeken, Pay-as-you-go (PAYG)'dan fonlamaya dayalı sistemlere geçiş olmuştur. Bu tez, sosyal güvenlik sistemlerinin makroekonomik performansa olan etkilerinin bir zaman kesiti analizi ile incelenmesidir. Beş temel makroekonomik gösterge analiz edilmiştir: Gayrısafi yurtiçi hasıla (GSYİH) büyüme hızı, bütçe açığı, özel sektör tasarruf oranı, işsizlik oranı ve enflasyon. Bu çalışmanın amacı, belirtilen makroekonomik göstergelerin, ilintili diğer makroekonomik değişkenler ve anlamlı sosyal güvenlik değişkenleriyle –bağımlılık oranı, sosyal güvenlik bütçe açığı, emeklilik yaşı, prim oranları, sosyal güvenlik kamu harcamaları- tahmin edilmeye çalışılmasıdır. Çalışmanın temel sonucu, sosyal güvenlik değişkenlerinin makroekonomik performansı belirli bir şekilde etkilediği yolundadır.

Anahtar sözcükler: Sosyal güvenlik sistemi, gayrısafi yurtiçi hasıla (GSYİH) büyüme hızı, bütçe açığı, özel sektör tasarruf oranı, işsizlik oranı, enflasyon, makroekonomik performans

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TABLE OF CONTENTS

ABSTRACT	ii
ÖZET	iii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	v
I.INTRODUCTION	1
II.LITERATURE SURVEY	4
II.1.Literature on the Relation between Saving and Social Security Systems	5
II.1.A.Theoretical Studies.....	5
II.1.B. Household Cross-Sectional Studies.....	8
II.1.C. International Cross-Sectional Studies.....	9
II.2.Literature on Labor Market.....	13
II.3.Literature on Pension Systems	17
II.4.Literature on Country Studies	22
III.SOCIAL SECURITY SYSTEMS	25
III.1.System Definitions	25
III.1.A. Systems According to Their Benefit Distributions	26
III.1.B. Systems According to Financing Methods.....	28
III.2.Criteria for Evaluating Systems	29
III.3.History of Transition from PAYG to Funded Systems	31
III.4.Evaluation of Social Security Systems for the Sample Countries.....	32
III.5.Effects of the Systems on Macroeconomic Performance.....	36
IV.DATA AND MODELS	44
IV.1.Variable Definitions and Sources	44
IV.2.Models.....	49

V.ESTIMATION TECHNIQUES AND REGRESSION RESULTS	55
V.1.Description of the Techniques Employed in the Estimation of Models	55
V.2.Regression Results	57
V.2.A.Ordinary Least Square (OLS) Estimation	57
V.2.B.Tests of Models Specification	66
V.2.C.Two Stage Least Square (2SLS) Estimation	68
V.2.D.Principal Components and Seemingly Unrelated Regression (SUR) Estimation	70
 VI.CONCLUSION.....	 72
 REFERENCES	 75
 APPENDICES	 88
1.A.Country List	88
1.B.Data Set	89
2.A.1. Elderly Dependency Ratio	90
2.A.2. Total Dependency Ratio.....	91
2.B. Life Expectancy.....	92
2.C. Fertility Rate.....	93
2.D. Labor Force Participation for Men.....	94
2.E. Labor Force Participation for Women.....	95
2.F. Replacement Rates.....	96
3.Individual Effects of Social Security Attributes	97
3.A. For the Model Budget Deficit	97
3.B. For the Models GDP Growth Rate.....	98
3.C. For the Model Private Saving Rate	99
3.D. For the Model Unemployment Rate.....	100
3.E. For the Model Inflation	101
4. Correlation Matrix	102

LIST OF TABLES

1.	Social Security System Features of Sample Countries	33
2.	OLS and 2SLS Results for Budget Deficit Model.....	81
3.	OLS and 2SLS Results for GDP Growth Rate Model.....	82
4.	OLS and 2SLS Results for Private Saving Rate Model.....	83
5.	OLS and 2SLS Results for Unemployment Rate Model	84
6.	OLS and 2SLS Results for Inflation Model	85
7.	SUR and Principal Component Estimation Results of The Models	86

LIST OF FIGURES

1.	Population Aging and Macroeconomic Indicators	35
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CHAPTER I

INTRODUCTION

For the past fifteen years, Social Security Systems have started to go through a transformation throughout the world. This was induced mainly by the developments in such demographic factors as the increase in life expectancy, fertility and mortality rates and dependency ratio. For instance, since the life expectancy has been lengthened in many countries, governments have to pay benefits for a longer period of time, resulting in higher burden on budget. Since the main component of Social Security System is the pension regime, due to those changes in demographic factors, the current structure of the systems leads to increasing financial strain on governments.

Among the goals of social security system are economic growth, income adequacy and equity for current and future beneficiaries. The three main roles of the social security system, as a saving program; social insurance program; and an income redistribution program, should be constructed so as to reach these main goals. The need for reforming social security systems has stemmed from the fact that existing systems fail to satisfy these goals and thus have had a distortionary effect on the macroeconomic indicators of the economy.

Many studies aim to explain how and why Social Security Systems may have negative effect on macroeconomic performance. These studies, which are generally

in the form of surveys, mainly focus on the effects on saving, capital accumulation, labor force participation, and economic growth. Most of the models are formed with regards to the "Life-Cycle Hypothesis". The main features of empirical studies on these issues are, however, that each study is concerned either with a single country example, based on time series data, or perform cross-country analysis using panel data by considering the differences of the social security systems with respect to financing methods. They compare funded and unfunded systems or private and public systems in general.

The main contribution of this study is to determine the attributes of social security system in general, and investigate the effect of those attributes on the main macroeconomic indicators. Hence, the current study closes a gap in the related literature outlined briefly above, which mainly compares different social security systems, rather than individual attributes with respect to macroeconomic consequences. To this end, we first identify the important social security attributes that may be common to different social security systems. We next assemble major data on these attributes and generate some of them. These attributes are dependency ratio, contribution rates of both the insured person and the employer; effective retirement ages for men and women; existence of unemployment insurance and the form of government intervention to the systems; deficit of social security systems; share of social security expenditures over total public spending; ratio of social security contributions to public spending on the system.

Next, we empirically investigate their linkages with the major macroeconomic indicators. As the indicators of macroeconomic performance, we choose private saving rate, budget deficit, unemployment rate, GDP growth rate, and inflation. We form models for each of the macroeconomic variables.

Data we use for our empirical analysis are in averages over the five-year period between 1992-1997 for 29 developing and developed countries (see Appendices 1A and 1B). Since the analysis cover a large and variable sample, data unavailability, especially for social security attributes, limits the number of countries in our sample. Data analysis for these periods justifies the claim of increasing financial burden on budget. In the regression analysis of the models, we employ Ordinary Least Square Estimation (OLS), Two Square Least Square Estimation (2SLS), Seemingly Unrelated Regression (SUR), and OLS with Principal Components estimation techniques.

Our main finding is that several social security attributes are significantly related with main macroeconomic indicators, and therefore with the macroeconomic performance. The results of the regression analysis for the saving model appear to be consistent with the existing studies. Moreover, the other models also yield mostly meaningful results, which align with relevant economic theories.

Chapter II provides an extensive literature review on the relationship between social security systems and macroeconomic performance. In addition, it provides a general survey of country examples. In Chapter III, we report the existing and proposed systems. We also examine the changes in demographic structure that are assumed to be the main reason of the problems in the current systems. We then classify the sample countries according to certain features of their Social Security Systems. In Chapter IV, we present the data and models. In Chapter V, we present the methodology employed in regression analysis and results. Finally, Chapter VI concludes, with some additional comments.

CHAPTER II

LITERATURE SURVEY

The main types of social security systems referred to in this chapter are fully funded systems, Pay-as-you-go (PAYG) systems, Defined Benefit Schemes (DB), and Defined Contribution Schemes (DC). In PAYG, benefits accruing to the current beneficiaries are financed by current contributors or by budget transfers. In fully funded type, the contributions are chosen so as to accumulate a stock of capital that, any point in time should equal the present discounted value of future benefits minus future contributions of those currently in the scheme. DB schemes grant pensions on the basis of each individual's history of covered earnings, irrespective of the payments that he or she may have made into the system. DC schemes credit each participants with actual payments made into the system much like an individual account.

There are many studies investigating the relation between different macroeconomic indicators and social security systems. We report in section II.1, studies on the saving and social security systems are given in three parts: theoretical studies, household cross-sectional studies, and international cross sectional studies. In section II.2, we report the studies on the relation between labor market and social security systems. Section II.3, summarises the studies on pension systems and the literature on privatization of Social Security Systems, Section II.4 reports country survey studies.

II.1.Literature on the Relation between Saving and Social Security Systems

II.1.A. Theoretical Studies

Social security literature suggests that the effect of social security system on the saving rate is not clear-cut. Recent research has attempted to measure the effect of social security on saving by regression analysis and in the context of Overlapping Generations Model (OLG models). Each study, however, has also been severely criticised. Since saving could not be considered without consumption, " permanent income hypothesis" by Milton Friedman and " life-cycle hypothesis" by Franco Modigliani are closely relevant to the issue at hand.

The basic idea of the life-cycle hypothesis is that decisions about saving are made in the same way as all other economic decisions, that is, by an individual who attempts to maximise his well being given some constraints. Likewise, a worker begins his working career earning a relatively low income and saving little. As he gains experience and knowledge, his wage increases and so does his saving. At retirement, those savings become the source of his consumption. Thus, savings are used to smooth the consumption stream over the life cycle of the individual. This smooth path for individual lifetime income is maintained through dissaving.

Feldstein (1974) argues that social security has a damaging effect on saving and capital formation. Rather than looking at social security taxes, Feldstein analyses the process from the benefits perspective. Some individuals might view the expected benefits as an obligation of the government to provide an annuity. In this way, the individual has an asset: the government annuity that increases his wealth. Changes in wealth, in turn, alter consumption patterns and thus saving decision.

Feldstein points out that if social security induces early retirement through some provisions such that social security pays benefits only after a worker has reached a certain age, it may increase desired savings. This is because an increase in the length of retirement period increases the proportion of lifetime income that can not be consumed as earned. Thus, Feldstein argues that the combined effect of PAYG financing and the lifetime wealth increment of an immature system (which reduces saving) and the alleged inducement to early retirement (which increases saving) is theoretically indeterminate.

The major theoretical assault to the above comes from **Barro (1974)**, whose formulation of the multigeneration model indicated that most of the attributes of social security, in principle, should have no effect on saving. **Munnell (1974)**, on the other hand, argues that not all forms of personal saving, but principally that intended to support retirement (notably additions to pensions and to insurance company assets) would be affected by social security.

Another set of argument against Feldstein comes from **Leimer and Lesnoy (1982)**, based on the following points. First, social security wealth data used in the study- social security wealth variable- suffers from computational errors due to computer programming. Correction of this error changes the estimated effects of social security on saving. Secondly, the assumptions are not demonstrably preferable and in some cases inferior to alternative assumptions. The assumptions are the form of expectations of individuals about the social security benefits and taxes. And the third one is that, the estimated relationship between social security and saving is acutely sensitive to the selection of study period.

Feldstein (1978) also examines the difference between private pension program and explains public social security in their likely impact on aggregate

savings. He explains some shortcomings of private pensions in terms of capital market (asset holding) behaviour and estimates the savings function with annual time series data under both the life-cycle theory and permanent income hypothesis. The two models are compared in such a way that conventional saving equation with any private or public pension program and the model with the appropriate variables (saving and disposable income) which contains the properties of private and pension programs.

Kotlikoff (1987) points out that the enormous expansion of the social security system over the last four decades has left the government very heavily involved in determining the insurance of American households. While the growth of social security has been very substantial, it has also been gradual; this may explain the lack of focused debate on the pros and cons of government intervention in this area as well as evidence supporting the need for such intervention. He concludes that, in the area of saving and insurance, appropriate government intervention through social security can be readily justified on grounds of externalities and failure of insurance markets.

Hu (1987) provides a theoretical analysis of the effects of the insurance features of social security indexation on portfolio allocation and the stability of income and consumption of the retiree. He uses a framework of a life cycle model of allocation under uncertainty. This paper shows that the magnitudes of such effects depends on the importance of social security in total wealth, the covariance of real portfolio returns with the inflation rate and, more importantly, whether there exists market failure in providing for inflation insurance.

Cready and Van de Ven (1997) examine the conditions under which a compulsory PAYG system is superior to the use of private savings by using the two-

period overlapping generations model. Model shows that a transfer system can be superior to the use of private savings if the sum of the rates of growth of population and real earnings exceed the real rate of interest. This model also meets with a declining population (population ageing). Furthermore, the basic two-period model is extended to allow for labor supply responses to taxation whereby an attempt to raise revenue in order to finance current pensions introduces distortions into labor supply and a reduction in tax-base.

II.1.B. Household Cross-sectional Studies

In order to examine how social security affects saving, economists have examined survey data on individual households as well as aggregate statistics. Cross-sectional data allow strong tests of the validity of the life-cycle model, with regards to the assertion that social security reduces saving rates.

Several cross-sectional studies have found that different types of social security systems, such as defined benefit; defined contribution; funded or unfunded systems, have caused little or no change in saving or private asset holdings or have actually increased them. Kurz (1989) reports that different social security systems have very small effects on asset holdings, which depend on the group under study and the mathematical forms of the equation used in the statistical estimation.

Hausman and Diamond (1984) estimate an individual model of wealth accumulation (and decumulation after retirement) with the first 10 years of panel data from the National Longitudinal Survey of Mature Men (NLA) for U.S. to examine the response of savings to pension systems. This individual model consists of three components: a. Continuous time model for retirement behaviour; b. Life cycle type

specification of individual wealth accumulation and decumulation after retirement ;c. Individual saving propensities as a function of permanent income, expected pension and social security benefits and demographic factors. The results are strongly in support of life cycle hypothesis and permanent income hypothesis. Moreover, the findings indicate that, the presence of pension and social security benefits has a significant effect on retirement behaviour where there is a strong trend towards early-retirement.

Gustman and Steinmer (1998) develop an argument against Life Cycle Hypothesis. They examine the composition and distribution of total wealth for a cohort of 51 to 61 years old from the Health and Retirement Study (RHS)¹, and the role of pensions in forming retirement wealth. The finding is that, the ratio of wealth to lifetime earnings is no higher for people with pensions than that for people without pensions. However, heterogeneity is quite important. Multivariate regressions relating total wealth to pension coverage and pension value, which standardise for sources of heterogeneity, suggest that pensions cause very limited displacement of other wealth, if any. These findings are not consistent with a simple life-cycle explanation for savings.

II.1.2.International Cross Sectional Studies

Because saving rates differ widely from one country to another, it is tempting to examine whether variations in social security benefits help explain these differences. We note mainly six studies for the 1980's, two of which are by Feldstein and Inman (1977, 1980), who find an association between high social security

¹ RHS is nationally (US) representative survey of over 7600 families who have at least one member born from 1931 to 1941.

benefits and low personal savings. Three studies that find no association, including one by Barro and MacDonald (1979) and one by Kopits and Gotur (1980) that finds industrial countries public pensions for the aged increase saving. They also find that the other social security benefits (notably health insurance, family allowances, unemployment insurance and etc.) reduce saving, and that social security taxes increase saving.

By considering all these studies, one important instrument for increasing national saving is the reduction in government deficit. It might be argued that creating a large surplus in the social security trust funds is a good way to achieve this goal. By reducing social security benefits or boosting social security taxes, one would add directly to national saving, if there were no offsetting effects of the kind predicted by the multigenerational model would predict. An important conclusion made by **Aaron (1982)** is that the evidence does not support the position that reductions in social security benefits would be effective in increasing private saving. Previously mentioned studies done by Feldstein and Inmann (1977,1980) could be reconsidered in light of the **Campbell's (1977)** study that suggest that more saving arises under private pension plans. Workers who are covered by private pension plans have an economic incentive to retire earlier than they would otherwise. But when they retire their wealth will drop and they must save more to cover the additional years of retirement. So it is possible to have two effects: first one is that the substitution of social security benefits or wealth for private saving and the second one is that, the early retirement of beneficiaries. The former one decreases the amount of private saving while the latter increase saving.

Since age of retirement might be a factor for saving decision, it seems appropriate to consider it in the aggregate saving analysis. **Munnell (1974)** studies

this subject as a doctoral dissertation. She investigates the impact of the two offsetting forces under discussion. The first one is the effect of social security benefit acting as an asset that substitutes for private savings. The second one is early retirement, which generates a need for more saving to last over the increased retirement years.

Hurd (1990) mention two important factors about the regression studies on the relation of social security systems with the savings. The first one is that, quantitative results of such studies are sensitive to the structure of the model and the selection of time periods which means that this period is important in the interpretation of the magnitude of the relation between social security and the savings. Secondly, the studies rely on variables whose construction makes them sensitive to alternative assumptions. These constructed variables for social security wealth may in fact be serving as a proxy for other economic effects. Unemployment insurance , private retirement program, medicare and other social programs have been the driving forces in the economy, and that the constructed variables are really measures of their influence. Another point that is indicated by them is that dependency ratio (ratio of number of retired to number of active worker) has increased as educational experience, which is investment in human capital. These factors may influence the saving decision.

Besides those previous studies, many recent studies examine the effect of social security attributes on saving. One of these is by **Roseveare, Leibfnitz and Fore (1998)** who examine the impact of ageing on national saving- private and government- on a survey base by keeping life- cycle theory in mind. Based on an analysis by IMF(1996) for the OECD countries, overall effects of ageing on national saving could be significant together with sharp decrease in government saving.

Applying coefficient for the demographic effect on private saving for industrial countries, the increase in the dependency ratio of almost 20 percentage points as projected leads to a decline in the average private saving rate of the OECD area by around 6 percentage points between 2000 and 2030, particularly marked in Japan, Germany and Italy. By adding Ricardian equivalence effects as 50 percentage, this decline in national saving becomes 8 percentage.

Another study by **Baillu and Reisen (1998)** point out the difference between the effects of funded pension systems and unfunded pension systems on aggregate saving. Using OLS and 2SLS over the 1982-1993 period, the author find that major features of pension design affect saving, that funded pension schemes should be mandatory rather than voluntary. Mandatory pension schemes that effectively cover the low-savers group will not only simulate savings, but they also act as important policy vehicles to help make retirement income levels and wealth distribution more equal between low and high savers.

Similar to study by Baillu and Reisen (1998), **Edwards (1995)** examines the reason of the difference in the saving rates across countries using the instrumental variable estimation method, He finds that government-run social security systems affect private saving negatively and percapita growth is one of the most important determinants of both private and public savings. Replacement of government-run (partially funded) systems by privately run capitalisation systems will tend to result in higher private saving rates. Furthermore, another result according to analysis is that, while private savings respond to demographic variables, social security expenditures, and debt of the financial sector, government savings do not.

Kohl and O'Brien (1998) also examine the effect of different types of pension systems on public and private saving. They underline two important

findings: unfunded public pension systems reduce national saving and tax-favoured private saving schemes increase national saving.

II.2.Literature Survey On Labor Market

For the last few decades, the population in industrialised countries has been aging rapidly and individual life expectancies have been increasing. At the same time, workers have started to leave the labor force at younger ages. In some countries the labor force participation rates of 60 to 64 years old have fallen by 75 percentage over the past three decades. This decline in labor force participation magnifies population trends, further increasing the number of retirees relative to the number of working persons and, thereby, increasing the dependency ratio. The changes in demographic factors with respect to countries and time are given in Appendix 2.

The most important problem of the social security systems and the need for the reforms arises from the correspondence between the retirement decision and the trends in labor force participation. There are many studies on this subject especially on individual country basis. Two important features of social security plans appear in these studies to have an important effect on labor force participation incentives. The first is the age at which benefits are available, which is called as " early retirement age", and the second one is the social security wealth.

As pointed in most of the studies mentioned above, the most important problem of unfunded system is the generosity of its benefits. The study done by **Lubyova and Ours (1997)** reach this result by examining the tightening of the benefits in the restructured Slovak unemployment benefit system. They show that

this policy is needed due to the increase in unemployment rate as in most of the European countries.

Studies by **Kapteyn and Vos (1998)**, **Blundell and Johnson (1998)**, **Borsh and Schnabel (1998)** examine the labor force participation and employment dynamics for Netherlands, United Kingdom and Germany, respectively. According to a detailed survey of those countries' security systems, they point out that the basic reason of the change in labor force participation is the introduction of new arrangements that created incentives to retire. Dependency ratio is given as the main important item in the economic consequences of the countries. Netherlands, however, is stated to be less problematic in the financing of future retirement benefits due to its fully funded occupational pension plans. For United Kingdom, labor market behaviour is changed dramatically since 1970's. The relative generosity of benefits and the incentives, which they create, combined with the reduced demand for unskilled labor, play an important part in observed fall in the labor force participation rate. Increases in pension wealth influence early retirement heavily.

German PAYG system similarly appears under severe pressure due to its generous benefits. Already, Germany has a sharp increase in the contribution rate to the social security system. Due to generosity of the system, labor force participation has a sharp decline and the new arrangements due to social security taxes induce early retirement rather than late retirement. Here, population aging shifts the majority voting towards PAYG due to its generosity rather than fully or partial funding. Blundell and Johnson (1998) argue that for the implementation and the adaptation of the transition from the PAYG to partial or fully funded system requires a considerable time and sufficient capital accumulation.

Blau (1994) finds out that labor dynamics at older ages are important including using quarterly data from the Retirement History Survey (RHS)², which includes duration and spell occurrence dependence, and work experience effects. These effects are robust to nonparametric controls of unobserved heterogeneity. The estimates indicate that social security benefits have strong effects on the timing of labor force transitions at older ages, but that changes in the level of social security benefits over time have not contributed much to the trend of earlier labor force exit.

Kruger and Pischke (1992) uses aggregate birth year/calendar level data derived from the Current Population Survey (CPS)³ to estimate the effects of Social security wealth on the labor supply of older men in the 1970s and 1980s. The analysis focuses on measuring the impact of the 1977 amendments on the Social Security Act, which creates a substantial and unanticipated reduction in the social security wealth for individuals born after 1926. This differential in benefits has become known as the benefit notch. Results indicate that labor supply continued to decline for the "notch babies" who received lower social security benefits than earlier cohorts.

Friedberg (1998) explores whether the Old Age Assistance (OAA) program of the US, the first means tested program for the elderly induces individuals to retire from work. Using individual records from the 1940 and 1950, he estimates that OAA has a substantial effect on Labor force participation. He argues that, a major problem in quantifying the impact of social security or pensions on retirement arises because benefit levels do not vary across the population randomly but depend on past earnings (replacement ratio⁴). Studying OAA gets around this problem because

² US Social Security Administration's Longitudinal Retirement History Survey contains information on a random sample of individuals who were aged 58-63 in 1969.

³ U.S. Department of Labor

⁴ proportion of the average wage that is replaced by the average pension.

benefit levels vary across states. The conclusion is that the growth of means tested transfers for the elderly play a significant role in the trends toward early retirement. By using additional data from younger people shows that, the impact of pension generosity would result in higher and higher decline in the labor force participation rates in the following decades.

Samwick (1998) estimates the combined effects of Social security and pension benefits on the probability of retirement in a cross-section of the population near retirement age. He also estimates accrual rate of retirement wealth according to the model of the retirement decision. Besides this, in econometric model of retirement, he estimates in which the logic of "option value" model of retirement, developed by Stock and Wise (1990). Among the demographic variables, he finds that only the age is significantly related to retirement probability. The main finding is that both the option value of retirement and the accrual in retirement wealth are statistically significant in reducing the probability of retirement.

Kahn (1988) argues that it is important to take realistic account of how recipients evaluate potential benefit flow. Thus he presents a simple retirement model, in which liquidity constraints prompts individuals to use higher than market discount rates in evaluating future pension benefits. As a consequence, even an apparently actuarially fair early retirement benefit could (on average) discourage continued work. Using data on individual retirement decisions, he finds a support for the argument that this phenomenon contributes to some of the observed increase in early retirement.

Van Rijckeghem (1997) develops and calibrates a simple general equilibrium, which is characterized by different wage setting mechanism for skilled and unskilled labor, one-sector, three-factor general equilibrium model with capital

for the French economy. Her simulation results indicate that targeted reductions in employer social security taxes have six times as large an effect on employment as untargeted reductions for equal initial budgetary cost, while employee social security tax reductions have a negative effect on employment. She also points to the presence of "self-financing", whereby reductions in various tax rates lead to lower budget deficits in the long-run, as a result of an expanding tax base and lower unemployment insurance outlays.

Borsh (1998) examines the decline in old age labor force participation throughout Europe by using qualitative and econometric evidence for the strength of the incentive effects on old age labor supply. He shows that a significant part of this problem is homemade: most European pension systems provide strong incentives to retire early, thus, the correlation between the force of these incentives with old age labor force participation is strongly negative.

II.3.Literature on Pension Systems

Studies show that pension systems resulted in different effects on macroeconomic indicators. Some of the new studies have examined major properties of pension systems and found the superiorities of each system as compared to another.

Cichon and Latulippe (1997) address three models. The first one is a social budget model, which maps the macro socioeconomic environment as well as the social protection environment of pension systems. The second one is a pension model used to assess the long-term financial implications of alternative benefit

provisions and alternative financing options. The last one is an income distribution model that determines the distributive aspects of pension system or reform options.

The following studies include arguments for and against the funding of public pensions with a view to establishing whether there is an economic basis for judging funding to be superior to Pay-as-you-go (PAYG).

Hemming (1998) argues that funding does not have a clear advantage, and the case for a shift from PAYG to funding is thus an uneasy one. There is, nonetheless, a growing advocacy of funded public pensions as part of an ideal pension system, which raises the general issue about the role of the public sector in pension provision in a Defined benefit (DB) and Defined contribution (DC) base.

Congio, Cottarelli and Cubeddu (1998) review developments in pension systems in eleven transition economies during the 1990's, highlighting the forces behind their rapid weakening. They point out that, due to higher dependency ratios reached by mid-1995, countries change their policies not only by raising mandatory retirement age and by tightening early retirement rules, but also by changing the nature of pension system. The main goal thus becomes to increase the link between contributions and expenditures. Most of the transition countries (for example Bulgaria, Czech Republic, FYR Macedonia, Russia, Ukraine, Romania, Slovenia) are considering shifting or have already shifted (for example, Hungary, Latvia, Poland, Kazakhstan) from the traditional defined benefit PAYG system to defined contribution fully funded systems. Expectation of high yields of the funds with respect to the implicit yield of PAYG, and the high power of funds to protect pensioners during the transition with respect to PAYG are the main reasons for this transition.

Another approach comes from **Kramer and Li (1997)** with regards to the significant effects of PAYG public pension system on macroeconomic behaviour. The authors, in the context of a stylised model of the Canadian economy, illustrate some of these effects, which are important in weighing options for reforming public pensions. They, in addition, show that introducing such a system can reduce aggregate saving, income and wages and increase interest rates. Furthermore, they argue that a significant part of the distortion can occur because benefits are not explicitly linked to contributions and that creating a linkage can reduce the distortions associated with a wage tax that funds plan contributions.

Maisonneuve and Mylonas (1999) examine the financial strain created by PAYG system as population ageing. This study evaluates the prospects of the Greek pension system. This study is important for developing a basis for critical evaluation of social security systems. The main focus of the paper is on the factors of the Greek PAYG system that could potentially result in its future unsustainability.

Willmore (1998) points out that social security reform by itself is not likely to generate increased savings or growth, but it is essentially a zero sum game in which some participants gain at the loss of others. Arguments for reform of social security are usually from economic point of view, while in reality they are political arguments for changing the distribution of costs and benefits. He argues that, as shown by most of the empirical analysis, choice of a pension regime in itself has little impact on savings, investment or growth, but it can change markedly the distribution of income and wealth. Pension reform, for this reason, more a "political" than an economic issue.

Homburg (1990) criticises the paper by Breyer (1989) which considers the problem of efficiency of unfunded systems (PAYG) pension schemes. He finds that

these schemes are intergenerationally efficient in Pareto's sense when the rate of interest permanently exceeds the growth rate. In Breyer's model, contributions to that system, are introduced as lump-sum taxes and the pensions are lump-sum transfers, but in reality contributions to PAYG are never raised as lump-sum payments. Thus, this paper show that an unfunded scheme induces distortions and can completely be abolished in finite time without inflicting damage upon any generation.

Furthermore, **Heller (1998)** argues that there are significant risks, limitations and complications associated with reliance upon mandatory defined contribution/fully funded schemes as the dominant public pension pillar. Policies to limit risks may lead in the government to playing an important financial role in the provision of social insurance. For many countries, the principal source of old age support should thus derive from a well-formulated, public DB pillar, with a significant amount of prefunding. A Defined contribution /Fully funded pillar can play a useful supplemental role in a multi-pillar system for the accumulation of pension savings.

Kotlikoff, Smetters and Walliser (1997) compare two general methods of privatizing social security system: forced participation in the new privatised systems versus allowing people to choose between the new system or remaining in the current social security system. Simulations are performed using a large-scale perfect-foresight OLG simulation model that incorporates both intra-generational and inter-generational heterogeneity. Both methods lead to large long-run gains for all life time income classes despite the intra-generational progressivity of social security. But they differ in their short run effects due to adverse selection associated opting out. Relative to forced participation that preserves accrued liabilities; the opting out

method performs surprisingly well both in its distributional impact and speed of convergence. Opting out tends to do a better job at protecting the welfare of the initial elderly, even though the forced participation method is designed to fully protect their value of social security benefits. These results suggest that giving people freedom of choice might actually generate more favourable outcomes than mandates.

Brown (1997) presents the similarities between the funding of an individual pension plan and PAYG social security systems. In each plan, the total expected value of benefits can exceed the total expected value of contributions. This is true for the individual pre-funded plan. He presents arguments to show that a fully funded scheme is no more secure economically than PAYG scheme. Both schemes rely on the ability of the economy to create and transfer wealth. That is, the social security does not lie in privatization.

Kotlikoff, Smetters and Walliser (1998) use a large-scale OLG model that features intragenerational heterogeneity to show that privatising the U.S. Social security system could be done on a progressive basis. The paper compares achieving progressivity as part of privatization reform by a) providing a PAYG financed minimum benefit to all agents at retirement independent of their contributions and b) matching contributions to private retirement accounts on a progressive basis. Although a PAYG financed minimum benefit can enhance progressivity, it comes at the cost of substantially smaller macroeconomic and welfare gains. The reasons are twofold: first, the ongoing unfunded liability to pay for the minimum benefit is roughly half of the unfunded liability of the current Social security system. Maintaining this liability limits the effect of privatization on saving and capital accumulation; second, the tax financing the flat minimum benefit is completely distortionary since the benefit one receives is independent of what one contributes. In

contrast, matching workers contributions on a progressive basis can achieve an equally progressive intragenerational distribution of welfare. But it affords much higher long-run levels of capital, labor supply, output, and welfare.

II.4.Literature on Country Studies

De Mesa and Bertranou (1997) compare two of the most important structural reforms of Social security reform in Latin America: The Chilean private fully funded system, and the public/private Argentinian "integrated" (PAYG/fully funded) program. Chilean pension reform affects most of the developing and developed countries. The Argentinian model has important differences from the Chilean model in several respects: A model has (a) more inter and intra-generational solidarity; (b) relatively lower transition costs to be covered by the state; (c) higher coverage of self-employed workers; (d) more comprehensive regularity framework; and (e) less gender inequality. Given these elements, the Argentinian pension model offers new insights to countries currently reforming their pension systems.

Hamann (1997) describes the pension reform in Italy in 1995. This reform modifies the mechanism for computing retirement benefits, merged the old age and seniority pension schemes into a single scheme but also penalises early retirement. Hamann argues that, new system has many long-run improvements such as actuarial soundness, to postpone retirement; a closer link between contributions and benefits; and a less heterogenous treatment of different categories of workers. This reform, however, has some weaknesses, such as high contribution rates for dependent workers and not addressing the problem posed by demographic transition.

Coulter and Heady (1997) examine social security reform for transitional economies, using the Czech Republic as an example. They state that replacement of universal benefits by more generous but income tested benefits helped the poor, while reducing government expenditure. However, it also harmed those slightly above the poverty line and increased the combined marginal rates of tax and benefit withdrawal, especially for the poor. Changes to benefit withdrawal rates before the reforms were enacted succeeded in improving targeting without increasing marginal tax rates. The implications for other transitional economies are that income tested benefits are practical and effective, but careful design is needed to maximise their benefit.

Branco (1998) argues that despite increasing fiscal burden, the public pension systems of BRO countries (Baltics, Russia, and other countries of Former Soviet Union: Latvia, Kazakhstan, Russia, Ukraine) are failing to provide adequate social protection. Although there is a broad consensus about the need for pension reforms, BRO countries are debating whether to embark on systematic reforms or whether to correct the distortions in their PAYG pension systems. The paper reviews the measures taken by BRO countries during the transition period to address their pension problems and examines the options for further reform. It makes a strong case for a gradual reform approach aimed at establishing a multi-pillar system over the long run, but initially focus on the implementation of "high-quality" reforms of the PAYG system.

A prediction of the basic permanent income hypothesis/ life cycle model is that an unexpected increases in future income produces an immediate increase in current consumption. **Levenson (1996)** tests this prediction using data for Taiwan. The 1985 Labor Standards Law in Taiwan granted all employees in covered

industries a windfall retirement severance benefit. The results of this study indicate that consumption did not increase immediately for those who were granted that windfall, relative to those who receives no windfall. Moreover, consumption for those who are granted is reduced.

CHAPTER III

SOCIAL SECURITY SYSTEMS

Throughout the world, there are many different social security schemes. In the following section, we define these schemes. In section III.2 we present the basic criteria used in the evaluation of those different schemes. In section III.3, we examine the history of transition from PAYG to funding, which is observed in many country studies as stated in the literature survey above (many countries are also in the process of implementation of funding systems). In section III.4, we classify the countries used in our empirical analysis according to type of the defined systems and their social security system features. In section III.5, we explain the relation between social security systems and economic performance, which lead us to perform our empirical analysis.

III.1. System Definitions

The system classifications are provided by " Social Security Throughout the World", published by ISSA- International Social Security Association in Geneva (1997).

III.1.A. Systems According To Their Benefit Distributions

The following systems are grouped according to distribution of benefits, and the coverage area⁵.

There are four main grouping under this classification: 1) Defined benefit schemes (DB)⁶; 2) Defined contribution schemes (DC); 3) Private pension models; 4) Benefits-in-kind⁷

Defined benefit schemes grant pensions on the basis of each individual's history of covered earnings, irrespective of the payments that he or she may have made into the system. DB schemes are of three forms: 1) Employment Related Systems; 2) Universal Pension Systems; 3) Means Tested Systems.

Employment Related Systems includes pensions, family allowances and work injuries (on the existence of employment relationship itself). Such programs are financed entirely or largely from contributions (usually a percentage of earnings) by employers, workers, or both, and are in most instance compulsory for defined categories of workers and their employers. Such systems are referred to as social insurance systems.

Universal Pension Systems provides flat-rate cash benefits to residents or citizens, without consideration of income, employment or means, usually financed from general revenues. These benefits are often universal in application for persons with sufficient residency.

Most social security systems incorporating a universal program also have a second-tier earning-related program. Some universal programs are financed in part

⁵ The countries included in our empirical analysis possess some combination of the systems. However, we did not use the type of social security systems as a separate attribute in our empirical analysis.

⁶ It is also named as Income Maintenance Program

⁷ direct service or financing

by contributions from workers and employers, even though they receive substantial support from income taxes.

Means-Tested System establishes eligibility for benefits by measuring individual or family resources against a standard usually based on subsistence needs. Benefits are limited to needy or low-income applicants. Such programs are variously referred to as social pension equalisation payments and it is financed from general revenues. It is administered by social insurance agencies.

Defined contribution schemes credit each participant with actual payments made into the system, much like an individual account. DC schemes are of three forms: 1) Mandatory Private Insurance; 2) Provident Funds⁸; 3) Employer Liability.

Mandatory Private Insurance may have been put into place to substitute for or to complement social insurance systems. The employee (or a combination of employee and employer contributions) funds private insurance through mandatory contributions to an employee's individual account. The employee must pay an administrative fee for the account.

Public Provident Funds type of system exists primarily in developing countries and are essentially compulsory saving programs, in which their employers match regular contributions withheld from employee's wages. These contributions are set aside for each employee in a special fund for later repayment to the worker. When defined contingencies occur, although in a few cases the beneficiary can opt for a pension or pensions are provided for the survivors.

In Employer Liability System type, workers are usually protected through labor codes whereby affected employers are required to provide specified payments or services directly to their employees, such as payment of lump-sum gratuities to be

⁸ National Provident Fund systems (like in Chile) is a type of this category.

aged or disabled. This approach does not involve any direct pooling of risk, since the liability for payment is placed directly on each employer.

III.1.B. Systems According To Financing Methods (Public Pension Schemes)

Social security systems according to financing methods are divided into three groups: 1) PAYG; 2) Fully Funded; 3) Partial Funded.

In Pay-as-you-go (PAYG) scheme, benefits accruing to the current beneficiaries are financed by current contributors or budget transfers (generally in DB style) such as the programs in Germany, France, Italy, UK, USA, and Turkey.

In Fully Funded type, the contribution rate is chosen so as to accumulate a stock of capital that, any point in time should equal the present discounted value of future benefits minus future contributions of those currently in the scheme (generally in DC style).

Partially Funded type combines features of a fully funded and a PAYG scheme, however, reserves do not fully meet the aforementioned financial condition (generally in DB style). Examples of this system type are the schemes in United States, Japan, and Sweden⁹

DB is sometimes assumed to be synonymous with public PAYG schemes and DC plans are with private funded pension, but this is not strictly true. A DB plan may be funded or unfunded, but its degree of funding is inherently uncertain, as calculations of the present value of future liabilities depend of assumptions as the life expectancy of participants and the rate of return on assets of the plan. DC plans are always fully funded, but there is no compelling reason for this to be true.

⁹ for earning related scheme only

Another point that should be considered to make the distinction between these two schemes is that, DB/DC choice is central design of pension policies because DB invariably redistributes wealth within a single generation or cohort whereas DC generally does not.

III.2 Criteria for Evaluating Systems

Most of the defined social security systems today are publicly managed, "defined benefits" that depend on worker's earnings, and are financed by payroll taxes on a PAYG basis. This means that today's workers are taxed to pay the pensions of those who have already retired. As mentioned before, those systems create financial burden on the economy. Averting the Old Age Crisis, World Bank (1994) documents, in great detail, many problems found in that systems.

There are several problems that lead to the crisis of today's social security systems. The existing systems have not always protected the old; they especially will not protect those who grow old in the future; they often have not distributed their benefits in an equitable way; and they have hindered economic growth. We list below these problems.

1. High and rising payroll tax rates, which may increase unemployment
2. Evasion and escape to the informal sector, where workers may be less productive
3. Early retirement, which reduces the supply of experienced labor
4. Misallocation of public resources, as scarce tax revenues are used for pensions rather than for education, health or infrastructure

5. Lost opportunity to increase long term saving, which are considered to be low in many countries

6. Failure to redistribute to low income groups

7. Unintended inter-generational transfers (often to high income groups)

8. The growth of a large hidden implicit public pension debt, which, together with the abuses mentioned above, makes the current system financially non-sustainable in many countries.

In line of above problems, there is a great tendency towards the reform on social security systems. The social security system is a complex institution that plays many roles simultaneously. In some ways, it behaves like a (mandatory) savings program, like a saving account or a pension. Like these other instruments, it reallocates income over time, taking contributions during one's working years and then paying benefits during retirement. It is also an insurance program, since it replaces some of the income lost following the disability or death of a covered worker, and thereby cushions the household's decline in economic well being. Finally, the social security system is a very important income distribution program, like the income tax and transfer system.

Below are the list of criteria¹⁰ to evaluate social security systems based on their ability to achieve their stated objectives through their specified programs.

1. Income adequacy: Are benefits sufficient for recipients to maintain minimum standard of living?

2. Individual equity: What is the relationship between what an individual contributes to the system and what an individual can expect to receive in return?

¹⁰ proposed by the 1994-1996 Advisory Council's Technical Panel on Trends and Issues, US

3. Economic growth

3.1. Individual labor-leisure choice: Is there a distortionary effect on labor market?

3.2. Individual consumption-saving choice through aggregate national saving: Is there an effect on the allocation of income between consumption and saving.

4. Other considerations

4.1. Administrative cost

4.2. Confidence in the social security system: political and economic components

4.3. Social cohesiveness: Which type of systems affects which part of the society.

4.4. Financial health of the social security system

III.3. History of Transition from PAYG to Funded Systems

During 1980s, many industrial countries had experienced problems with PAYG financing method. Many studies were carried out, which state that there are two sources of financial strains that were experienced in these countries. One of these sources is the generous pension benefit. These costs are awarded at a point in time but paid from some later time in the future, and under PAYG, contribution rates are required to be higher during the period of employment. In addition, prospective population ageing reduced the ratio of number of workers to number of pensioners. Therefore, higher PAYG contribution rates are needed to pay the particular level of pension benefits. One way to finance the public pensions was funding. However,

during 1980s, not much emphasis was put on analysing the pros and cons of changing the financing methods.

The switch to funded systems, receiving more attention, had become a major issue in the literature by mid-1990s. The discussion on the issue involved no significant argument as to the inherent superiority of the funded systems over PAYG. Moreover, not many faults have been found in the PAYG system, which many industrial countries have been using to scale back pensions. Indeed, there have been political incentives to make quite large adjustments in pensions such as in U.K. It has been shown that PAYG pensions can be sustainably financed (Chad and Jeager, 1997). Probably, the most important factor that led to the increased attention toward funded systems is the success of the reform in Chile, which involved switching to this system. It has been claimed that the reform did not only put in place a lower-cost, more secure pension system, but also has been conducive to the country's subsequent impressive savings, investment and growth performance. By considering this, funded systems are now being implemented or considered for implementation in other countries in Latin America (Argentina, Colombia, Mexico, Peru), as well as in some countries of Eastern Europe (Hungary, Poland), and of the Former Soviet Union (Kazakhstan, Russian Federation, Ukraine).

III.4. Evaluation of Social Security Systems in the Sample Countries

X.X. Sala-i-Martin (1997) links public pensions to retirement. In the light of this study and the information provided by " Social Security Throughout the World", we prepared the following table (Table 1) to show the current systems and the properties of the retirement systems of the countries.

TABLE 1: SOCIAL SECURITY SYSTEM FEATURES OF SAMPLE COUNTRIES

COUNTRY	COVERAGE	IS RETIREMENT NECESSARY? ECONOMIC INCENTIVES FOR RETIREMENT? RETIREMENT AGE FOR RETIREMENT? PENSIONS RELATED TO PAST EARNINGS PENSIONS RELATED TO PREVIOUS WORK PENSION IS WAGE FINANCED						FINANCING TYPE	SYSTEM TYPE
		D	E	F	G	H	I		
Argentina	E,S	N	Y	60(M)55(W)	Y	I	Y		1+5
Austria	E,S	N	Y	65(M)60(W)	Y	C	Y	PAYG	1
Belgium	E,P	Y	Y	65(M)60(W)	Y	Y	Y	PAYG	1
Bolivia	E:industry, commerce			55(M)50(W)	Y	C	Y		1+6
Canada	E,S	N	Y	65(M)65(W)	Y	Y	N	PAYG	2+1
Chile	E(vol),S	Y		65(M)60(W)	C	C	Y	FULLY FUNDED	1+6
China	E	Y	Y	60(M)55(W)	Y	I	Y	PAYG	1+8
Denmark	E	N	Y	67(M)67(W)	D	C	Y	PAYG, FULLY FUNDED	2+1
Finland	E	Y	Y	65(M)65(W)	N	C	Y	PAYG,PARTIAL FUNDED	2+9
France	E,P	N		60(M)60(W)	Y		Y	PAYG	1+5
Germany	E,S,P	Y	D	65(M)60(W)	Y	I	Y	PAYG	1
Greece	E,P,agriculture	Y	Y	65(M)60(W)	Y	Y		PAYG	1
Hungary	E	Y	D	60(M)60(W)	Y	I	Y	PAYG	1
Ireland	E			66(M)66(W)	N	C	Y	PAYG	1+3
Israel	all,P		Y	65(M)60(W)	N	I	Y		1
Italy	E,P,S,farmers			60(M)55(W)	Y	C	Y	PAYG	1
Japan	E	N	Y	60(M)56(W)	Y	cov	Y	PARTIAL FUNDED	1
Korea	resident(firmsize>=10)			60(M)60(W)	Y	I	Y		1
Malaysia	E	Y		55(M)55(W)	C		Y		7+1
Mauritius	Ll residents, E,S(vol)			60(M)60(W)	N		N		1+2
Netherlands	All residents	N		65(M)65(W)	N	C		FULLY FUNDED	1
Norway	all residents, E,S			67(M)67(W)	N	cov	Y		1+2
Portugal	E,S	Y		65(M)62(W)	Y	C	Y		1
Spain	E,S,P	Y		65(M)65(W)	Y	C	Y	PAYG	1
Switzerland	All residents	N		65(M)62(W)	Y		Y	PAYG	1+4
Tunisia	E	Y		60(M)60(W)	Y	C	Y	PAYG	1
Turkey	E			55(M)50(W)	Y	C	Y	PAYG	1
UK	all residents, optional for E	N	Y	65(M)60(W)	Y	Y	Y	PAYG	1
USA	E	N	Y	60(M)60(W)	Y	cov	Y	PARTIAL FUNDED	1

Notes:

1. Abbreviations for system type:

1. Social Insurance system
2. Universal pension system
3. Means tested system
4. Mandatory occupational pension
5. Private social insurance
6. Mandatory private insurance
7. Provident fund
8. Employer provided plans
9. Statutory earnings related

Y-Yes
N-No

2. Explanations of columns

- for coverage column**
E-employers or employed persons
S-Self-employed persons
P-Public workers
(vol)-voluntary

for column of E

D-incentive for deferral of retirement or pension

for column H:

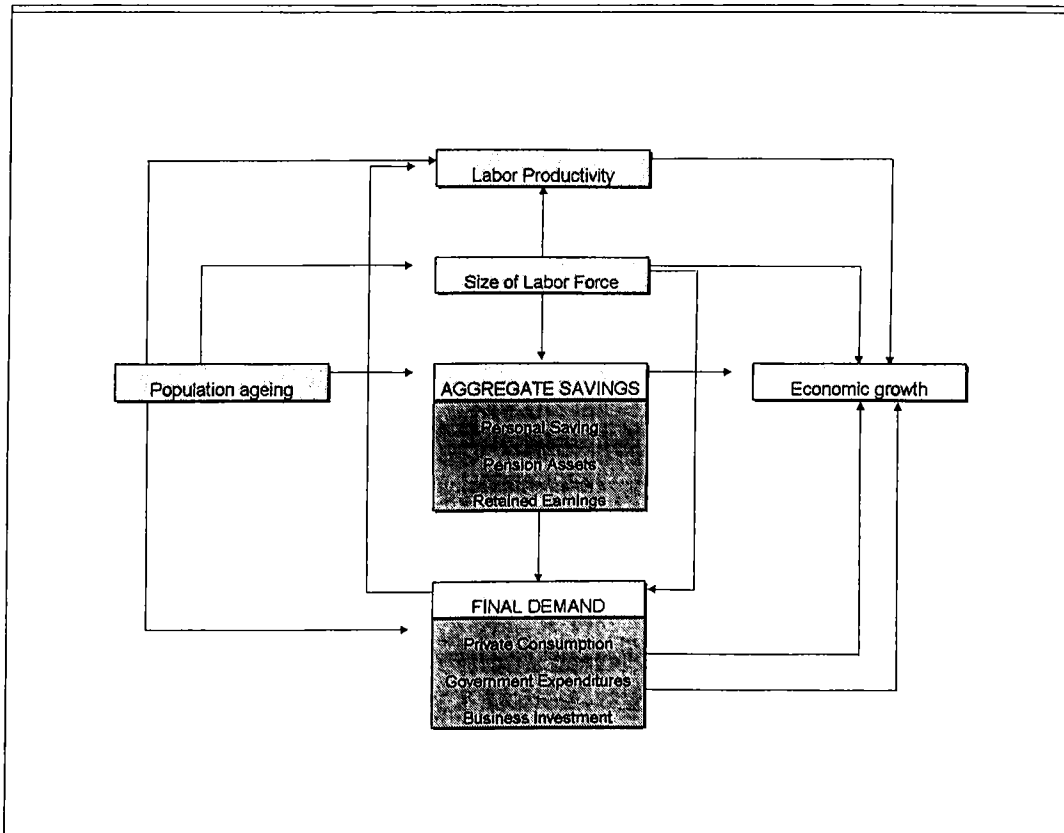
C-related to years of contribution
I-related to years of insurance
cov-related to years of coverage

We examine our sample countries to investigate the relation between transfers and retirement. In most countries, the elderly are required not to earn any extra labor income so that they can receive old-age pensions. They should "effectively retire" to be a pensioner (column D). Various economic incentives are involved in the social security programs of many other countries (Australia, Canada, Japan, United Kingdom; see column E). One such incentive program has been experienced by the United States. In 1992 figures, marginal tax rates on labor income over \$7440 for the retirees under 65 is 50 percentage and 30 percentage for the ones between 65 and 70. Many studies point out the social security programs themselves led to such an outcome (see column F).

As indicated in the table, pensions are linked to previous wages. In most of the sample countries, pension is determined fully or partially by the worker's previous wage earnings. Either the benefits are simply proportional to contributions or there are other factors as in Canada, Denmark that may incorporate a basic pension scheme, yielding a minimum amount of income for all the elderly, or the pension benefits are directly related to the history of previous wage earnings.

As seen in the table, pensions are linked to work history. For the sample countries people are to work for a certain number of years and to make contribution during this period so as to get the right to collect pensions (column H). The minimum number of years to work that is required being a full pensioner vary from 3 years in Norway, Sweden and United Kingdom to 40 years in Belgium.

As seen in Column I, in most of the countries, the social security system is financed with wage taxes. The worker generally pays a fraction, and the employer pays the rest, although in some countries the government pays a final fraction or becomes the third payer.



Source: Schulz, Borowski, Crown, 1991

FIGURE 1
POPULATION AGEING AND MACROECONOMIC INDICATORS

III.5. Effects of the Systems on Macroeconomic Performance

Many countries have been experiencing population aging and therefore steadily increasing dependency ratios (see Appendix 2A), which resolve to various strains within the social security system of each particular country. As a result of the changes in the demographic structures, i.e. increasing life expectancies (see Appendix 2B), change in fertility (Appendix 2C) and mortality rates, the current systems, mainly PAYG, start facing financial problems which lead to increased social security deficit. In turn, the problems of the existing systems affect overall macroeconomic performance. As indicated in literature survey, a vast amount of literature exists, which investigates the relationship between different social security systems, saving rate and labor market dynamics. In addition to saving rate and labor market, we suggest other macroeconomic indicators such as GDP growth rate, budget deficit and inflation to be considerably affected by social security attributes. In this section, we form a basis to evaluate the validity of the models described in Chapter IV, and to interpret the results presented in Chapter V.

To illustrate the relationship between the macroeconomic indicators stated above and the social security attributes, we have to understand the channels, which constitute the dynamics of this relation. Figure 1 presents an overview of these interrelations.

Governments finance income-related pensions predominantly through payroll taxes on a pay-as-you-go basis. With this type of financing, today's workers support today's retirees so there is no need to build up a pension fund. This is the great attraction of such schemes: full pensions can be given to a first generation of workers who retire before the plan matures, even though they did not contribute the social

security in the early years of their working lives. Moreover, if the demographics and economics are right, these are the pensions, which can be proceeded at little or no cost to succeeding generations of workers. PAYG financing under these circumstances can be justified as enlightened self-interest with no need for emotional appeals to "solidarity" between generations and altruism of young workers toward their elders.

Feldstein (1980) argues that PAYG pensions may have adverse (positive) effect on saving. But economic theory cannot predict the effect on national saving of the introduction of unfunded pensions. Early participants in such plans enjoy a windfall gain, for they receive disproportionate benefits compared to what they contribute in taxes. This is known as the social security wealth effect, which causes the current consumption to rise, so is unambiguously negative for saving. There are two additional effects, which are positively related. First, access to a pension might induce workers to retire earlier than they otherwise would, and, unless the pensions are exceedingly generous, individuals will want to build up over fewer working years in order to supplement their social security income during retirement. This causes workers to increase their rate of saving. Second, individuals save not only for retirement but also to leave an inheritance for their children. Parents, realising that future generations bear the burden of their retirement benefits, may save more in order to leave larger bequest, thus offsetting the impact of social security taxes on their children's incomes. Barro (1974) argues that this bequest effect offsets completely the negative impact of social security wealth on national saving.

The alternative to PAYG is a funded system, which might be expected to have a positive effect on saving. When pensions are administered by governments, however, funding may well be more apparent than real. Even when accounts are kept

'off budget', policy makers typically regard social security contributions as a part of general revenue: they promptly spend it or use the income to reduce the taxes, which causes the public debt to increase. It is a simple matter for a government or a central bank to finance new debt by selling bonds to the social security fund, the assets of which typically consists solely of government bonds. The government has to service its debt, so it remains committed to future transfer payments; the apparent funding amounts to little more than creative accounting, a round about method of PAYG financing.

Willmore (1998) argues some points about saving as follows:

"Private funds may increase saving, but they may have also no effect at all, and they might even decrease saving. If contributions to private pension funds are voluntary and taxed in the same manner as other saving, they will have no effect whatsoever on total saving; saving in pension funds will simply displace other forms of saving. If contributions to pension funds are sheltered from taxes, or are taxed only lightly, their effect on saving may well be negative. "

For national saving to increase, someone's consumption must fall. The government can finance its pensions with taxes, for instance, consequently causing the general public to reduce consumption; or it can pay lower pensions, thereby causing retirees to reduce their consumption. But governments can achieve this same result with tighter fiscal policy or conventional public pension reform, eliminating the need to privatising social security systems.

In the discussion of the effect of social security systems on national saving, it is important to make a distinction between DB and DC schemes. It is more important to make this distinction than to make the choice between funding and PAYG or public and private provision. A DB plan grants pensions on the basis of

each individual's history of covered earnings, irrespective of the payments that he or she may have made into the system. A DC plan, in contrast, credits each participant with actual payments made into the system, much like an individual account.

Presumably, the improvident behaviour, which justifies mandatory participation in social security in the first instance, is still present at retirement, so workers ought to receive a pension rather than a lump sum settlement. With defined benefits, the size of the pension is by definition part of the contract between a worker and the pension scheme. With defined contributions, the worker's accumulated savings have to be transformed into monthly annuity payments.

The demographic trends have placed enormous pressure on the financial viability of the social security systems of many countries. The financial pressure caused by demographic trends is compounded by another trend. In every country, employers are leaving the labor force at younger ages (see Appendices 2D and 2E). It is clear that, there is a strong correspondence between the age at which benefits are available and departure from the labor force. Social security programs often provide generous retirement benefits at young ages due to different retirement age policies of pension systems. In addition, plan provisions often imply large financial penalties on labor earnings beyond the social security early retirement ages. Furthermore, in many countries, disability and unemployment programs effectively provide early-retirement benefits before the official social security early-retirement age. The conclusion is that social security program provisions have indeed contributed to the decline in the labor force participation of older persons, reducing the potential productive capacity of the labor force.

Particularly defined benefit plans and, most dramatically, PAYG pension systems face the problems that arise due to changes in demographic structure. The

decline in labor force participation rate amplifies the problems of financing social security in times of population aging because it implies more beneficiaries and fewer contributors. As indicated by Gruber and Wise (1998), declining old age labor force is strongly correlated with the incentives created by generous early retirement provisions. Unlike defined contribution plans in funded pension systems, PAYG based systems show more unfair design due to its nature.

According to Peter J. Ferrara (1980)¹¹, social security system has three separate effects that tend to distort the labor supply, discourage employment, and create economic inefficiency. The first effect is caused by the payroll tax, which creates a wedge between what an employer pays and what an employee receives. This wedge is equal to the full amount of the social security tax, including both the employer and employee's shares, and is borne entirely by the employee. This wedge reduces the compensation of workers and therefore discourages them from working. With less employment, economic inefficiency and misallocation of resources, the result is lower GNP. Earning test causes the second effect. This test-applied in some European countries and USA- reduces benefits for all beneficiaries under the age of 62 who have annual earnings above a certain limit. It works as a tax on earned income. This reduces the compensation of workers, so discourages employment among the elderly. The third effect is the result of the decreased capital supply, which is caused by the reduction in savings. The loss in capital investment by social security results in lower wages, lower worker productivity, less employment, lower GNP and more unemployment.

The above categorisation, in fact, gives a brief description of the overall effect of social security systems. In addition to this, another important factor is that the existence of Unemployment Insurance. There has been large number of studies

investigating the impact of unemployment insurance on the unemployment rate. These studies reflect not only differences in approach (cross-sectional or time series), but also differences in the way the effect is measured. Some measure the effect of absolute changes in the replacement ratio (see Appendix 2F), others percentage changes and the results can be given in terms of elasticity. There are two studies¹² for the United Kingdom and the United States. The results of these studies yield that Unemployment insurance has a significant but relatively small effect on unemployment rate.

There are nonetheless important differences between pure PAYG and funding with government debt. First, participants in a funded scheme earn only the return that assets of the pension fund earn, so the first generation does not receive a windfall gain on their contributions to social security. They do, however, receive a windfall gain in the form of lower taxes and increase in government spending for social security finance. Second, funding leaves a transparent burden on future generations, since the debt is explicit rather than the implicit debt of unfunded pension liabilities. Third, if real interest rates are higher than real GDP growth, social security contributions will be insufficient to finance pension payments to retirees. In this case, funding with government debt will be equivalent to mature of PAYG scheme only if the latter is financed partly from payroll taxes and partly from general taxes. If, on the other hand, real interest rates on government debt are low or negative, contributions to a social security fund may eventually be larger than payments to retirees. Because governments are prone to spend the revenues they collect, those who favour the funding of pensions also advocate privatization.

¹¹ pp.104-105

¹² Schulz, Barowski, and Crown, PP.158-159

Since there is an apparent relation between government financial position and the social security systems, we incorporate several attributes of social security systems in a model for deficit in the following chapter. Financial position of the existing social security system creates an increasing burden on the budget and also the future generations. Since contribution rates of insured person and employer are not changed due to the structure of the current system (such as PAYG), government has to take more financial responsibility. Furthermore, some features of the systems such as the existence of unemployment insurance becomes an extra budget deficit item.

In a country like Turkey, high rates of inflation may be one of the main characteristics of the economy for extended periods of time. Considering the main goals of social security systems, equity and adequacy, the effects of high rates of inflation on the social security system cannot be ignored. Inflation affects the purchasing power of pensioners, contributions of them through the system, and decision of employers for labor demand, since in most of the countries employers are required to pay premiums for their workers. In addition, high inflation decreases the real value of the accumulated contributions (or funds). We examine whether there exists a relation in reverse direction: do social security attributes have an effect on inflation? For instance, low retirement age in case of increasing life expectancy extends the time period for pension payment. Following that, higher financial burden occurs which may be a driving force for even higher inflation.

Changes in saving propensities, government spending, and labor supply have implications for relative prices, real interest rate, and real exchange rates; these variables in turn feed back onto decisions to spend and produce, therefore change the level of national output. The fact that transition from PAYG towards funded system

leads to higher capital accumulation supports the view of different social security systems having different impacts on macroeconomic performance; the higher the capital accumulation, the higher the level of resources available in the economy, thus the higher are the GDP growth rates. So, we propose that, together with other macroeconomic indicators, GDP growth rate is likely to be associated with the other social security attributes as well.

As described in detail above, the various attributes of social security systems have important effects on main macroeconomic indicators. In the following chapters, we build models for these indicators to empirically investigate their relations with such attributes.

CHAPTER IV

DATA AND MODELS

The main aim of this study is to investigate the relation between the various Social Security (SS) attributes and macroeconomic performance. Our empirical analysis involves models for five basic macroeconomic variables: GDP growth rate, inflation, consolidated budget deficit, unemployment rate and private saving rate. The selection of explanatory variables for each model follows the related literature, to which we add the SS attributes. We describe the variables and provide the sources of data in Section IV.1, and in Section IV.2, we present the models used in our empirical analysis.

IV.1 Variable Definitions and Sources

We use the following variables as the dependent variables in our empirical analysis. All the figures are taken from International Financial Statistics of the International Monetary Fund (IMF, IFS).

1. Private savings to GDP ratio (Spriv):

$$(\text{investment} + \text{current account} - \text{budget surplus}) / \text{GDP}$$

$$\text{investment} = \text{gross fixed capital formation} + \text{change in stocks}$$

2. Budget deficit to GDP ratio (Def/GDP):

(Consolidated central government budget deficit)

3. Unemployment rate (U):

(Percentage of unemployed out of work force)

4. Inflation rate (Inf):

In the empirical analysis, we use a transformed version: $D = \text{Inf} / (1 + \text{Inf})$. This measure has one to one relationships to inflation, but eliminated huge variations across countries.

5. GDP growth rate (GDPgr):

Calculated by using real GDP figures taking base year as 1990

$$\{[(\text{GDP at } t+1) - (\text{GDP at } t)] / (\text{GDP at } t)\} * 100$$

The following are the macroeconomic variables used as the explanatory variables in our models, though not all of them appear in all five models. All the figures are obtained from IFS of IMF.

1. Growth rate of real per capita GDP (grGDPpc):

Calculated by using real GDP and population figures

2. Real interest rate (rint):

$$[(1+i)/(1+\text{Inf})] - 1 \quad \text{where } i \text{ is the nominal interest rate}$$

3. Domestic credit/GDP (domCR):

(Domestic credit claims on the private sector as a portion of GDP)

4. Real per capita GDP (realGDPpc):

(Real GDP / population)*exchange rate

5. Population growth rate (popgr)

6. Exchange rate growth (Devalr)

Growth rate of domestic currency in terms of \$

(Rate of Devaluation)

7. Money growth rate (moneygr):

(Sum of currency outside banks and demand deposits other than those of the central government, refer to M1 generally, given in line 34)

To determine the social security attributes for our analysis, we follow " Social Security Throughout the World " by ISSA- International Social Security Association (1997). Our sample consists of 29 countries as listed in Appendix 1. The sample size is limited by the availability of consistent data. Furthermore, some of the countries in our sample have many different pension schemes, and thus, different contribution rates and benefit style. To include those countries in our sample, we chose the scheme, which has the highest coverage of beneficiaries. The countries in which the schemes are not differentiated according to their coverage area are not included. As a result of this elimination procedure, sample size is limited to 29 countries.

Below, we present the social security attributes that are used in our analysis.

1. Dependency Ratio (depratio):

Ratio of dependent population (persons under 19 and over 65) to the working age population (persons between 19 and 65).

(Source: World Development Indicators)

2. Existence of unemployment insurance (UI):

This variable is indexed as four groups according to size of the coverage of unemployed people.

0: no unemployment insurance

1: labor code requires but not fully applied

2: employed persons but with many exclusions

3: employed persons

(Source: Social Security Throughout the World, 1997)

3. Government Behaviour Towards Social Security System (govtbeh):

Government's financial contribution to the social security system. This indexation consists of four categories according to subsidising behaviour towards the system.

0: no contribution

1: regular subsidy

2: support for any deficit

3: variable subsidy and support for cost

In this grouping, variable subsidy is thought as a greater contribution to the system than others, because besides deficit compensation, further contribution may also be made.

(Source: Social Security Throughout the World, 1997)

4. Contribution rate of insured person (inscont):

Contribution rate (premiums) of insured person as a percentage of average earnings.

(Source: Social Security Throughout the World, 1997)

5. Contribution rate of employer (empcont):

Contribution rate (premiums) of employer as a percentage of average earnings.

(Source: Social Security Throughout the World, 1997)

6. Effective retirement age for women (ERAw):

Effective retirement ages for women calculated by dividing retirement ages to life expectancies at birth.

(Source: Social Security Throughout the World, 1997)

7. Effective retirement age for men (ERAm):

Effective retirement ages for men calculated by dividing retirement ages to life expectancies at birth. Rather than using those retirement ages, effective retirement ages are more suitable to include in the analysis as pointed out by Yeldan (1998).

(Source: Social Security Throughout the World, 1997)

8. Contribution/expenditure (contSS/expSS):

Ratio of amounts of contribution by employer and insured person for social security to public expenditure for social security.

(Source: Government Financial Statistics- GFS of IMF)

9. Social security deficit as a percentage of GDP (defSS/GDP):

Calculated as subtracting expenditure on social security system from social security contributions collected from employer and employees and dividing it by GDP.

(Source: Government Financial Statistics- GFS if IMF)

10. Public expenditure on social security/ total public spending (pubSS/Tpub):

Ratio of public spending on social security systems to total public spending.

(Source: Government Financial Statistics- GFS of IMF)

IV.2. Models

GDP Growth Rate

There are many studies on the determination of economic growth. Just to name a few, King and Levine (1993) present cross-country evidence for the relation between financial sector development and GDP growth rate. The study by Alesina and Rodrik (1994) provide a framework for economic growth under the political and economic aspects. Furthermore, Barro (1991) investigates the demographic and financial determinants of growth rate of real per capita GDP across countries. In accordance with the results of these studies, we include variables 1 to 4 for our GDP growth model. Variables 5 to 11 are potentially relevant social security attributes, with which we extend the model.

- ***dependent variable:*** GDP growth rate
- ***explanatory variables:***
 1. private saving rate
 2. budget deficit
 3. inflation
 4. real per capita GDP
 5. government behaviour towards social security system
 6. dummy variable for unemployment insurance coverage
 7. Employer's contribution rate
 8. Insured person's contribution rate

9. public expenditure on social security as a portion of total public spending

10. dependency ratio

11. ratio of contributions from employer and worker to public expenditure on social security

Private Saving Rate

There are basically two studies which lead us to structure the private saving rate model: First one is from Baillu and Reisen (1998) which points out the effects of different pension systems on aggregate saving rate. The second one is by Edwards (1995), and it examines the difference in the saving rates across countries. In the light of these studies, variables 1 to 5 are included to our model. The rest of the variables are the additional ones to introduce the social security attributes to our private saving rate analysis.

- ***dependent variable:*** Private saving rate/GDP
- ***explanatory variables:***
 1. dependency ratio
 2. growth rate of percapita GDP
 3. per capita income
 4. real interest rate
 5. domestic credit as a portion of GDP
 6. government behaviour towards social security system
 7. employer's contribution rate
 8. insured person's contribution rate

9. ratio of contributions from employer and worker to public expenditure on social security
10. dummy variable for existence of unemployment insurance
11. effective retirement age for man
12. effective retirement age for woman
13. public expenditure on social security as a portion of total public spending

Unemployment Rate

Although we have no previous study at hand predicting the determinants of unemployment rate, we hypothesise that social security systems affect labor market significantly. Thus, we determine the model for unemployment rate by considering the possible macroeconomic variables (1 to 4), and related social security attributes as follows.

- ***dependent variable:*** unemployment rate
- ***explanatory variables:***
 1. inflation
 2. population growth rate
 3. real per capita income
 4. per capita income growth rate
 5. effective retirement age for men
 6. effective retirement age for women

- 7.dummy variable for the existence unemployment insurance
- 8.government behaviour
- 9.public expenditure on social security as a portion of total public spending
- 10.insured person's contribution rate
- 11.employer's contribution rate

Budget Deficit

Our budget deficit model follows the guidance of some previous works. The study by Roubini (1991) highlights the economic and political determinants of budget deficit. Also, Alesina and Perotti (1995) provide a framework for the cross-country differences of budget deficits. By considering those studies, we include variables 1 to 3 used in the model for budget deficit¹³, variables 4 to 12 are social security attributes that we hypothesise to affect this relation.

- ***dependent variable:*** budget deficit/GDP
- ***explanatory variable:***
 - 1.GDP growth rate
 - 2.inflation
 - 3.unemployment rate
 - 4.dummy variable for existence of unemployment insurance

¹³ In this study, however, we do not include political variables due to difficulties in gathering this data, mainly due to time constraints.

- 5.government behaviour towards social security system
- 6.contribution rate of insured person
- 7.contribution rate of employer
- 8.effective retirement age for men
- 9.effective retirement age for women
- 10.public expenditure on social security as a portion of total public spending
- 11.dependency ratio
- 12.ratio of contributions from employer and worker to public expenditure on social security.

Inflation

Many studies in the literature have suggested that inflation is highly correlated with budget deficit. Metin (1998) analyses the relationship between inflation and budget deficit for the Turkish economy. Furthermore, Rogerson and Rupert (1993), Abdullah and Hanna (1994), Azariadis and Smith (1996) examine the relation between inflation, output and money growth rate. Moreover, Metin (1995) examines the inflationary process of Turkish inflation. Ertel and Insel (1993) state the determinants of inflation. Those studies guide us to predict the variables 1 to 4. We add the rest of the variables to examine the impact of social security attributes.

- ***dependent variable:*** inflation
- ***explanatory variables:*** 1.money growth rate
2.exchange rate growth

3. budget deficit
4. domestic credit as a portion of GDP
5. dummy variable for existence of unemployment insurance
6. government behaviour towards social security system
7. public expenditure on social security as a portion of total public spending
8. social security deficit as a ratio of GDP
9. dependency ratio
10. ratio of contributions from employer and worker public expenditure on social security

CHAPTER V

ESTIMATION TECHNIQUES AND REGRESSION RESULTS

We use the methods of OLS, 2SLS, SUR and the OLS by using the principal components to estimate for all five models. Section V.1 gives the description descriptions of estimation techniques and explains the reasoning behind the use of different techniques in the analysis. Section V.2 reports the estimation results using these techniques. We report the results of OLS technique in Section V.2.A. In Section V.2.B, we present Ramsey-reset test, White-Heteroskedasticity test, Chow test and outlier test for OLS results; Section V.2.C includes the results of 2SLS estimation. In Section V.2.D, SUR and OLS estimation by Principal Component method are presented.

V.1 Description of the Techniques Employed in the Estimation of the Models

In several of our models, it is possible that there is a two-way causality between the explanatory variables and the dependent variable. Such a two-way causality would result in the error term being correlated with the dependent variable and the OLS estimates would then be biased and inconsistent. The problem is addressed by estimating the model using a 2SLS estimation procedure.

The seemingly unrelated regression method (SUR, also called multivariate regression or Zellner's method) applies to a system where each equation has an

endogenous variable on the left hand side and only exogenous variables on the right hand side. As in the standard regression case, the disturbances are assumed to be uncorrelated with the exogenous variables. Each equation of this kind of a system could be estimated equation by equation. However, if the disturbances of the equations are correlated, the SUR estimator is more efficient, because it takes account of the entire matrix of correlations of all of the equations.

The SUR estimator minimises the determinant of the covariance matrix of the disturbances. Each iterations of SUR reestimates the parameters after transforming the equations to remove the correlation across the residuals. You can take one iteration or iterate to convergence. In our empirical analysis, SUR yields generally the same result with the OLS for all the models.

As the last approach, we perform OLS by Principal Component (PC) approach using SHAZAM computer package. Our models have too many right hand side variables, which possibly create degrees of freedom problem. Also, it is possible that, some linear or nonlinear combinations of right hand side variables can better explain the variations in the dependent variable. Thus, we suggest that including some combination of social security attributes can be more relevant than individual attributes themselves. Thus, we first, determine principal components from social security data included in the original models, and then use those variables are used as explanatory variables with other macroeconomic variables. SHAZAM gives four principal components (PC), but we use the first and second ones only for subsequent PCs generally account for much lower variation in the social security attributes.

Ramsey-Reset test is one of the tests for the model misspecification. This test is used for cross-section models as well as time-series model. By Ramsey-Reset test, the estimated value of the dependent variable is used as an explanatory variable in

the model, along with some powers of itself. In addition, we use White-Heteroscedasticity test to check for heteroscedasticity. We observe however, that this method also yields the same results as in regressions without the heteroscedasticity correction except for the GDP growth rate model. Also, in order to check for possible breakpoints in our data, we apply Chow test. Furthermore, we apply outlier test by excluding one observed extreme observation from the analysis.

V.2. Regression Results

V.2.A Ordinary Least Square (OLS) Estimation

For each model, in addition to basic macroeconomic variables, we introduce social security variables one by one. Those estimation results are reported in Appendix 3. Tables 2 to 7, however report the estimation of the models outlined in Chapter IV. In what follows, we only describe the variables that appear significant in each model.

Budget Deficit

We use four alternative specifications for budget deficit model, differing from each other mainly by the use of unemployment rate as explanatory variable. As seen in the correlation matrix (see Appendix 4), there is a high and negative correlation between unemployment rate and dependency ratio. Thus, the first three of them do not include the unemployment rate for checking. The fourth one gives the best results with the highest R-square (0.83) and F-statistics. We exclude pubSS/Tpub and

contSS/expSS one by one from the model through run1 to run3. The following variables are observed as significant:

According to our results, GDP growth rate (**GDPgr**) has a negative relation with deficit. Intuitively, one can expect that the higher the GDP, the higher the net taxes which lowers the budget deficit. Generally, developed countries have relatively lower deficits as a portion of GDP, whereas poor countries have more inefficient tax systems and may be more prone to deficit. According to the national income identity, government spending leads to larger GDP, but the inverse relation is not necessarily true. If the GDP growth rate increases, more resources can be created to finance the deficit, thus deficit can be reduced so as to confirm our result.

Model shows that, **pubSS/Tpub** is associated with deficits negatively. Given that deficit = $G+TR-T$, public spending on social security (SS) and welfare is an item of TR. Spending on social security exhibits more stable behaviour according to other public spending items. As in most of the countries, especially in Europe, there is a strong tendency to lower the public spending items (through privatization), but this is not true for SS spending, as most systems are still government-run. Furthermore, it should be noted that, since in a considerably high-inflation environment, transfer payments are adjusted to inflation, the dynamic relation between SS spending and other spending items should be carefully examined. When we look at the five-year period time trends of pubSS/Tpub and other public spending, most of the countries show a stable behaviour (e.g. United States, Malaysia, S.Korea) in such a way that, there is no sharp increase or decrease in their social security spending in five-year period.

Our model shows that unemployment rate **U** is associated with deficit significantly and has a positive relation with it. A possible explanation for this is as

follows: If the unemployment rate increases, there is a recessionary gap which means economy is under the potential output level, which may lead to expansionary policies and thus to deficit. Furthermore, if unemployment insurance exists in a country and this covers a large portion of public spending on SS, this may cause higher deficit, because high portion of the unemployment insurance is financed by government which means systems is not financed by the contributions of insured persons and employer. However, this kind of relation is most probably not seen in many countries. Another possible reason of this result is that, unemployment insurance generosity makes people to be out of labor force due to sociological factors. This point is also examined in recent studies, but it is not aligned with any economic theory.

An interesting result is the negative relation between effective retirement age for women (**ERAw**) and deficit. The effective retirement age for a man (**ERAm**), however not significant. By closely observing data, "ERAw" shows more variable behaviour than retirement age for man. This variation should be interpreted by considering sociological and cultural differences between countries. If the retirement age increases, pension payments are made for shorter period. This causes a reduction in public spending on social security. Furthermore, this result is highly related to the labor force participation of older people. Literature strongly argues that a decrease in the labor force participation rate due to lower effective retirement age of elderly people creates higher burden on deficit.

GDP Growth Rate

Due to possible multicollinearity among the social security attributes, we try different sets of right hand side variables and obtain three different model

specifications numbered as runs 1 through 3 as reported in Table 3. The main difference is to introduce insured and employer's contribution rates as explanatory variables in the third run and the use of different combinations of pubSS/Tpub and $\text{contSS}/\text{expSS}$ in the first two. All models yield significant effects of deficit and pubSS/Tpub . Furthermore, GDP growth rate model results are obtained by applying White heteroskedasticity correction¹⁴. Estimations lead to following results.

We obtain that high deficit **Def/GDP** brings low GDP growth rate. Here, the reason of high deficit should be examined. Deficit includes returnable and unreturnable spending items such that spending for social security. Government spending has both "returnable" (public investment) and "unreturnable" (spending for security, government worker spending and etc.) spending items whereas transfers are unreturnable spending items. If the returnable part of spending has a large proportion, and deficit occurs due to this, it is expected to increase working areas and an increase in GDP. But if deficit is generated by unreturnable items, this could lead to a significant reduction in GDP. As mentioned in the deficit model, social security public spending and the deficit of the current systems is a major component of the budget deficit, so, for our sample this result is not surprising. Furthermore, since benefits are adjusted to inflation, this causes an increase in deficit, thus a reduction in the GDP growth rate.

We find a negative relation between **pubSS/Tpub** and the GDP growth rate, which is also supported by the above result. If social security payments have a large proportion of the overall public spending, this leads to a reduction in GDP growth rate due to its unreturnable fashion.

¹⁴ V.3.C. explains White-Heteroskedasticit test.

Private Saving Rate

We estimate private saving rate with three different specifications reported in the Table 4 as runs 1 to 3. The difference between these models is the use of "pubSS/Tpub" and "contSS/expSS" variables, since there is a strong relation between those variables, these two variables should be used separately (see Appendix 4 for correlation matrix). In the third run, we add both of them as explanatory variables, but none of them becomes significant. But if we add them separately as in the run 1 and run 2, both of them become significant. As an alternative specification, which is not reported here due to low R-square (0,24) and F-statistics, the variable "pubSS/Tpub" is significant and has negative sign. This result gives a support for the notion that reforms, which replace government run SS systems by privately-run capitalisation systems will tend to result in higher private saving rates. The variables that appear significant are as follows:

The coefficient of domestic credit — claims on private sector- **domCR** was significant and has positive sign in our analysis. Overall, this result does not provide borrowing constraints have resulted in lower savings. There are several possible explanations for this result. The first one is that the share of private credit is a very (poor) proxy for borrowing constraint, and that this operates on households saving, and not on private savings. But, more adequate measures of borrowing constraints, such as the down-payment required to buy a house, which is not available for this sample, could give a reasonable sign (negative),

Our analysis gives a negative sign between real per capita growth rate (**realGDPpc**) and private saving rate. The literature argues that, in a life-cycle setting, income growth will have an important positive effect on private savings. This is largely the result of an aggregation across households. If an economy is growing,

workers' saving will increase relative to retirees' dissaving and thus, measured savings will increase. However, as Basworth (1993) has pointed, there will also be an effect moving in opposite direction. In a growing economy, workers will tend to increase present consumption and reduce savings. We examine the consumption and saving data in order to see this type of behaviour and we obtain that some countries such as Italy, Israel, Denmark show this type of trend.

According to the life-cycle hypothesis, a country with a relatively high proportion of dependants (i.e. inactive young and old) relative to working population (**Depratio**), which means each working person should finance more inactive people, population experiences lower saving rates. Our model supports this. As indicated in most of the earlier studies, differences in demographics indeed play a key role in explaining differences in saving rates.

We observe that, if the system is financed mostly by contribution of employer and insured person contributions (**ContSS/expSS**), this affects private saving rates negatively. Due to this reason, many countries try to implement funding systems also to create new saving tools under the social security system, for which the response of private saving will not be as in government-run social security systems (PAYG).

The estimation results show a positive relation between **pubSS/Tpub** and private saving rate. If **pubSS/Tpub** increases, which means contribution of employer and insured person becomes less than benefits, this leads to an increase in the private saving rate. Furthermore, if the spending on the system increases, people have less trust in the system, which means that they try to guarantee their future incomes by alternative saving tools. By the increase in public spending, public trust decreases, and this causes further increase in deficit. Through this process, current government-

run system loses the role of guaranteeing future benefits. Transition towards the reform usually starts due to continuous accumulation of deficit.

Unemployment Rate

We have two model specifications for unemployment rate indicated as run 1 we report in Table 5. According to our model, deficit, real per capita income (at %95 level of confidence), per capita income growth rate and effective retirement age for women (at %90 level of confidence), and public spending on social security is significant.

Our finding suggest that the income (**realGDPpc**) is negatively related with unemployment rate. It is logical that, less developed countries are faced with higher unemployment rate.

We observe a positive relation between percapita income growth rate and unemployment. Data is examined to search for the reason of this positive relation between income growth rate (**grGDPpc**) and unemployment. We see that among 29 countries, 9 of them show relatively lower unemployment rate and growth rate with respect to whole sample. It is probably due to those observations that our data does not support the theory behind the growth and unemployment, which would normally indicate a negative association. We look at the descriptive statistics, and we see that there is negative correlation between real per capita income and growth. Thus, this different signed relation between income growth rate, rather than percapita income, and unemployment rate is obtained.

There is a positive relation between **pubSS/Tpub** and unemployment rate. If social security expenditures by public have large proportion, again this can have two

components, high spending on social security or low spending on other items. As in the deficit model, the reasoning between deficit and unemployment is also valid here.

If the effective retirement ages for working people increase, labor force of elderly people increase for both men and women. In our analysis, the variable for women (**ERAw**) becomes significant and has positive sign. If publicly or privately new investments are not established, these lead to unavailability of working positions, and thus increase in unemployment with population growth. The interpretation associated with negative relation between "ERAw" and unemployment rate should therefore be based on the changing demographic factors. These changes result in the change of the relationships between unemployment and demographic factors. In light of the system analysis part and the literature survey, the obtained result can be considered as meaningful.

Inflation

For the inflation model, there are three main model specifications. Each group consists of three different runs. In addition to first group's variables -runs 1 through 3, the second one includes dependency ratio- runs 4 through 6, and the third one has dependency ratio, "UI" and "govtbeh" variables -runs 7 through 9. Each group is differentiated according to use of defSS/GDP, pubSS/Tpub and contSS/expSS variables. All of the inflation models give high R-squares (0,96) and F-statistics. The results are given in Table 6.

Money growth (**moneygr**) plays a special role in determining inflation not because money affects prices more directly than other factors do, but because variations in money growth account for most of the variation in aggregate demand. Hence, the higher the money growth, the higher is the inflation rate.

Our results show a positive relation between rate of devaluation (**Devalr**) and inflation. It is clear that the higher the rate of devaluation leads to higher import price and domestic prices.

Instead of the public sector, domestic credit claims on the private sector (**domCR**) could be a sign of effective allocation of resources provided that the private sector is profitable. In this case, we would expect a negative relation between inflation and domestic credit as a portion of GDP. Our result confirms this intuition.

Our results suggest that the higher deficit of Social Security system as a portion of GDP, **defSS/GDP**, the higher the inflation rate. When we consider the deficit of the Social Security system as a component of overall budget deficit, a higher financial strain on the budget most probably leads to a higher inflation rate.

As mentioned before, public social security spending item (**pubSS/Tpub**) can be named as transfer payments, which are unreturnable items as opposed to other public spendings, such as investment. Thus spending on social security could not be considered as a spending item inducing growth. As indicated in the literature survey, most of the countries are prone to higher burden due to lower contributions from employers and workers which increases the financial supporting responsibility of government. Thus, it is reasonable that higher public spending on social security will lead to higher inflation.

We expect that the ratio of contribution by both employer and insured person to public spending on social security, **ContSS/expSS**, should behave in the opposite direction of the previous variable ,pubSS/Tpub. If the ContSS/expSS is higher for a country, it is clear that the government's financial support for the system is less than the other contributors. Such a relation appears to lead to a lower inflation rate

Our result shows a negative sign for the relation between **Depratio** and inflation. Our sample consists of countries with inflation rates that have a large variety. We overcome this problem by taking the transformation of inflation. As opposed to this, dependency ratios do not show a large variety. Furthermore, it is known that, most of the countries face the problem of high dependency ratio whether developed or developing. Thus, the relation between this variable and inflation rate could have either positive or negative sign. However this relation is only marginally significant.

Government behaviour towards social security system **Govtbeh** is indexed according to country's financial support to the system, where the higher is the index, the higher is the support. We obtain a negative relation between Govtbeh and inflation. This relation should be evaluated from two different points of view. First, it could be considered that a developed country, which overcomes its high inflation problem supports its social security system more than less developed countries. Thus, the negative relation is intuitive. Secondly, higher financial responsibility of government to the system creates a belief among the people so that they trust the system. This may decrease the leakage ratio of the working population from the system, which induces growth and results in lower inflation rates.

V.2.B. Tests of Model Specification

We apply Ramsey-Reset test to all models for model specification. This test controls the model specification errors. We then look at the F- and chi-square statistics to test the hypothesis that coefficients on the forecast vectors (the predicted

values of dependent variables) are all zero. All the models, except for two of the model specifications of inflation, indicated as runs 2 and 3 in Table 6, pass this test.

Another test employed in our analysis is the White heteroskedasticity test which is applied to the residuals from least square regression. The powers and cross products of right hand variables are included in the model to obtain an augmented regression. This test is applied for model misspecification. The null hypothesis is that the errors are homoskedastic and independent of the regressors and that the linear specification of the model is correct. The statistics provides a test of the hypothesis that the coefficients of the variables in augmented regression are all zero. The output from the test is F-statistic and a statistic which will have an chi-square distribution with degrees of freedom equal to the number of regressors and squared regressors in the test regression.

For the GDP growth rate model, the calculated F-statistic is 0.64 but the critical value is 2.01. So, according to this test, null hypothesis is rejected for this model and we conclude that there is heteroskedasticity in errors. Thus, GDP growth rate model is estimated by White Heteroskedasticity correction.

In order to test the breakpoint problem of our data, we apply Chow Breakpoint test. The main aim of this test is to see whether the coefficient vector is constant over the subsets of data. Since our data is not time series, to apply this test to our models, we first order the data according to each dependent variable. After this, by examining the data using graphs, we partition this data into two parts if there is a sharp difference observed in magnitude. Our application of Chow test to our models, therefore, unavoidably leads to sample selection bias.

As a second way, we examine the explanatory variables of the models, and choose two variables that we suspect to generate breakpoint. We then apply the

Chow test to these models by indicating these variables. Comparing the F-statistic of each model to the critical values, we observe that our models do not have any breakpoint problem. We also applied Wald test on data partitions to look at parameter restrictions, and the results confirm that no breakpoint exists in our data set.

As seen in the data set given in Appendix 1B, the data for inflation shows a great variety among the sample countries. Especially Turkey's data seem to be an extreme observation. In order to overcome this problem, as indicated in Section IV.1, we transform the inflation data. However, the great variation for inflation data among the countries still exists. Thus, to check whether this data is outlier or not, we apply an outlier test.

For this test, we estimate all the models twice, first with including Turkey and second by excluding Turkey. When we compare the results of each group, we see no difference between the significance of variables, coefficients or the test statistics. Thus, we conclude that, there is no outlier in our data set.

V.2.C. Two Stage Least Square Estimation (2SLS)

Below we report the results of the 2SLS analysis for each of the model explained above.

In budget deficit model, it is possible that there is a two-way causality between deficit and inflation. The problem is addressed by estimating the model for budget deficit, where money growth rate and exchange rate growth and all the other explanatory variables are employed as instruments for inflation in the first stage. As

shown in Table 2, the results of the 2SLS estimation for the deficit model do not differ much from the OLS results.

Likewise, the saving rate, in the model for GDP growth rate, is instrumented by domestic credit and real interest rate variables. As compared to OLS results, insured person's contribution rate becomes significant in 2SLS. As seen in the Table 3, run 3 for 2SLS, the sign of *inscont* also becomes positive. It is known that, social security system is mostly financed by insured person's and employer's contributions. As the contribution of insured person becomes higher, the burden on the public sector due to benefit payments becomes lower. So, it can be considered that, higher contributions help to reduce social security deficit, thus, it can lead to create more resources to increase the national output.

For the private saving rate model, there are theoretical arguments by Baillu and Reisen (1997), to justify the two-way causality between saving rate and income growth rate. So, income growth rate is instrumented by the population growth rate and the inflation rate. We see that, such an attempt do not improve our model. As shown in Table 4, some of the significant variables in OLS estimation are not significant in 2SLS results.

When we estimate the unemployment model by the 2SLS estimation technique, we instrument the inflation rate by money growth rate and exchange rate growth. However, the model does not improve in terms of R-square, F-statistics and the additional significant variable. Results can be seen in Table 5.

Inflation model is also estimated by the 2SLS method, where deficit is instrumented by GDP growth rate and private saving rate. As a result of the estimation, some variables such as exchange rate growth losses its significance in the

explanation of variation in the inflation. Also, lower R-square and F-statistics are obtained. The results can be seen in Table 6.

V.2.D. Principal Components and Seemingly Unrelated Regression (SUR) Estimation

In addition to OLS and 2SLS, we also employ SUR and Principal Components analysis to estimate all five models. As a result of SUR method, in the budget deficit model, employer's contribution rate becomes significant, unlike in the OLS and 2SLS estimations. According to this analysis we find a positive relation between the employer's contribution rate and deficit for which the intuition is as follows. When the employer is forced to pay higher contribution for their workers, the leakage of the SS system usually becomes higher which means participation rate to the existing system is low (creating informal sector). For example, just 40 percentage of the working population is under the coverage of the SS system in Turkey. The most important reason for this is the employers' action towards not to pay the required premiums. The existing leakage from the system and the informal sector could be a possible linkage of this variable with high budget deficit. The SUR estimation for the other models does not add to the list of any significant variable.

As the last method, we employ OLS estimation with principal components for each of the models. We only use the first two principal components obtained from each models' own social security variables. The other principal components generally account for much lower variation in the social security attributes. For the unemployment rate model, none of the principal components are significant. For the other models, however, first principal component's of each model is significant with

higher F-statistics though lower R-squares are obtained for some of them. The economic variables obtained as significant from OLS estimation still protect their significance. The results for principal components and SUR estimation are reported in Table 7.

VI. CONCLUSION

Since 1980s, a considerable number of countries have been reforming their social security systems, especially experiencing a transition from unfunded to funded systems. This transition is mainly due to improvements in demographic factors, which have had two important consequences. First, the social security system causes a deterioration of the economy due to greater financial burden. Second, the structure of the social security systems starts being insufficient in carrying out its main goals such as individual equity and adequacy. The financing methods and benefit distribution schemes become incapable of competing with the changes in demographic factors, such as the increased dependency ratio and life expectancy.

The need for the social security reforms, and the experiences of the countries that have gone through such reform processes, have induced us to investigate the relationship between some major economic indicators and social security systems. This study analyzes the effects of social security attributes on macroeconomic performance. In this paper, we build models for five main macroeconomic indicators, GDP Growth Rate, Private Saving Rate, Budget Deficit, Unemployment Rate, and Inflation, with both relevant macroeconomic variables and social security attributes such as social security deficit, contribution rates, dependency ratio, retirement ages, public spending on social security, government behavior towards social security system, and the existence of unemployment insurance.

We perform a cross sectional analysis, using 29 countries' data averaged over a five-year period, 1992-1997, and estimate the models by OLS, 2SLS, SUR, and Principal Component techniques. We apply Principal Component technique to

relevant social security attributes of each model in order to eliminate the potential degrees of freedom problem due to number of right-hand side variables being considerably high.

Most of the significant variables for each model appear to be consistent with the theory, such as the Life Cycle Hypothesis, and also, they come about as intuitively expected. The results of all the estimation techniques are consistent among themselves, however, some variables show different behavior between the 2SLS and OLS results.

Some of the main findings of this study are as follows: Public spending on social security as a ratio of total public spending is negatively related to budget deficit. Increased social security spending of the government induces lower GDP growth rate. Besides, contribution rate of insured person appears to be in a significantly positive relation with the GDP growth as a result of the 2SLS estimation.

In the private saving rate model, the contribution by employer and insured person for social security as a ratio of public expenditure for social security has a negative effect. An interesting result comes from the unemployment rate model: effective retirement age of women is negatively related with unemployment, an anomaly which must be explored further. Also, public spending on social security, as an unreturnable item of public spending, is positively associated with unemployment. This variable is also significant and has a positive relation with inflation. Dependency ratio and government's accommodative behavior towards social security system are also significant in our inflation model analysis. Besides this, several of the macroeconomic variables that are suggested in the related literature are also significant for each of our models. In a separate experiment, we observe that, for

every model, the first principal component of the social security attributes appears significant, except for the unemployment rate model.

In sum, the main contribution of this study is first to determine possible social security system indicators; to assemble a set of social security attributes, generating some of them. Moreover, we estimate the effects of those social security attributes on several macroeconomic indicators. The existing studies generally compare different types of social security systems instead of the individual attributes of social security systems. Moreover, existing studies address the effects of different social security systems on saving, growth and labor market only. This study is an attempt to close this gap.

The main finding of this study is that several of the social security attributes are significantly related with main macroeconomic indicators, and therefore with the overall macroeconomic performance. For further work, this study can be extended to include time-series dimensions for a panel data analysis. Moreover, the number of countries included in the analysis can be enlarged, as a result of which the sample size would allow the analysis to include other features of social security system such as the system type. This could facilitate the investigation the effects of different social security systems on the macroeconomic performance.

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TABLE 2: OLS AND 2SLS RESULTS FOR BUDGET DEFICIT MODEL

explanatory var.	OLS				2SLS			
	run1	run2	run3	run4	run1	run2	run3	run4
c	33.38	26.82	23.74	27.92	33.58	27.27	23.82	28.19
tranlnf	0.005	-0.008	0.03	-0.012	-0.008	-0.02	0.03	-0.02
GDPgr	-0,87 (***)	-0,90 (***)	-0,62 (**)	-0,89 (***)	-0,87 (***)	-0,9 (***)	-0,62 (**)	-0,88 (***)
U				0,29 (*)				0,28 (**)
govtbeh	0.26	0.22	0.1	0.36	0.24	0.2	0.1	0.34
uneins	-0.05	-0.25	-1.01	0.012	-0.13	-0.33	-1.03	-0.03
inscont	0.07	0.07	-0.06	0.1	0.07	0.07	-0.06	0.1
empcont	0.09	0.11	0.14	0.01	0.1	0.11	0.14	0.02
ERAm	-1.62	5.022	-2.38	2.56	-0.004	6.74	-2.07	3.98
ERAw	-34,17 (*)	-29.11	-25.74	-33.73	-35,91 (*)	-31.37	-26.18	-35.19
depratio	-0.08	-0.87	6.01		0.22	-0.47	6.12	
pubSS/Tpub	-0,17 (**)	-0,12 (**)		-0,20 (***)	-0,17 (**)	-0,13 (**)		-0,20 (***)
ContSS/expSS	0.03			0.03	0.03			0.031
R-square	0.75	0.73	0.63	0.83				
Adj. R-square	0.52	0.49	0.35	0.58				
F-stat.	3,6(*)	3,75(*)	2,68(*)	6,01(*)	3,59(*)	3,74(*)	2,67(*)	6,01(*)
F-stat(SS vars)	2,07(*)	2,05(*)	1.23	3,12(*)	2,04(*)	2,02(*)	1.56	1.89

Note:

(***) Significance level for 99% level of confidence

(**) Significance level for 95% level of confidence

(*) Significance level for 90% level of confidence

TABLE 3:OLS AND 2SLS RESULTS FOR GDP GROWTH RATE MODEL

explanatory var.	OLS			2SLS		
	run1	run2	run3	run1	run2	run3
c	5.52	7.67	5.73	-1.33	2.05	-1.35
traninf	0.029	0.01	0.02	0.04	0.02	0.04
Def/GDP	-0,64 (***)	-0,62 (***)	-0,63 (***)	-0,65 (***)	-0,63 (***)	-0,63 (***)
Spriv	0.06	0.05	0.04	0.16	0.12	0.15
realGDPpc	-0.07	-0.67	-0.07	-0.07	-0.06	0.23
govtbeh	0.28	0.33	0.29	0.46	0.48	0.49
UI	0.22	0.23	0.22	0.4	0.41	0.95
inscont			0.01			-0,009(*)
empcont			-16.1			-13.79
depratio	0.06	-0.82	-0.65	4.46	2.78	1.46
pubSS/Tpub	-0.07	-0,02(*)	-0.07	-0.05	-0,08(*)	-0,16 (**)
ContSS/expSS		-0.05	0.01		-0.01	0.01
R-square	0.76	0.74	0.77			
Adj.R-square	0.58	0.52	0.6			
F-stat.	6,81(*)	6,19(*)	4,67(*)	5,43(*)	5,47(*)	5,28(*)
F-stat(SS vars)	5,48(*)	5,22(*)	3,96(*)	4,32(*)	4,12(*)	4,5(*)

Note:

(***) Significance level for 99% level of confidence

(**) Significance level for 95% level of confidence

(*) Significance level for 90% level of confidence

TABLE 4:OLS AND 2SLS RESULTS FOR PRIVATE SAVING RATE MODEL

explanatory var.	OLS			2SLS		
	run1	run2	run3	run1	run2	run3
<i>c</i>	95,46 (*)	141,89 (*)	113,44 (**)	88.22	145	94.23
<i>rint</i>	-0.23	0.06	-0.14	-0.55	-0.62	-0.54
<i>domCR</i>	0,10 (*)	0,08 (*)	0,09 (*)	0.11	0.1	0,11 (*)
<i>grGDPpc</i>	-0.35	-0.02	-0.25	-1.06	-1.75	-1.08
<i>realGDPpc</i>	-4,02 (*)	-5,02 (**)	-4,52 (*)	-5.07	-8.15	-5,07 (*)
<i>govtbeh</i>	-0.58	-0.88	-0.69	-0.42	-0.59	-0.45
<i>UI</i>	-0.32	-0.34	-0.56	-0.58	-0.23	-0.43
<i>inscont</i>	0.05	-0.005	0.03	0.12	0.13	0.11
<i>empcont</i>	0.25	0.22	0.25	0.25	0.18	0.25
<i>ERAm</i>	-64.75	-98.29	-77.93	-67.74	-123.66	-72.79
<i>ERAw</i>	24.02	-1.36	14.65	43.28	38.7	41.29
<i>depratio</i>	-49,36 (*)	-53,44 (**)	-51,08 (*)	-50,94 (*)	-59,56 (*)	-51,68 (*)
<i>pubSS/Tpub</i>		0,73 (*)	0.31		0.98	0.11
<i>ontSS/expSS</i>	-0,09 (*)		-0.05	-0.1		-0.09
R-square	0.62	0.61	0.62			
Adj.R-square	0.25	0.27	0.26			
F-stat.	2,56(*)	2,51(*)	2,25(*)	2,44(*)	1.9	2,14(*)
F-stat(SS vars)	2,67(*)	2,63(*)	2,6(*)	2,55(*)	1.98	2,53(*)

Note:

(***) Significance level for 99% level of confidence

(**) Significance level for 95% level of confidence

(*) Significance level for 90% level of confidence

TABLE 5:OLS AND 2SLS RESULTS FOR UNEMPLOYMENT MODEL

	OLS	2SLS
explanatory var.		
c	1.51	1.02
popgr	-0.47	-0.59
traninf	0.11	0.17
realGDPpc	-0,31 (*)	-0,31 (*)
grGDPpc	0,91 (*)	0,92 (*)
govtbeh	-0.5	-0.47
UI	0.59	0.8
inscont	-0.32	-0.34
empcont	-0.01	-0.03
ERAm	-56.75	-65.01
ERAw	57,63 (*)	65,90 (*)
pubSS/Tpub	0,42 (***)	0,43 (***)
R-square	0.68	
Adj. R-square	0.42	
F-stat.	2,94(*)	2,96(*)
F-stat(SS vars)	3,13(*)	3,15(*)

Note:

(***) Significance level for 99% level of confidence

(**) Significance level for 95% level of confidence

(*) Significance level for 90% level of confidence

TABLE 6: OLS AND 2SLS RESULTS FOR INFLATION MODEL

OLS									
explanatory var.	run1	run2	run3	run4	run5	run6	run7	run8	run9
c	-0.19	-5.15	-1.8	8.32	6.98	9.89	10.8	13.5	11.66
<i>Def/GDP</i>	0.19	0.12	0.19	0.13	0.072	0.13	0.063	0.11	0.1
<i>moneygr</i>	0,6 (***)	0,72 (***)	0,64 (***)	0,86 (***)	0,95 (***)	0,79 (***)	0,91 (***)	0,77 (***)	4,29 (***)
<i>Devalr</i>	0,36 (***)	0,29 (**)	0,34 (**)	0.17	0.11	0.21	0.11	0.21	0.15
<i>domCR</i>	-0,11 (***)	-0,1 (***)	-0,11 (***)	-0,12 (***)	-0,11 (***)	-0,12 (***)	-0,12 (***)	-0,13 (***)	-0,13 (***)
<i>govtbeh</i>							-1,48 (***)	-1,38 (*)	-1,42 (*)
<i>UI</i>							0.05	-0.003	0.03
<i>depratio</i>				-19.62	-21,88 (*)	-18.28	-24,61 (*)	-20.86	-22,8 (*)
<i>defSS/gdp</i>	0,68 (***)		0.51	0.39		0,65 (***)		0,62 (***)	0.29
<i>pubSS/Tpub</i>	0,26 (***)	0,15 (***)	0,23 (***)	0,20 (**)	0,14 (**)	0,24 (***)	0,17 (***)	0,27 (***)	0,21 (**)
<i>contSS/expSS</i>		-0,07 (***)	-0.024	-0.034	-0,07 (***)		-0,07 (***)		-0.04
R-square	0.96	0.95	0.96	0.96	0.96	0.96	0.97	0.97	0.97
Adj.R-square	0.92	0.91	0.92	0.92	0.92	0.93	0.93	0.93	0.93
F-stat.	73,95(****)	69,57(****)	62,4(****)	59,36(****)	67(****)	68,34(****)	65,29(****)	63,8(****)	58,28(****)
F-stat(SS vars)	9,34(*)	9,34(*)	6,08(*)	4,8(*)	6,98(*)	7,3(*)	6,28(*)	6,06(*)	5,21(*)

2SLS									
explanatory var.	run1	run2	run3	run4	run5	run6	run7	run8	run9
c	-3.49	-9.62	-4.91	9.99	8.8	10.89	12.41	14.35	13.24
<i>Def/GDP</i>	0.61	0.57	0.59	-0.02	-0.08	0.04	-0.07	0.03	-0.04
<i>moneygr</i>	0,66 (***)	0,81 (***)	0,69 (***)	0,85 (***)	0,92 (***)	0,78 (***)	0,89 (***)	0,76 (***)	0,84 (***)
<i>Devalr</i>	0.3	0.21	0.28	0.18	0.13	0.22	0.13	0.22	0.17
<i>domCR</i>	-0,1 (***)	-0,1 (***)	-0,1 (***)	-0,12 (***)	-0,12 (***)	-0,12 (***)	-0,13 (***)	-0,13 (***)	-0,13 (***)
<i>govtbeh</i>							-1,47 (*)	-1,38 (*)	-1,43 (*)
<i>UI</i>							0.14	0.04	0.13
<i>depratio</i>				-20.48	-22,49 (*)	-18.77	-25,46 (*)	-21.45	-23,95 (*)
<i>defSS/gdp</i>	0,78 (***)		0.6	0.35		0,63 (**)		0,6 (**)	0.25
<i>pubSS/Tpub</i>	0,28 (***)	0,17 (**)	0,26 (**)	0,19 (*)	0,13 (*)	0,23 (***)	0,16 (**)	0,26 (***)	0,20 (*)
<i>ContSS/expSS</i>		-0,086 (***)	-0.02	-0.035	-0,07 (**)		-0,07 (**)		-0.04
F-stat.	68,18(****)	63,34(****)	57,92(****)	58,53(****)	66,15(****)	63,12(****)	64,42(****)	63,52(****)	57,09(****)
F-stat(SS vars)	9,32(*)	9,46(*)	6,1(*)	4,75(*)	6,76(*)	7,2(*)	6,45(*)	6,54(*)	5,21(*)

Note:
 (***) Significance level for 99% level of confidence
 (**) Significance level for 95% level of confidence
 (*) Significance level for 90% level of confidence

TABLE7:SUR AND PRINCIPAL COMPONENT ESTIMATION RESULTS OF THE MODELS

INFLATION explanatory var.	SUR	PRINCIPAL COMPONENT		
		1	2	3
<i>c</i>	15,08(*)	6,58(*)	7,92(*)	6,28
<i>Def/GDP</i>		-0,007	-0,37	-0,02
<i>moneygr</i>	0,87 (***)	0,51(**)	0,55 (***)	0,53 (***)
<i>Devalr</i>	0,14	0,40(**)	0,42 (**)	0,43 (**)
<i>domCR</i>	-0,13 (***)	-0,09 (***)	-0,07(**)	-0,087 (***)
<i>govtbeh</i>	-1,5 (***)			
<i>princ1</i>		0,44(*)		0,49 (*)
<i>princ2</i>			0,34	0,4
<i>UI</i>	0,14			
<i>inscont</i>	0,03			
<i>empcont</i>	-0,05			
<i>depratio</i>	-26,89 (***)			
<i>detSS/gdp</i>	0,25			
<i>pubSS/Tpub</i>	0,19 (***)			
<i>ContSS/expSS</i>	-0,05			
R-square	0.97	0.93	0.93	0.94
F-stat.		55.1528	46.07	48.2

UNEMPLOYMENT explanatory var.	SUR	PRINCIPAL COMPONENT		
		1	2	3
<i>c</i>	-29,25	-0,1	2,34	-0,24
<i>popgr</i>	1,2	0,23	0,19	0,37
<i>tranInf</i>		0,01	0,02	0,022
<i>realGDPpc</i>	0,8	1,61	1,23	1,59
<i>grGDPpc</i>	-0,17	0,67	0,29	0,7
<i>princ1</i>		0,2		0,22
<i>princ2</i>			0,069	0,098
<i>UI</i>	-0,63			
<i>inscont</i>	0,013			
<i>empcont</i>	0,34 (***)			
<i>ERAm</i>	35,32			
<i>ERAw</i>	0,23			
<i>pubSS/Tpub</i>	0,15			
R-square		0.32	0.29	0.31
F-stat.		1.83	1.41	1.31

PRIV.SAVING explanatory var.	SUR	PRINCIPAL COMPONENT		
		1	2	3
<i>c</i>	45,78 (***)	21,76(***)	20,18 (***)	21,37 (***)
<i>rint</i>	-0,4	-0,77	-0,51	-0,08
<i>domCR</i>	0,11 (***)	0,13(**)	0,08	0,12(**)
<i>grGDPpc</i>	0,05	-0,36	0,5	-0,4
<i>realGDPpc</i>	-0,18	-0,29	-0,11	-0,27
<i>govtbeh</i>	1,47			
<i>UI</i>	-0,26			
<i>princ1</i>		-0,71 (*)		-0,74 (*)
<i>princ2</i>			-0,21	-0,29
<i>inscont</i>	-0,0007			
<i>empcont</i>	0,38 (**)			
<i>ERAm</i>	-28,12			
<i>ERAw</i>	20,69			
<i>depratio</i>	-42,61 (***)			
<i>pubSS/Tpub</i>	-0,26			
<i>ContSS/expSS</i>	-0,13 (**)			
R-square	0.54	0.33	0.23	0.36
F-stat.		2.34	1.26	1.87

GDP GROWTH explanatory var.	SUR	PRINCIPAL COMPONENT		
		1	2	3
<i>c</i>	5,29 (**)	3,64(*)	2,74	3,73
<i>tranInf</i>		0,086(*)	0,081	0,07
<i>Def/GDP</i>		-0,63 (***)	-0,56 (***)	-0,62 (***)
<i>Spriv</i>		0,039	0,073	0,029
<i>realGDPpc</i>	0,52	0,056	0,48	0,35
<i>govtbeh</i>	0,46			
<i>UI</i>	0,81			
<i>princ1</i>		-0,26 (**)		-0,28 (**)
<i>princ2</i>			-0,062	-0,1
<i>inscont</i>	0,14			
<i>empcont</i>	-0,047			
<i>pubSS/Tpub</i>	-0,14 (***)			
<i>ContSS/expSS</i>	-0,006			
R-square	0.53	0.72	0.68	0.67
F-stat.		8.48	3.51	6.84

cont. TABLE 7

DEFICIT explanatory var.	SUR	PRINCIPAL COMPONENT(WITH U)			PRINCIPAL COMPONENT(WITHOUT U)		
		1	2	3	1	2	3
<i>c</i>	25,18 (**)	2.07	0.4	2.23	5,06(**)	3,97(*)	5,23(**)
<i>tranlnf</i>		0,089(*)	0.08	0.084	0.09	0.083	0.08
<i>GDPgr</i>		-0,79 (***)	-0,63 (***)	-0,62 (***)	-0,92 (***)	-0,75 (***)	-0,94 (***)
<i>U</i>		0,20(*)	0,26(**)	0,21(*)			
<i>govtbeh</i>	0.22						
<i>UI</i>	-0.27						
<i>prnc1</i>		-0,25 (**)		-0,27 (**)	-0,29 (**)		-0,3 (**)
<i>prnc2</i>			-0.01	-0.07		0.009	-0.06
<i>inscont</i>	0.09						
<i>empcont</i>	0,12 (**)						
<i>ERAm</i>	9.59						
<i>ERAw</i>	-0,34 (***)						
<i>depratio</i>	-5.34						
<i>pubSS/tpub</i>	-0,13 (***)						
<i>ContSS/expSS</i>	0.02						
R-square	0.71	0.65	0.52	0.64	0.58	0.4	0.56
F-stat.		8.65	4.6	6.06	8.42	3.8	5.55

Note:

- (***) Significance level for 99% level of confidence
- (**) Significance level for 95% level of confidence
- (*) Significance level for 90% level of confidence

APPENDIX 1A

COUNTRIES INCLUDED IN THE STUDY

1	Argentina
2	Austria
3	Belgium
4	Bolivia
5	Canada
6	Chile
7	China
8	Denmark
9	Finland
10	France
11	Germany
12	Greece
13	Hungary
14	Ireland
15	Israel
16	Italy
17	Japan
18	Korea
19	Malaysia
20	Mauritus
21	Netherlands
22	Norway
23	Portugal
24	Spain
25	Switzerland
26	Tunisia
27	Turkey
28	UK
29	USA

COUNTRY	MACROECONOMIC INDICATORS												
	Def/GDP	domCR	rint	realGDPpc	grGDPpc	Sprtv	GDPPr	moneygr	Devalr	popgr	Inf	traninf	U
Argentina	0.72	17.65	-2.96	5.27	4.05	16.62	5.45	19.67	0.80	1.33	30.77	23.53	11.98
Austria	4.75	96.61	-0.17	21.46	1.19	25.63	1.74	8.11	1.12	0.55	2.76	2.69	6.65
Belgium	5.05	77.41	2.53	19.75	1.19	27.83	1.54	4.84	1.19	0.35	2.27	2.22	13.20
Bolivia	2.04	44.70	8.24	0.78	1.47	13.88	3.93	25.75	6.63	2.42	11.03	9.94	4.48
Canada	4.13	61.24	3.69	20.60	1.31	18.24	2.57	9.23	3.25	1.25	2.08	2.04	10.23
Chile	-2.14	52.63	3.90	2.95	6.67	15.30	8.34	20.36	3.22	1.56	11.89	10.63	6.10
China	0.93	92.97	-2.50	0.48	10.42	41.33	11.55	27.60	8.97	1.02	11.85	10.59	2.77
Denmark	1.96	33.69	2.80	27.78	2.50	22.48	2.93	5.01	0.89	0.42	2.02	1.98	10.42
Finland	10.13	65.82	2.49	25.54	1.88	25.38	2.41	3.57	5.26	0.43	1.82	1.79	16.22
France	5.08	89.96	2.16	21.46	0.88	21.79	1.44	3.18	0.89	0.45	2.04	2.00	11.60
Germany	1.92	104.96	2.04	22.08	1.10	23.74	2.07	8.11	1.11	2.56	3.00	2.91	10.58
Greece	12.34	20.69	4.50	8.28	0.23	28.97	0.33	15.83	7.25	0.43	11.90	10.64	9.77
Hungary	5.93	27.55	-1.22	2.86	0.52	21.87	0.20	14.39	16.63	-0.32	24.08	19.41	10.15
Ireland	0.64	64.13	-0.19	15.07	6.46	21.02	7.15	9.43	1.26	0.65	2.25	2.20	14.05
Israel	3.12	68.33	0.70	12.05	2.32	22.48	5.15	19.07	7.24	2.77	12.08	10.78	8.38
Italy	7.66	59.67	1.98	19.75	0.89	26.15	1.12	5.58	5.94	0.22	4.44	4.25	11.55
Japan	0.61	116.89	0.58	25.47	0.42	33.89	0.66	7.74	-1.23	0.23	1.24	1.23	2.93
Korea	0.08	62.57	1.82	7.37	5.75	34.70	6.82	8.83	4.65	1.01	5.77	5.45	2.37
Malaysia	-0.95	84.63	2.76	2.94	5.54	33.65	8.52	20.15	0.56	2.83	3.98	3.83	2.90
Mauritius	1.69	44.70	3.37	2.88	3.29	28.14	5.01	8.16	4.87	1.69	6.99	6.53	7.80
Netherlands	1.88	97.38	1.04	19.89	1.75	26.95	2.34	5.27	1.10	0.58	2.55	2.49	6.42
Norway	1.44	58.17	3.91	30.41	3.45	27.70	4.04	8.78	1.79	0.58	2.25	2.20	5.20
Portugal	4.27	70.74	3.59	7.44	2.25	27.79	2.13	10.76	3.76	-0.12	5.92	5.59	6.33
Spain	4.80	80.28	3.23	13.22	1.57	24.68	1.74	6.83	6.39	0.17	4.48	4.28	21.87
Switzerland	1.38	166.50	0.94	33.21	0.72	30.11	0.36	9.39	0.68	0.70	2.45	2.39	4.30
Tunisia	2.80	52.81	4.19	1.65	2.92	24.05	4.68	9.53	3.32	5.04	5.19	4.93	7.19
Turkey	5.41	18.57	-3.17	2.85	3.26	28.23	5.11	80.94	85.51	1.79	80.37	44.56	7.15
UK	5.47	117.04	1.86	17.39	2.25	19.73	2.36	7.91	1.49	0.11	3.24	3.13	8.53
USA	2.47	64.36	1.98	23.66	2.03	4.16	3.03	4.24	0.00	0.98	2.98	2.90	6.07

COUNTRY	SOCIAL SECURITY ATTRIBUTES										
	ContSS/expSS	Inscont	empcont	depratio	govtbeh	UI	ERAm	ERAw	pubSS/Tpub	deSS/GDP	
Argentina	93.48	11.00	16.00	0.52	1	3	0.81	0.75	45.84	0.32	
Austria	75.70	10.25	12.55	0.50	2	2	0.88	0.75	45.15	4.68	
Belgium	80.00	7.50	8.86	0.54	1	3	0.89	0.76	42.30	5.75	
Bolivia	50.89	2.00	1.85	0.80	3	3	0.93	0.79	15.70	1.68	
Canada	36.79	3.00	3.00	0.62	3	2	0.86	0.79	39.55	6.23	
Chile	23.39	18.84	0.00	0.60	3	3	0.80	0.77	33.85	5.42	
China	60.00	3.00	20.00	0.50	3	2	0.88	0.77	0.07	0.00	
Denmark	9.21	3.00	7.00	0.52	3	2	0.82	0.86	39.30	14.66	
Finland	14.62	15.00	3.00	0.48	3	2	0.89	0.80	44.39	14.46	
France	88.42	6.60	9.80	0.54	3	3	0.88	0.73	44.45	1.61	
Germany	105.88	10.15	10.15	0.46	1	2	0.86	0.75	46.10	1.20	
Greece	2.02	6.67	13.33	0.51	1	2	0.87	0.74	14.24	6.12	
Hungary	103.52	6.00	24.50	0.50	2	2	0.92	0.75	28.56	0.40	
Ireland	46.73	7.50	10.00	0.65	2	2	0.88	0.82	27.48	5.91	
Israel	23.99	3.00	6.00	0.60	1	3	0.87	0.76	23.12	8.09	
Italy	65.02	9.00	19.36	0.46	3	2	0.81	0.75	36.57	3.61	
Japan	66.41	9.00	9.00	0.44	3	2	0.84	0.78	37.55	2.84	
Korea	59.20	2.00	4.00	0.40	3	0	0.87	0.79	9.90	0.52	
Malaysia	15.84	11.00	12.00	0.70	0	2	0.79	0.74	5.44	1.21	
Mauritius	32.54	1.00	15.00	0.50	0	3	0.88	0.80	15.40	2.55	
Netherlands	94.36	15.40	0.00	0.48	2	1	0.87	0.81	37.51	1.50	
Norway	60.01	7.80	14.10	0.54	2	2	0.89	0.83	38.91	6.21	
Portugal	87.37	11.00	23.75	0.58	1	2	0.90	0.82	25.07	1.47	
Spain	86.50	4.70	23.60	0.47	2	2	0.89	0.80	38.61	1.60	
Switzerland	87.12	4.20	4.20	0.47	1	2	0.87	0.76	49.93	0.30	
Tunisia	91.31	3.00	4.00	0.60	1	2	0.87	0.85	14.12	0.99	
Turkey	26.73	9.00	11.00	0.63	0	1	0.83	0.70	2.85	0.30	
UK	46.04	7.00	7.00	0.51	0	2	0.88	0.75	28.73	5.67	
USA	99.42	6.20	6.20	0.52	3	2	0.88	0.81	27.70	1.19	

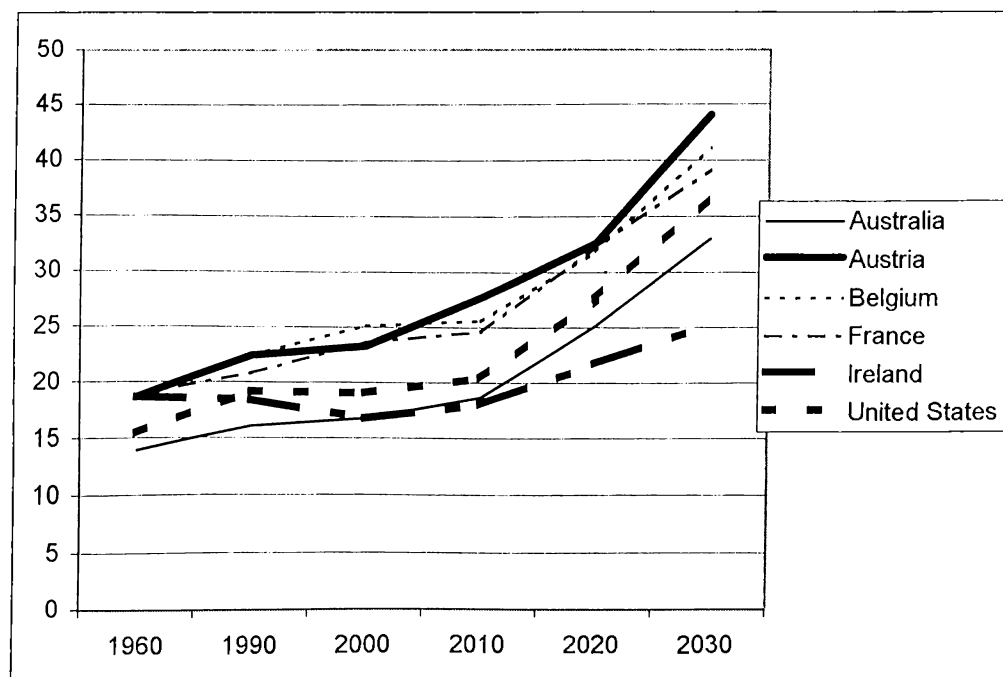
* Data are generated averaging 5-year period through 1992 to 1997

APPENDIX 2A/1: ELDERLY DEPENDENCY RATIO*

	1960	1990	2000	2010	2020	2030
Australia	13.9	16	16.7	18.6	25.1	33
Austria	18.6	22.4	23.3	27.7	32.6	44
Belgium	18.5	22.4	25.1	25.6	31.9	41.1
Canada	13	16.7	18.2	20.4	28.4	39.1
Denmark	16.5	22.7	21.6	24.9	31.7	37.7
Finland	11.7	19.7	21.5	24.3	34.7	41.1
France	18.8	20.8	23.6	24.6	32.3	39.1
Germany	16	21.7	23.8	30.3	35.4	49.2
Greece	12.3	21.2	25.5	28.8	33.3	40.9
Iceland	14.1	16.6	17.3	18.1	24.1	32.1
Ireland	18.6	18.4	16.7	18	21.7	25.3
Italy	13.3	21.6	26.5	31.2	37.5	48.3
Japan	9.5	17.1	24.3	33	43	44.5
Luxemburg	15.9	19.9	21.9	25.9	33.2	44.2
Mexico		6.4	7	8	10.4	14.8
Netherlands	14.7	19.1	20.8	24.2	33.9	45.1
New Zealand		16.7	17.1	18.9	24.6	30.5
Norway	17.3	25.2	23.9	24	31.2	38.7
Portugal	12.7	19.5	20.9	22	25.3	33.5
Spain	12.7	19.8	23.5	25.9	30.7	41
Sweden	17.8	27.6	26.9	29.1	35.6	39.4
Switzerland	15.5	22	23.6	29.4	37.8	48.6
Turkey	6.7	7.1	8.9	9.4	11.7	16.2
United Kingdom	17.9	24	24.4	25.8	31.2	38.7
United States	15.4	19.1	19	20.4	27.6	36.8

*Population aged 65 and over as a per cent of working age population

Source: Bos et al., 1994

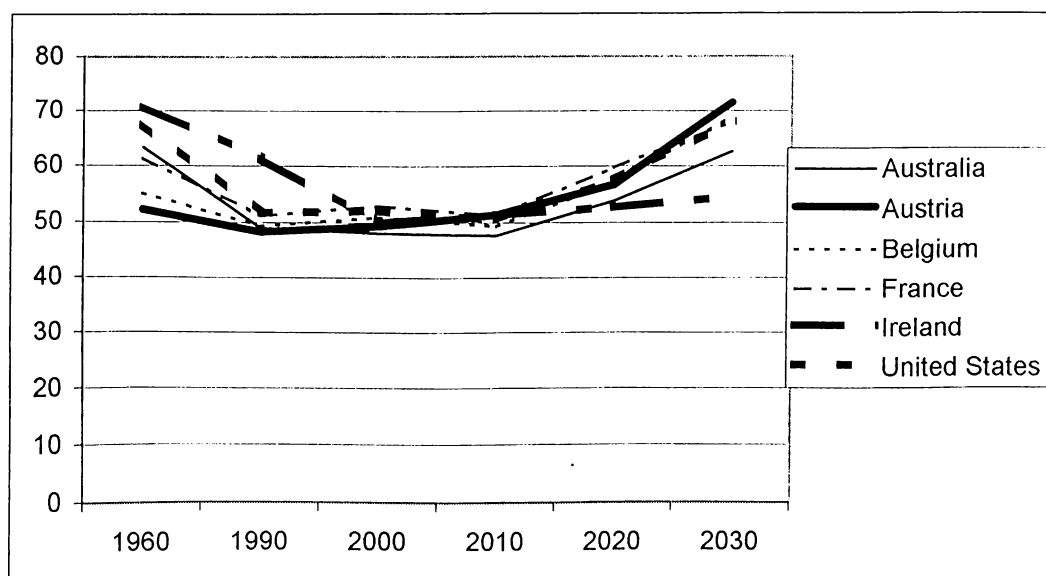


APPENDIX 2A/2: TOTAL DEPENDENCY RATIO*

	1960	1990	2000	2010	2020	2030
Australia	63.2	48.9	48	47.6	53.7	62.6
Austria	52.1	48.2	49.3	51.3	56.7	71.4
Belgium	55	49.2	50.9	49.3	57	68.9
Canada	70.5	47.5	48.3	47.5	56.3	69
Denmark	55.8	47.9	49.1	51.3	57.9	67
Finland	60.6	48.4	49.2	50.4	62.7	70.9
France	61.3	51.1	52.8	51.2	59.6	67.9
Germany	47.4	45.3	46.7	50	57.3	75.1
Greece	52	49.6	48.8	51.7	57.1	66.3
Iceland	75	55.2	52.4	49.5	54.7	63.2
Ireland	70.6	61.4	49.8	51.3	52.6	54.5
Italy	47.9	45.5	47.8	51.5	58.8	72.7
Japan	56.6	43.5	47.2	56.7	67.8	70.5
Luxemburg	47.4	44.8	48.4	50	58.5	72.7
Mexico		71.6	61.5	50.2	45.5	48.1
Netherlands	63.9	44.5	47.7	47.5	58.1	73.2
New Zealand		50.9	51.9	50.2	54.7	61.6
Norway	58.2	54.4	54.1	51.7	58.6	68.3
Portugal	59.1	50.7	46.4	46.6	50	59.8
Spain	55.1	49.3	45.3	46.9	52.7	64.8
Sweden	51.8	55.3	57.9	58.5	65.1	70.4
Switzerland	51.5	46.1	49.6	53.7	62.4	77
Turkey	81.4	66.3	57.9	46.9	46.1	48.6
United Kingdom	53.7	52.9	54	52.3	58.3	68
United States	67.4	51.7	52	50.5	57.4	68

*Population aged 0-14 and 65 and over as a per cent of working age population

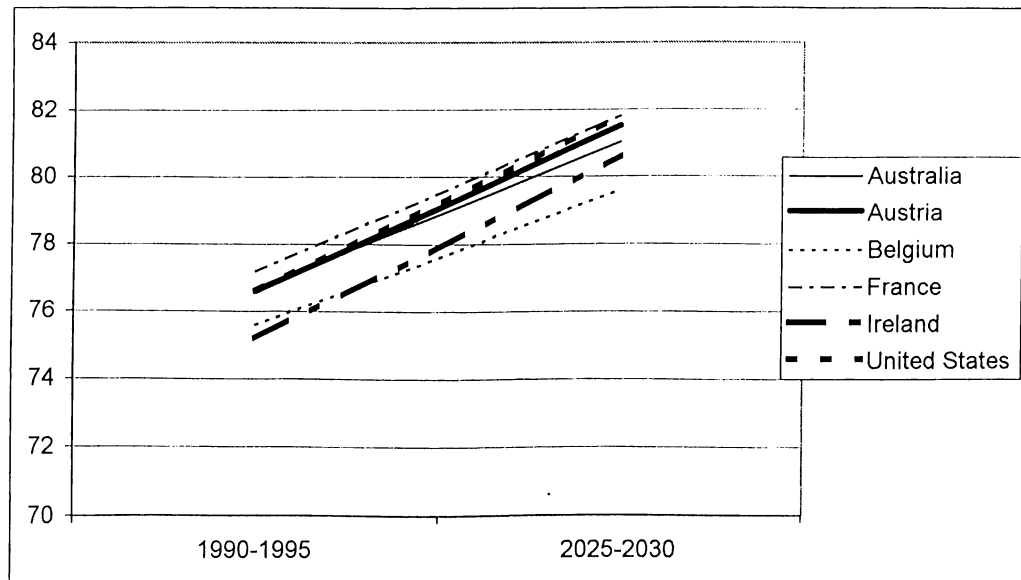
Source: Bos et al., 1994



APPENDIX 2B: LIFE EXPECTANCY AT BIRTH

	1990-1995	2025-2030
Australia	76.7	81
Austria	76.6	81.5
Belgium	75.6	79.6
Canada	77.8	82.2
Denmark	74.7	79.1
Finland	75.4	80.8
France	77.2	81.8
Germany	75.8	80.6
Greece	77.4	81.7
Iceland	78.2	81.9
Ireland	75.2	80.6
Italy	77.4	82
Japan	79.1	82.8
Luxemburg	75.7	80.6
Mexico	70.3	77
Netherlands	77.3	81.5
New Zealand	75.7	80.5
Norway	77.2	81.7
Portugal	73.7	78.3
Spain	76.8	81.2
Sweden	77.9	82.3
Switzerland	78.4	82.6
Turkey	67.3	74.8
United Kingdom	76.2	81
United States	76.6	81.8

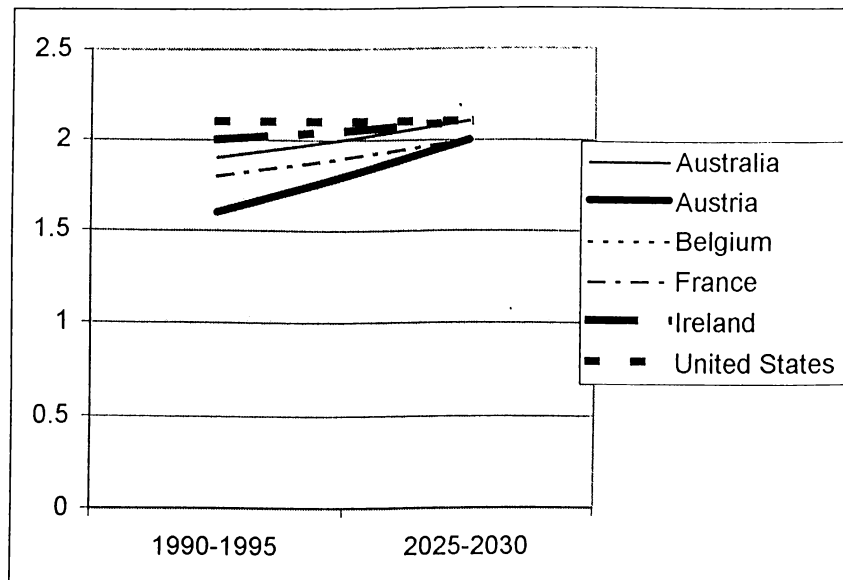
Source: Bos et al., 1994.



APPENDIX 2C:FERTILITY RATE*

	1990-1995	2025-2030
Australia	1.9	2.1
Austria	1.6	2
Belgium	1.6	2
Canada	1.9	2.1
Denmark	1.8	2
Finland	1.9	2.1
France	1.8	2
Germany	1.3	2
Greece	1.4	2.1
Iceland	2.2	2
Ireland	2	2.1
Italy	1.3	2
Japan	1.5	2
Luxemburg	1.7	2
Mexico	3.2	2.1
Netherlands	1.6	2
New Zealand	2.1	2.1
Norway	1.9	2.1
Portugal	1.5	2
Spain	1.2	2
Sweden	2.1	2.1
Switzerland	1.7	2
Turkey	2.9	2.1
United Kingdom	1.8	2
United States	2.1	2.1

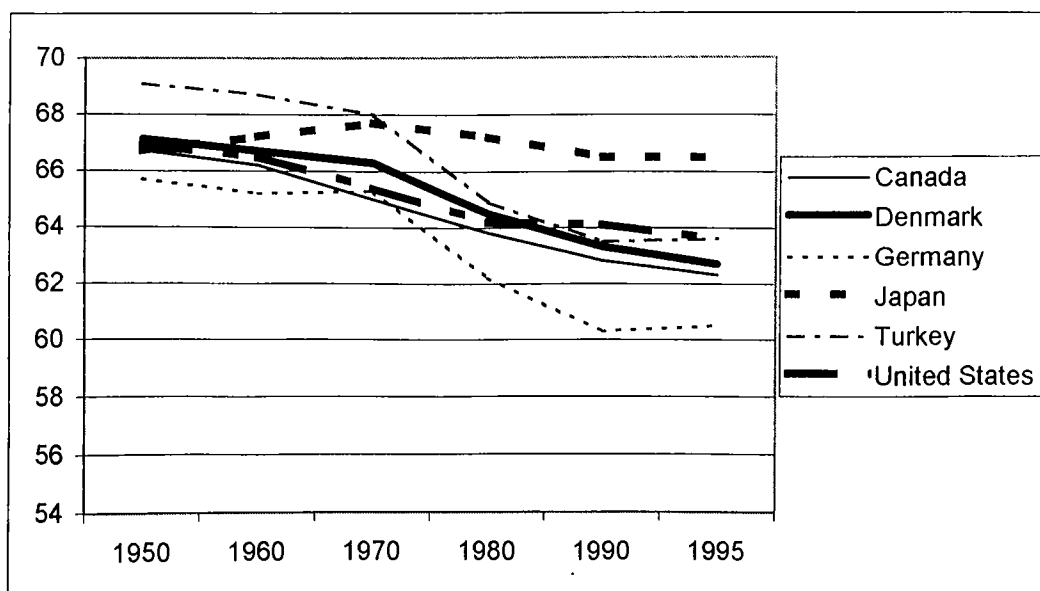
*Number of children per woman of childbearing age
 Source: Bos et al., 1994.



**APPENDIX 2D: ESTIMATES OF THE
AVERAGE AGE OF TRANSITION TO INACTIVITY AMONG OLDER WORKERS***

	Males					
	1950	1960	1970	1980	1990	1995
Australia	66	66.1	65	62.7	62.4	61.8
Austria	66.4	63.9	62.7	60.1	58.7	58.6
Belgium	64.8	63.3	62.6	61.1	58.3	57.6
Canada	66.7	66.2	65	63.8	62.8	62.3
Denmark	67.1	66.7	66.3	64.5	63.3	62.7
Finland	66.8	65.1	62.7	60.1	59.6	59
France	66.1	64.5	63.5	61.3	59.6	59.2
Germany	65.7	65.2	65.3	62.2	60.3	60.5
Greece	68.2	66.5	65.6	64.9	62.3	62.3
Iceland	68.9	68.8	66.7	69.3	68.9	69.5
Ireland	68.3	68.1	67.5	66.2	64	63.4
Italy	66.9	64.5	62.6	61.6	60.9	60.6
Japan	66.7	67.2	67.7	67.2	66.5	66.5
Luxemburg	65.8	63.7	62.5	59	57.6	58.4
Netherlands	66.4	66.1	63.8	61.4	59.3	58.8
New Zealand	64.8	65.1	64.7	62.9	62.2	62
Norway	67.6	67	66.5	66	64.6	63.8
Portugal	67.8	67.5	67.2	64.7	63.9	63.6
Spain	68.1	67.9	65.2	63.4	61.6	61.4
Sweden	66.8	66	65.3	64.6	63.9	63.3
Switzerland	67.7	67.3	66.7	65.5	64.8	64.6
Turkey	69.1	68.7	68	64.9	63.5	63.6
United Kingdom	67.2	66.2	65.4	64.6	63.2	62.7
United States	66.9	66.5	65.4	64.2	64.1	63.6

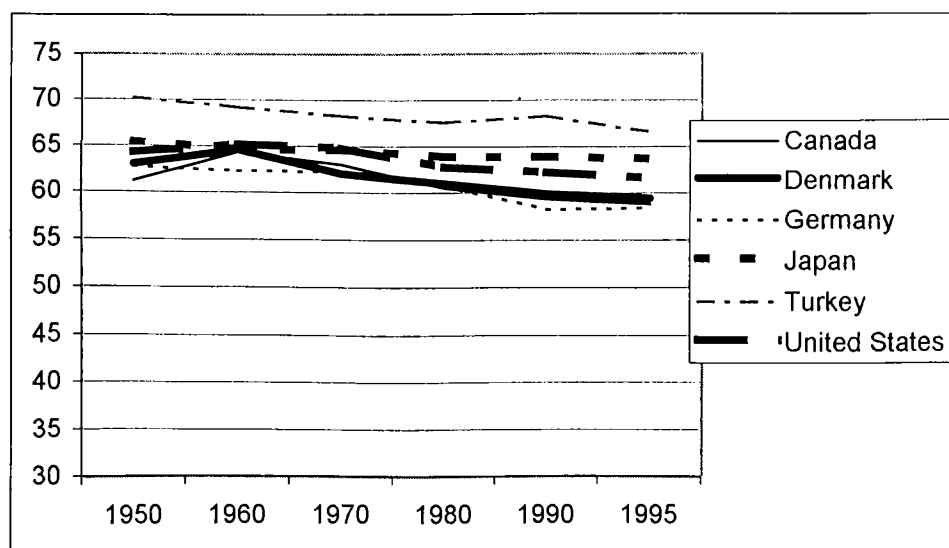
* Source: Leibfritz, Roseveare, Fore, and Wurzel (1995)



**APPENDIX 2E: ESTIMATES OF THE AVERAGE AGE OF TRANSITION TO INACTIVITY
AMONG OLDER WORKERS***

	Females					
	1950	1960	1970	1980	1990	1995
Australia	63.6	62.4	60.3	58.2	57.6	57.2
Austria	64.7	61.9	60.6	59.3	56.7	56.5
Belgium	62.9	60.8	59.1	57.5	54.7	54.1
Canada	61.2	64.3	63	60.5	59.3	58.8
Denmark	63	64.6	62	61	59.9	59.4
Finland	64.7	63.2	60.6	59.6	59.4	58.9
France	69	65.8	64	60.9	59	58.3
Germany	62.7	62.3	62.2	60.7	58.2	58.4
Greece	64.3	64.4	64.3	62.5	60.6	60.3
Iceland			69.6	65.8	66.4	66
Ireland	68.7	70.8	69.8	66	61.8	60.1
Italy	64	62	60.7	59.5	57.5	57.2
Japan	65.5	64.6	64.6	63.9	63.9	63.7
Luxemburg	64.8	63.8	62.3	60.8	56	55.4
Netherlands	64.1	63.7	62.9	58.4	55.8	55.3
New Zealand	61.5	62.5	60.9	58.7	59.2	58.6
Norway	69	70.8	66.2	61.5	63	62
Portugal	68.5	68.1	65.3	62.9	61	60.8
Spain	68.9	68	64.7	63.6	59.7	58.9
Sweden	65.4	63.4	62.5	62	62.4	62.1
Switzerland	67.2	66.9	65.4	62.4	61.1	60.6
Turkey	70.2	69.2	68.3	67.6	68.3	66.6
United Kingdo	63.9	62.7	62.4	62	60.5	59.7
United States	64.2	65.1	64.8	62.8	62.2	61.6

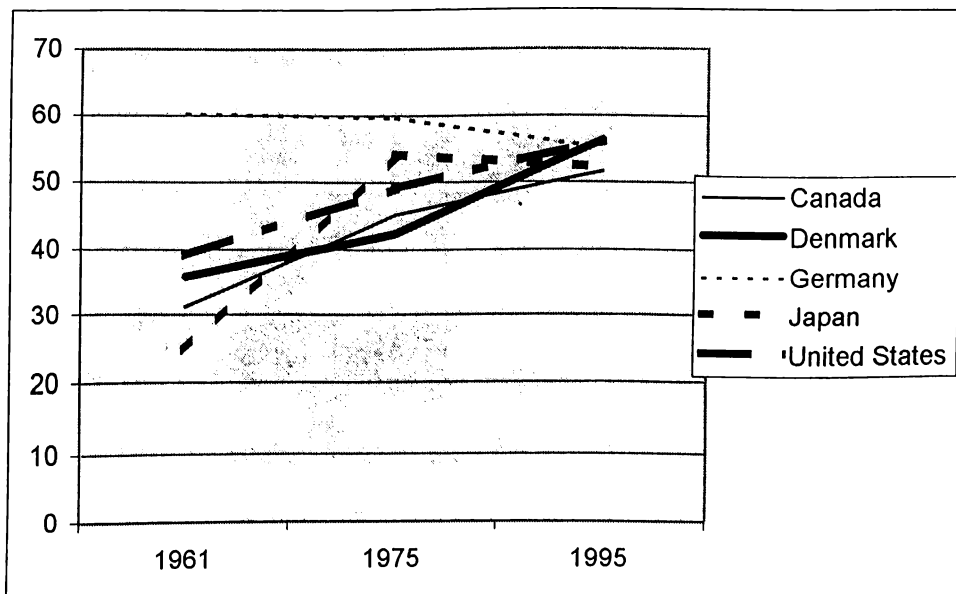
* Source: Leibritz, Roseveare, Fore, and Wurzel (1995)



APPENDIX 2F: EXPECTED OLD-AGE PENSION REPLACEMENT RATES*

	1961	1975	1995
Australia	19.1	32.8	40.9
Austria	79.5	79.5	79.5
Belgium	72.6	70.5	67.5
Canada	31.3	45.1	51.6
Czech Republic			53.2
Denmark	35.9	42.3	56.2
Finland	34.9	58.6	60
France	50	62.5	64.8
Germany	60.2	59.6	55
Greece			120
Hungary			54.6
Iceland			93
Ireland	38.6	28.9	39.7
Italy	60	62	80
Japan	24.6	54.1	52.1
Luxembourg			93.2
Netherlands	32.2	48	45.8
New Zealand	32	43	61.3
Norway	25.3	61.2	60
Poland			53.7
Portugal	85	77	82.6
Spain		50	100
Sweden	53.8	77.1	74.4
Switzerland	28.4	51.7	49.3
United Kingdom	33.4	33.8	49.8
United States	39.1	49.1	56
AVERAGE	44	54.6	59.3

* Source: Leibfritz, Roseveare, Fore, and Wurzel (1995)



APPENDIX 3:INDIVIDUAL EFFECTS OF SOCIAL SECURITY ATTRIBUTES ON BUDGET DEFICIT EQUATION WITH MACROECONOMIC INDICATORS

OLS										
explanatory var.	1	2	3	4	5	6	7	8	9	10
<i>c</i>	3,98 (*)	3.62	-3.51	3.97	3,85 (*)	7.04	10.36	3.75	2.09	7,93 (***)
<i>traninf</i>	0.08	0.08	0.08	0.082	0.07	0.082	0.064	0.081	0,11 (**)	0.04
<i>GDPgr</i>	-0,75 (***)	-0,76 (***)	-0,75 (***)	-0,75 (***)	-0,73 (***)	-0,75 (***)	-0,73 (***)	-0,76 (***)	-0,73 (***)	-0,94 (***)
<i>govtbeh</i>		0.13								
<i>UI</i>			0.15							
<i>inscont</i>				0.001						
<i>empcont</i>					0.048					
<i>ERAm</i>						-3.32				
<i>ERAw</i>							-7.87			
<i>depratio</i>								0.4		
<i>pubSS/Tpub</i>									-0.07	
<i>ContSS/expSS</i>										-0,036 (***)
R-square	0.42	0.42	0.42	0.42	0.43	0.42	0.42	0.42	0.53	0.47
F-stat.	6.09	4.41	4.4	4.38	4.56	4.4	4.49	4.38	6.94	5.5

INDIVIDUAL EFFECTS OF SOCIAL SECURITY ATTRIBUTES ON GDP GROWTH RATE EQUATION WITH MACROECONOMIC INDICATORS

OLS											
explanatory var.	1	2	3	4	5	6	7	8	9	10	11
c	5.62	4,72(**)	5,9(*)	5,36(**)	5.82	12.74	0.51	3.74	4,85(***)	7,77(***)	7,76(***)
<i>traninf</i>	0.001	0.0126	0.00016	-0.001	0.005	-0.0005	0.015	-0.009	0.02	-0.0008	-0.0002
<i>Def/GDP</i>	-0,57(***)	-0,57(***)	-0,56(***)	-0,57(***)	-0,56(***)	-0,57(***)	-0,54(***)	-0,53(***)	-0,62(***)	-0,6(***)	-0,63(***)
<i>Spriv</i>	0.056	0.066	0.053	0.058	0.071	0.043	0.06	0.06	0.07	0.016	0.04
<i>realGDPpc</i>	-0,13(**)	-0,13(**)	-0,13(**)	-0,13(**)	-0,13(**)	-0,13(**)	-0,12(**)	-0,12(**)	-0,15(***)	-0.05	-0,11(**)
<i>govtbeh</i>		0.34									
<i>UI</i>			-0.084								
<i>inscont</i>				0.03							
<i>empcont</i>					-0.056						
<i>ERAm</i>						-7.67					
<i>ERAw</i>							6.17				
<i>depratio</i>								2.74			
<i>defSS/gdp</i>									0,26(**)		
<i>pubSS/Tpub</i>										-0,07(*)	
<i>ContSS/expSS</i>											-0,02(**)
R-square	0.6	0.62	0.6	0.61	0.62	0.61	0.61	0.61	0.7	0.66	0.71
F-stat.	9.35	7.67	7.18	7.27	7.67	7.35	7.3	7.28	11.01	9.23	11.51

INDIVIDUAL EFFECTS OF SOCIAL SECURITY ATTRIBUTES ON PRIVATE SAVING RATE EQUATION WITH MACROECONOMIC INDICATORS

OLS											
explanatory var.	1	2	3	4	5	6	7	8	9	10	11
<i>c</i>	22,08(***)	22,8(***)	31,31(***)	22,94(***)	16,05(**)	90,91(**)	29,35	51,53(***)	22,39(***)	25,61(***)	27,77(***)
<i>rint</i>	-0.54	-0.44	-0.33	-0.57	-0.2	-0.4	-0.46	-0.15	-0.67	-0.6	-0.85
<i>domCR</i>	0.07	0.07	0.07	0.07	0,08(*)	0.06	0.07	0.07	0.092	0,088(*)	0.1
<i>grGDPpc</i>	0.41	0.54	0.23	0.47	0.62	0.38	0.49	0.18	0.26	0.11	-0.04
<i>realGDPpc</i>	-1.31	-1.02	-1.76	-1.1	-0.85	-1.42	-1.15	-3,34(*)	-2.01	0.74	-1.85
<i>govtbeh</i>		-0.9									
<i>UI</i>			-3.81								
<i>inscont</i>				-0.17							
<i>empcont</i>					0.31						
<i>ERAm</i>						-77.02					
<i>ERAw</i>							-10.002				
<i>depratio</i>								-46.63			
<i>defSS/gdp</i>									0.27		
<i>pubSS/Tpub</i>										-0.26	
<i>ontSS/expSS</i>											-0.07
R-square	0.21	0.22	0.32	0.22	0.28	0.31	0.22	0.36	0.22	0.32	0.29
F-stat.	1.6	1.35	2.23	1.3	1.87	2.06	1.23	2.62	1.31	2.17	1.94

**INDIVIDUAL EFFECTS OF SOCIAL SECURITY ATTRIBUTES ON UNEMPLOYMENT EQUATION WITH
MACROECONOMIC INDICATORS**

OLS											
explanatory var.	1	2	3	4	5	6	7	8	9	10	11
<i>c</i>	6.35	6.44	1.25	5.99	3.88	-24.26	-11.24	3.99	7.3	-2.19	4.59
<i>popgr</i>	-0.28	-0.29	-0.36	-0.24	0.16	0.07	-0.33	-0.42	-0.41	0.33	-0.19
<i>traninf</i>	-0.02	-0.02	0.0007	-0.03	-0.02	-0.019	0.02	-0.031	-0.01	-0.017	-0.02
<i>realGDPpc</i>	0.026	0.026	0.06	0.021	0.072	0.059	0.025	0.03	-0.03	-0.18	0.032
<i>grGDPpc</i>	0.03	0.04	0.19	0.023	0.05	0,12(*)	-0.009	0.065	-0.15	0.66	0.15
<i>govtbeh</i>		-0.048									
<i>UI</i>			1.87								
<i>inscont</i>				0.061							
<i>empcont</i>					0.13						
<i>ERAm</i>						33.38					
<i>ERAw</i>							22.25				
<i>depratio</i>								4.32			
<i>defSS/gdp</i>									0.27		
<i>pubSS/Tpub</i>										0,27(***)	
<i>contSS/expSS</i>											0.016
R-square	0.26	0.26	0.33	0.26	0.29	0.3	0.28	0.26	0.29	0.54	0.27
F-stat.	1.62	1.29	1.86	1.31	1.51	1.65	1.46	1.31	1.54	4.42	1.36

INDIVIDUAL EFFECTS OF SOCIAL SECURITY ATTRIBUTES ON INFLATION EQUATION WITH MACROECONOMIC INDICATORS

OLS											
explanatory var.	1	2	3	4	5	6	7	8	9	10	11
<i>c</i>	7.91	10,2(**)	6.14	6.72	6.34	-24.1	68,81(**)	22,18(**)	9,78(**)	0.09	1.1
<i>Def/GDP</i>	-0.33	-0.34	-0.34	-0.36	-0.44	-0.29	-0.66	-0.37	-0.15	-0.16	0.01
<i>moneygr</i>	0,53(**)	0,49(**)	0,49(**)	0,52(**)	0,55(***)	0,54(**)	0.31	0,82(***)	0,49(**)	0,63(***)	0,65(***)
<i>Devalr</i>	0,40(**)	0,41(**)	0,45(*)	0,41(**)	0,38(*)	0,42(**)	0,5(***)	0.17	0,40(**)	0,37(**)	0,31(*)
<i>domCR</i>	-0,08(**)	0,08(**)	-0,07(**)	0,08(**)	-0,07(**)	-0,06(*)	-0,11(***)	-0,09(***)	-0,09(***)	-0,09(***)	-0,09(***)
<i>govtbeh</i>		-0.91									
<i>UI</i>			0.76								
<i>inscont</i>				0.22							
<i>empcont</i>					0.17						
<i>ERAm</i>						35.26					
<i>ERAw</i>							-71,8(**)				
<i>depratio</i>								-27.28			
<i>defSS/gdp</i>									-0.4		
<i>pubSS/Tpub</i>										0,18(**)	
<i>ContSS/expSS</i>											0,08(**)
R-square	0.92	0.92	0.92	0.93	0.93	0.93	0.94	0.93	0.93	0.94	0.94
F-stat.	57.83	48.71	46.63	49.06	50.44	49.06	60.39	52.58	52.17	58.5	66.28

APPENDIX 4: CORRELATION MATRIX

	Def/gdp	domCR	rint	realGDPpc	grGDPpc	Spriv	GDPgr	moneygr	Devalr	popgr	Inf	U	ContSS/expSS	inscont	empcont	depratio	govbeth	UI	ERAm	ERAw	pubSS/Tpub	defSS/GDP
Def/gdp	1.00	-0.21	0.07	0.13	-0.55	0.009	-0.59	-0.02	0.2	-0.34	0.1	0.49	-0.14	0.008	0.23	-0.18	-0.05	-0.03	-0.01	-0.25	-0.09	0.31
domCR		1.00	-0.04	0.51	-0.1	0.27	-0.18	-0.36	-0.37	-0.13	-0.49	-0.2	0.35	0.06	-0.18	-0.29	-0.01	-0.08	-0.27	-0.08	0.34	-0.16
rint			1.00	0.036	-0.27	-0.23	-0.19	-0.37	-0.39	0.2	-0.5	0.003	-0.21	-0.14	-0.3	0.28	0.15	0.23	0.15	0.4	0.011	0.23
realGDPpc				1.00	-0.46	-0.07	-0.55	-0.5	-0.33	-0.42	-0.46	-0.17	0.16	0.1	-0.24	-0.5	0.27	-0.08	-0.06	0.18	0.75	0.42
grGDPpc					1.00	0.26	0.95	0.27	0.054	0.22	0.11	0.29	-0.25	0.03	0.025	0.13	0.06	-0.1	-0.01	0.12	-0.52	-0.11
Spriv						1.00	0.17	0.12	0.11	-0.08	0.008	-0.27	-0.14	-0.09	0.28	-0.31	-0.17	-0.38	-0.4	-0.14	-0.31	0.12
GDPgr							1.00	0.36	0.1	0.43	0.18	-0.34	-0.33	-0.009	-0.08	0.33	-0.01	-0.01	-0.08	0.08	-0.6	-0.13
moneygr								1.00	0.9	0.26	0.92	-0.22	-0.28	0.031	0.06	0.44	-0.31	-0.15	-0.18	-0.45	-0.55	-0.27
Devalr									1.00	0.09	0.92	-0.026	-0.21	0.007	0.12	0.19	-0.28	-0.3	-0.19	-0.41	-0.43	-0.18
popgr										1.00	0.13	-0.26	-0.09	-0.18	-0.36	0.6	-0.29	0.13	-0.23	0.05	-0.4	-0.19
Inf											1.00	-0.04	-0.13	0.06	0.16	-0.29	-0.33	-0.15	-0.06	-0.48	0.39	0.27
U												1.00	0.039	0.078	0.25	-0.46	0.02	0.23	0.21	0.04	0.45	0.35
ContSS/expSS													1.00	0.002	0.24	-0.22	0.05	-0.04	0.18	0.02	0.38	-0.62
inscont														1.00	-0.1	0.029	0.014	-0.007	-0.11	-0.17	0.32	0.11
empcont															1.00	-0.18	-0.19	0.05	0.04	-0.16	-0.1	-0.29
depratio																1.00	-0.22	0.41	0.042	-0.13	-0.33	-0.11
govbeth																	1.00	-0.07	0.25	0.32	0.24	0.22
UI																		1.00	0.33	-0.09	0.26	0.16
ERAm																			1.00	0.37	0.24	0.18
ERAw																				1.00	0.06	0.32
pubSS/Tpub																					1.00	0.3
defSS/GDP																						1.00